

MAY / JUNE 2011  
SUPPLEMENT VOL 22 NO 3



# CVJ AFRICA

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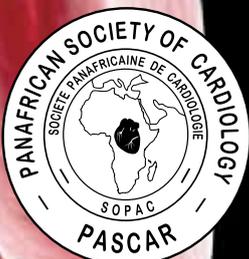
CardioVascular Journal of Africa (official journal for PASCAR)

## The 10th Pan African Society of Cardiology Conference and the Uganda Heart Association

Kampala, Uganda

27–30 May 2011

### PASCAR ABSTRACTS



# ACKNOWLEDGEMENT



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The **Pan African Society of Cardiology** and the **Uganda Heart Association**, 3<sup>rd</sup> All Africa Conference is supported by an unrestricted Educational Grant from PEPSICO



PASCAR is grateful to the Cardiovascular Journal of Africa for sponsoring the abstract book



## PASCAR Abstracts

### PREVALENCE AND DETERMINANTS OF ELECTRO-CARDIOGRAPHIC ABNORMALITIES IN SUB-SAHARAN INDIVIDUALS WITH TYPE 2 DIABETES

Abdoul KAS, Dzudie TA, Choukem SP, Kengne AP, Dehayem M  
Department of Internal Medicine, Douala General Hospital, Cameroon

**Aim:** Recommendations of the African Type 2 Diabetes Practice Guideline for the use of electrocardiogram (ECG) in the monitoring of people with diabetes are non-specific. We assessed the prevalence and determinants of ECG abnormalities in people with diabetes in two referral centres in Cameroon.

**Methods:** A total of 420 patients with type 2 diabetes (49% men) receiving chronic care at the Douala General and Yaounde Central hospitals were included. ECG abnormalities were investigated and related to potential history, and clinical and biological determinants, using logistic regression models.

**Results:** The mean age and median duration of diagnosed diabetes were 56.7 years and four years, respectively. The main (prevalence: %) ECG abnormalities were: T-wave alterations (20.9%), left ventricular hypertrophy (LVH) according to the Cornell product criteria (16.4%), arrhythmia (16.2%), ischaemic heart disease (13.6%), conduction defects (11.9%), QTc prolongation (10.2%) and ectopic beats (4.8%). Blood pressure variables were consistently associated with all abnormalities. Diabetes-specific factors were associated to some, but not all abnormalities.

**Conclusion:** ECG abnormalities in this population were dominated by repolarisation, conduction defects and LVH, and were more related to blood pressure indices than diabetes-specific factors.

### CORONARY FLOW IN NEONATES WITH IMPAIRED INTRA-UTERINE GROWTH

Aburawi EH,<sup>1,3</sup> Malcus P,<sup>2</sup> Thuring A,<sup>2</sup> Fellman V,<sup>1</sup> Pesonen E<sup>1</sup>

<sup>1</sup>Department of Pediatrics, Division of Pediatric Cardiology, Lund University and Skåne University Hospital, Lund, Sweden

<sup>2</sup>Department of Obstetrics and Gynaecology, Lund University and Skåne University Hospital, Lund, Sweden

<sup>3</sup>Department of Pediatrics, Faculty of Medicine and Health Sciences, United Arab Emirates University, Al-Ain, United Arab Emirates  
e-mail: e.aburawi@uaeu.ac.ae

**Background:** Sub-clinical myocardial injury has been reported in newborns with foetal weight below two standard deviations for the gestational age. Our aim was to investigate whether impaired intra-uterine growth affects cardiac function and coronary flow (CF).

**Methods:** Seventeen newborns with impaired intra-uterine growth and 15 age-matched healthy controls were enrolled in the study. Foetal growth was assessed by foetometry. Doppler velocimetry of the umbilical artery and blood flow of the uterine arteries were assessed. Cardiac function and left anterior descending artery (LAD) coronary flow were measured by transthoracic Doppler echocardiography at one week of age.

**Results:** Their mean growth deviation from normal was  $-2.5 \pm 0.2$ . The mean umbilical artery pulsatility index was at the 75th percentile,  $0.97 \pm 0.2$ . The left ventricular mass and left ventricular shortening fraction was similar in patients and controls. The mean LAD diameter was  $0.99 \pm 0.1$  mm in the patients and  $0.8 \pm 0.1$  mm in the controls ( $p = 0.002$ ). The LAD flow velocity time integral (VTI/min) correlated with left ventricular mass ( $r = 0.46$ ,  $p = 0.0001$ ) and with mitral peak E-wave velocity ( $r = 0.74$ ,  $p < 0.01$ ). Impaired intra-uterine growth was associated with increased peak flow velocity in diastole:  $34.5 \pm 4$  mm/s and  $19 \pm 6$  mm/s in the controls ( $p = 0.0001$ ) as well as increased CF:  $37 \pm 7.3$  ml/min; in controls,  $8.2 \pm 3.0$  ml/min ( $p = 0.001$ ).

**Conclusion:** Coronary flow was significantly increased in the neonates with impaired intra-uterine growth. However, their LV mass and systolic and diastolic functions remained normal. The clinical significance of the increase in CF is unclear but it might lead to a decreased coronary flow reserve.

### DOWN SYNDROME AND CONGENITAL HEART DISEASE: WHY THE REGIONAL DIFFERENCE AS OBSERVED IN THE LIBYAN EXPERIENCE?

Aburawi EH,<sup>3</sup> Elmagrpy Z,<sup>1</sup> Rayani A,<sup>1</sup> Shah A,<sup>1</sup> Habas E<sup>2</sup>

<sup>1</sup>The Children's Hospital, Tripoli, Libya

<sup>2</sup>Medical Department, Faculty of Medicine, Alfateh Medical University, Tripoli, Libya

<sup>3</sup>Department of Paediatrics, Faculty of Medicine and Health Science, United Arab Emirates University, Al-Ain, United Arab Emirates  
e-mail: e.aburawi@uaeu.ac.ae

**Background:** Children with Down syndrome (DS) have about a 40 to 50% incidence of congenital heart disease (CHD). The objectives of this study were to evaluate the distribution and frequency of CHD patterns in Libyan children with DS.

**Methods:** All patients with DS who were referred to the cardiology clinic between January 1995 and December 2008 were reviewed.

**Results:** Of the 1 193 patients reviewed, 537 (45%) had an associated CHD. Overall there were 349 (65%) patients who had a single cardiac lesion, and 188 (35%) had multiple cardiac lesions. The most common isolated cardiac lesion was atrial septal defect (ASD), found in 125 (23%) patients, followed by atrio-ventricular septal defect (AVSD) in 103 (19%), and ventricular septal defect (VSD) in 76 (14%).

**Conclusion:** Atrial septal defect is the most common cardiac lesion. The distribution of CHDs in Libyan children with DS is similar to, but the frequency was not compared with what has been reported internationally.

### THE PREVALENCE OF OVERWEIGHT/OBESITY AND HYPERTENSION IN SEMI-URBAN SETTLEMENT: AN IBADAN EXPERIENCE

Adeoye Abiodun M,<sup>1</sup> Balogun Williams O<sup>2</sup>

<sup>1</sup>Division of Cardiovascular Medicine, University College Hospital, Ibadan, Nigeria

<sup>2</sup>Division of Endocrinology, University College Hospital, Ibadan, Nigeria

**Introduction:** The rising trend of sudden cardiac death from cardiovascular diseases in Nigeria could be prevented by effective control of hypertension and diabetes mellitus. Excess weight is associated with increased rate of death from cardiovascular diseases. In Nigeria the data on the status of hypertension and overweight in semi-urban settlements are scanty, hence the need for this study.

**Methods:** A cross-sectional survey was carried out at the Kumapayi village, Ibadan in the western state of the country. All 293 subjects (119 males and 174 females) aged 15 years and older who consented to the study were recruited, after a period of intensive advertising and invitations to all residents in the Kumapayi settlement. Demographic questions were asked and anthropometric measurements and blood pressures were taken in all subjects studied.

**Results:** The results show that 28.9% were overweight (BMI 25–29 kg/m<sup>2</sup>) and 21.6% were obese (BMI > 30 kg/m<sup>2</sup>). Overweight and obesity increased with age, peaking at 40–64 years and then decreasing. The prevalence of hypertension (BP > 140/90 mmHg) was 36.5%. There was a significant association between increased body mass index and both systolic ( $p < 0.004$ ) and diastolic ( $p < 0.002$ ) hypertension.

**Conclusion:** This study confirms the association between overweight/obesity and hypertension. Lifestyles changes targeted at weight reduction will no doubt stem the increasing trend of cardiovascular diseases in our community.

### PROGNOSTIC VALUE OF NT-PROBNP IN HEART FAILURE AMONG OUTPATIENTS ATTENDING A SPECIALISED CLINIC

Adoubi KA,<sup>1</sup> Hahouot-Attoungbre M-L,<sup>2</sup> Kone D,<sup>2</sup> Konin C,<sup>1</sup> Nguetta R,<sup>1</sup> Adoh AM<sup>1</sup>

<sup>1</sup>Intensive Care Unit, Cardiology Institute of Abidjan, Ivory Coast

<sup>2</sup>Medical Testing Laboratory, Cardiology Institute of Abidjan, Ivory Coast

e-mail: anicetadoubi@yahoo.fr

**Introduction:** Amino-terminal pro-brain natriuretic peptide (NT-proBNP) is useful for the diagnosis of heart failure and determining the prognosis. We examined the value of NT-proBNP testing to predict outcomes in chronic heart failure patients attending a clinic specialising in cardiology.

**Methods:** Fifty-one outpatients, all black Africans (mean age: 48.9 ± 13.5, 45.1% female) already hospitalised three to six months earlier for heart failure in the Cardiology Institute of Abidjan (Ivory Coast) were enrolled in this study when coming in for a visit. All had dilated cardiomyopathy. The primary endpoint was all-cause death at three months. We used 4 500 pg/ml as cut-off value for NT-proBNP.

**Results:** Three-quarters (76.5%) of the patients had decompensated heart failure on admission, 12 had an NT-proBNP value above 4 500 pg/ml. Nine patients (17.6%) died within three months. Eight among them had NT-proBNP values above the cut-off point ( $p < 0.0001$ ).

**Conclusion:** An NT-proBNP level above 4 500 pg/ml can serve as an indicator of poor prognosis at three months in our context of outpatients with chronic heart failure. Use of this test for monitoring heart failure patients may improve their management.

### DYSLIPIDAEMIA AMONG NEWLY DIAGNOSED HYPERTENSIVES: PATTERN AND CLINICAL CORRELATES

Akintunde AA, Ayodele EO, Akinwusi OP, Opadijo GO

LAUTECH Teaching Hospital, Osogbo, Osun State, Nigeria

e-mail: iakintunde2@yahoo.com

**Introduction:** Hypertension and dyslipidaemia are closely interrelated. We aimed to determine the prevalence of dyslipidaemia among newly diagnosed Nigerian hypertensive subjects and its associated clinical correlates.

**Methods:** This was a cross-sectional study done at the Ladoko Akintola University of Technology (LAUTECH) Teaching Hospital, Osogbo, south-west Nigeria. We recruited 163 newly diagnosed hypertensive subjects and 88 controls who formed the study groups. Relevant history, examinations, and laboratory investigations were performed. Lipid parameters and atherogenic indices were determined. SPSS 16.0 was used for statistical analysis.

**Results:** Hypertensive subjects and controls were well matched for age and gender distribution. Dyslipidaemia was more common among the hypertensive subjects. Ninety-six (58.9%) newly diagnosed hypertensive subjects had at least one impaired lipid profile. Sixty-seven (41.1%) of them had isolated dyslipidaemia, while 29 (17.8%) had combined dyslipidaemia. Common patterns of dyslipidaemia included low high-density lipoprotein cholesterol (HDL-C) in 78 (47.9%) patients, high atherogenic index (total cholesterol/HDL-C) in 40 (24.5%), and elevated low-density lipoprotein cholesterol (LDL-C) in 38 (23.3%) subjects. Fasting blood glucose increased as the severity of dyslipidaemia increased.

**Conclusion:** A significant proportion of newly diagnosed hypertensive subjects had dyslipidaemia. Low HDL-C was the most common type of dyslipidaemia in this study. The use of statins and other supportive therapy is therefore justified among newly diagnosed Nigerian hypertensive subjects with isolated or combined dyslipidaemia.

### SOME EMERGING ISSUES IN MEDICAL ADMISSION PATTERNS IN THE TROPICS

Akintunde AA, Okunola OO, Akinwusi PO

LAUTECH Teaching Hospital, Osogbo, Osun State, Nigeria

e-mail: iakintunde2@yahoo.com

**Introduction:** Infectious diseases are an important cause of morbidity and mortality in sub-Saharan Africa. However, there is a changing pattern in terms of medical admissions worldwide, with an alarming increase in the prevalence of non-communicable diseases, especially in the tropics, over the last decade. A regular review and audit of medical admissions is necessary for health policy formulation and resource allocation. The aim of this study was to describe the patterns of medical admissions in a Nigerian university teaching hospital and highlight emerging issues.

**Methods:** A retrospective review was carried out on medical admissions at the LAUTECH Teaching Hospital, Osogbo, south-western Nigeria over a three-year period (January 2005 to December 2007).

**Results:** During the study period, 1 786 patients were admitted to the medical wards. They consisted of 1 089 males (61.0%) and 697 females (39.0%), with a male-to-female ratio of 1.5:1. Their ages ranged from 14 to 96 years (mean 51 ± 16.89). Elderly subjects (≥ 60 years) were the largest age group admitted, accounting for 27.3 and 29.8% of male and female admissions, respectively. The indications for admission in order of frequency were cerebrovascular accidents 239 (27.5%) patients, diabetes mellitus 194 (22.2%), and chronic kidney disease and tuberculosis 158 (16.6%).

**Conclusion:** Non-communicable diseases accounted for a significant number of admissions over a three-year period. The elderly accounted for a major age group admitted for medical diseases. Hypertension is still a common factor in the aetiopathogenesis of all causes. There is therefore an urgent need for intensification of existing preventive strategies (primary and secondary) to combat the insurgence of non-communicable disease. Holistic care for the elderly in the population is also advocated.

### BURDEN OF OBESITY IN ESSENTIAL HYPERTENSION: PATTERN AND PREVALENCE

Akintunde A,<sup>1</sup> Akinwusi P,<sup>1</sup> Adebayo R,<sup>2</sup> Ogunyemi S,<sup>2</sup> Opadijo O<sup>1</sup>

<sup>1</sup>Division of Cardiology, LAUTECH Teaching Hospital, Osogbo, Nigeria

<sup>2</sup>Division of Cardiology, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria

**Introduction:** Obesity continues to be an epidemic worldwide, and there is also a relationship between obesity and hypertension, both causally and consequentially. The study aimed at determining the prevalence and pattern of overweight and obesity among our patients being managed for essential hypertension.

**Methods:** The study was cross-sectional. Consecutive patients diagnosed with essential hypertension were recruited from two university teaching hospitals in the south-west of Nigeria. Demographic data such as age, gender, weight and height were obtained from patients on recruitment. Patients with congestive heart failure, secondary hypertension, chronic kidney disease and other chronic diseases were excluded, as were pregnant women. Obesity was defined according to the WHO classification. Statistical analysis was done by the Statistical Package for Social Sciences version 11.0.

**Results:** Consecutive hypertensive patients (1 102) were recruited, but 286 were excluded due to evidence of overt heart failure (98), and chronic kidney disease and other chronic diseases (188). There were 420 males (51.5%) and 396 females (48.5%). Their mean age was 54.97 ± 13.14 years (range 10–91); 7.6% (62) patients were underweight (36 males, 26 females); 260 (31.9%) were overweight (148 males and 112 females); 135 (16.5%) had mild obesity (48 males and 87 females); 43 (5.3%) had moderate obesity (15 males and 28 females), while 30 (3.7%) had severe obesity (22 females).

**Conclusion:** About two-thirds of the hypertensive patients seen in two teaching hospitals in the south-west of Nigeria in this study were

either overweight or obese. Therefore, lifestyle modification geared toward weight reduction should be emphasised in these patients.

### MULTINATIONAL FOOD AND BEVERAGE COMPANIES AND THE INFORMAL SECTOR IN AFRICA: IMPLICATIONS FOR NUTRITIONAL POLICY

Alexander E,<sup>1</sup> Mensah GA,<sup>2</sup> Yach D<sup>1</sup>

<sup>1</sup>Global Health and Agricultural Policy, PepsiCo Inc, Purchase, New York

<sup>2</sup>Global Nutrition, Global Research and Development, PepsiCo Inc, Purchase, New York

e-mail: elle.alexander@pepsico.com

**Introduction:** Ten major food companies have made commitments to improve public health as part of the International Food and Beverage Alliance (IFBA). Pledges include restricted advertising to children, and improved nutritional quality of products. However, the relative contribution and resulting health impacts of IFBA products compared to products from the informal sector in African countries is not fully understood. Better data is needed to describe the role of the food and beverage market, the informal sector in food and beverage sales, and the nutrient intake resulting from each sector, in all African countries.

**Methods:** Data were extracted from Euromonitor, an independent market-analysis company, on sales of packaged food and soft drinks in Algeria, Cameroon, Egypt, Kenya, Morocco, Nigeria, South Africa and Tunisia. Market shares of leading IFBA companies were calculated. Leading categories of packaged food and soft drinks in each country were described. The ratio of the packaged food to fruit and vegetable market was calculated for all African countries studied. The role of the informal sector in the African market was evaluated. Results from Africa were compared with those of eight other countries previously examined.

**Results:** Leading IFBA-packaged food companies accounted for a relatively small share of total packaged food sales in Africa, up to 11.9% of sales. This is consistent with other countries previously examined, as well as the global market. Leading IFBA soft-drink companies accounted for a large share of soft-drink sales in Africa, several accounted for over 50% of sales. This large share is consistent with that of other countries previously examined and the global market. Dairy, baked or dried processed food were the leading packaged food categories examined in African countries, while bottled water or carbonated soft drinks were the leading soft-drink categories. The packaged food market is smaller than the fruit and vegetable market in all African countries except Algeria, South Africa and Kenya, where the ratio reaches 2.4. Little data exist describing the role of the informal sector throughout Africa, and its contribution to nutrient intake.

**Conclusion:** IFBA companies account for a small share of leading packaged food sales and a large share of leading soft-drinks sales in African countries, consistent with previous research. Policies to improve nutrition must include all participants in the food sector, including small- and medium-sized companies and MNCs. The greatest health impact can be achieved through targeting companies that contribute to the largest packaged-food and soft-drink categories. More data are needed to describe the food and beverage market and the informal sector in Africa.

### RHEUMATIC HEART DISEASE IN UGANDAN PRIMARY SCHOOL CHILDREN: APPLYING THE 2006 WHO/NIH CONSENSUS ON ECHOCARDIOGRAPHIC GUIDELINES

Beaton A,<sup>1</sup> Okello E,<sup>2</sup> Batambuze W,<sup>2</sup> Lwabi P,<sup>2</sup> Mondo C,<sup>2</sup> Sable C<sup>1</sup>

<sup>1</sup>Childrens National Medical Center, Washington DC, USA

<sup>2</sup>Ugandan Heart Institute, Mulago Hospital, Kampala, Uganda

e-mail: abeaton@cnmc.org

**Introduction:** Echocardiographic-based screening has been shown to significantly improve early detection of rheumatic heart disease

(RHD), compared to physical examination alone. Questions remain on the best echo screening protocol to maximise case detection while avoiding over-diagnosis because of physiological valvular regurgitation. The most recent guidelines (2006) have yet to be assessed in a large-scale prevalence study. The objective of this study was to assess the current guidelines and identify risk factors for occult RHD in a large cohort of school children in Uganda.

**Methods:** Randomly selected schoolchildren from five to 16 years of age in Kampala, Uganda, were screened in schools for RHD, using clinical examination and portable ultrasound equipment. Positive cases were assigned to one of three categories of disease likelihood: definite, probable, and possible, according to the 2006 WHO/NIH consensus statement on echocardiographic diagnosis of RHD. Staff paediatric cardiologists from Uganda and the United States subsequently interpreted these studies. Rates of detection by clinical examination and echocardiographic imaging were compared. The impact of socio-economic status was examined.

**Results:** Clinical examination detected RHD that was confirmed by echocardiography in 23 of 4 869 children, giving a prevalence rate of 4.9 cases per 1 000 (95% CI: 0.9–9.2). In contrast, echocardiographic screening detected RHD in a significantly higher number of cases, 72 of 4 869 children, giving a prevalence rate of 14.8 cases per 1 000 (95% CI: 7.3–22.3,  $z = 4.97$ ,  $p < 0.001$ ). Most cases (97.8%) involved only the mitral valve. Children who attended a school with a lower socio-economic representation had significantly higher rates of RHD (2.5 vs 1.4%, OR 1.9, 95% CI: 1.0–3.5,  $p = 0.036$ ) and were more likely (70 vs 20% of cases, OR 6.7, 95% CI: 2.7–15.4,  $p < 0.001$ ) to have more advanced disease

**Conclusion:** Systematic screening with echocardiography according to the 2006 NIH/WHO consensus guidelines revealed a much higher prevalence of RHD than with clinical examination alone; approximately three times as much. Children attending schools with lower socio-economic representation were more likely to have RHD, and their RHD was more likely to be more advanced. Because early detection and prophylaxis can prevent devastating future clinical consequences, efforts should be made to promote more widespread use of echocardiographic screening.

### HYPERTENSION AMONG HIV-SEROPOSITIVE PATIENTS IN WESTERN KENYA

Bloomfield GS,<sup>1</sup> Hogan JW,<sup>2</sup> Keter A,<sup>3</sup> Sang E,<sup>3</sup> Carter EJ,<sup>4</sup> Velazquez EJ,<sup>1</sup> Kimaiyo S<sup>3,5</sup>

<sup>1</sup>Division of Cardiology and Duke Clinical Research Institute, Duke University, Durham, NC, USA

<sup>2</sup>Biostatistics Section, Program in Public Health, Brown University, Providence, RI, USA

<sup>3</sup>Department of Medicine, Moi University School of Medicine, Eldoret, Kenya

<sup>4</sup>Divisions of Infectious Diseases and Pulmonary Medicine, Alpert School of Medicine, Brown University, Providence, RI, USA

<sup>5</sup>USAID-AMPATH Program, Moi University School of Medicine and Moi Teaching and Referral Hospital, Eldoret, Kenya  
e-mail: gerald.bloomfield@duke.edu

**Introduction:** There is increased risk of cardiovascular disease among individuals who are human immunodeficiency virus seropositive (HIV+). The mediators of this risk remain obscure. The prevalence of HIV is highest in sub-Saharan Africa; however, research on HIV-related cardiovascular risk is largely derived from developed country settings. Herein, we describe the prevalence of and risk factors for hypertension in a large HIV treatment programme in Kenya.

**Methods:** We performed a retrospective analysis of the electronic medical records of a large HIV treatment programme in western Kenya between 2006 and 2009. We calculated the prevalence of hypertension among adult HIV+ men and women. Overweight/obesity was defined as body mass index  $\geq 25$  kg/m<sup>2</sup>. Hypertension was defined as systolic blood pressure (SBP)  $\geq 140$  mmHg or diastolic blood pressure (DBP)  $\geq 90$  mmHg. Use of protease inhibitors (PIs) was defined as being prescribed any of the locally available PIs,

which included lopinavir, ritonavir or darunavir. We utilised multiple logistic regression analyses to examine the relationship between age, CD<sub>4</sub> count, overweight/obesity, use of protease inhibitors, and hypertension.

**Results:** Our final sample size was 12 194, with 64.8% being women. The median (IQR) systolic and diastolic blood pressures were similar for men (SBP: 110 mmHg, IQR 100–120; DBP: 70 mmHg, IQR 60–80) and women (SBP: 110 mmHg, IQR 100–120; DBP: 70 mmHg, IQR 60–76). Women had a higher median body mass index (22.0 kg/m<sup>2</sup>, IQR 19.7–24.7) than men (20.8 kg/m<sup>2</sup>, IQR 19.0–22.9). The prevalence of hypertension among men and women was 11.2 and 7.4%, respectively. The prevalence of overweight/obesity was 10.6 and 22.6%, respectively. Logistic regression analyses adjusted for age, body mass index and CD<sub>4</sub> count showed that overweight/obesity was a stronger predictor of hypertension among HIV+ men (OR 2.41, 95% CI: 1.88–3.09) than age (OR 1.62, 95% CI: 1.40–1.87) and that CD<sub>4</sub> count did not predict hypertension (OR 1.23, 95% CI: 0.95–1.58). Among women, age was a stronger predictor of hypertension (OR 2.21, 95% CI: 1.95–2.50) than overweight/obesity (OR 1.80, 95% CI: 1.50–2.16). Length of time on PIs was not related to hypertension. Our main limitation is that this was a retrospective analysis of clinically obtained data.

**Conclusion:** In western Kenya, there is a high prevalence of hypertension and overweight/obesity among HIV+ patients, with significant gender-based differences. Overweight/obesity is a strong predictor of hypertension among HIV+ patients. The care of HIV+ patients in sub-Saharan Africa should include identification and management of associated cardiovascular diseases.

#### VALUE OF C-REACTIVE PROTEIN IN PATIENTS WITH ASYMPTOMATIC AND SYMPTOMATIC BRUGADA SYNDROME

Bonny A,<sup>1,2</sup> Hidden-Lucet F,<sup>1</sup> Ditah I,<sup>3</sup> Larrazet F,<sup>1</sup> Frank R,<sup>2</sup> Fontaine G<sup>2</sup>

<sup>1</sup>Hôpital St Camille, Bry sur marne, France

<sup>2</sup>Hôpital Pitié salpêtrière, Paris, France

<sup>3</sup>Wayne State University, Detroit, MI, USA

**Background:** The inflammatory pathway of Brugada syndrome has been little studied, although an increasing body of evidence links lethal ventricular arrhythmias and inflammatory states. We set out to study the relationship between C-reactive protein (CRP) concentrations and the clinical manifestation of Brugada syndrome.

**Methods and Results:** Consecutive patients suspected or confirmed with Brugada syndrome were screened in our centre between October 2001 and April 2008. According to current consensus, all patients underwent physical examination and detailed cardiac tests, which included ECG, 2-D echocardiography, signal-averaged ECG, ajmaline test, right ventricular angiography, and either cardiac MRI or ventricular radionuclide imaging. On admission, prior to any intervention such as electrophysiological study or implantable cardioverter-defibrillator (ICD) placement, all patients had blood samples drawn for CRP levels. Physicians deciding to implant an ICD according to current consensus were blinded to CRP concentrations. Patients with a febrile state or evidence of infection were excluded. We divided our study group into two groups: symptomatic (syncope or aborted sudden death) and asymptomatic.

In multivariable analysis, we adjusted for variables (age > 45 years, CRP > 2 mg/l and history of VT) that attained statistical significance in the univariate analysis. Our study included 54 patients. The mean age was 45 ± 13 years, and 91% were male. Twenty (37%) were symptomatic (17 syncope and three aborted sudden death) and 34 (63%) were asymptomatic. In symptomatic patients, mean age at symptom onset was 42 ± 14 years. Baseline characteristics were similar in both groups. Mean CRP level was 2.4 ± 1.42 mg/l in the symptomatic group and 1.41 ± 0.92 mg/l in the asymptomatic group ( $p = 0.003$ ). In a multivariate model, CRP concentrations ≥ 2 mg/l remained an independent marker for being symptomatic ( $p = 0.018$ ; 95% CI: 1.3–19.3) and a predictor of ICD implantation ( $p = 0.008$ ;

95% CI: 2.2–19.8).

**Conclusion:** C-reactive protein was significantly higher in symptomatic patients with Brugada syndrome and the level ≥ 2 mg/l appears to be associated with arrhythmic events. Further investigations are warranted to establish the accuracy of this new biomarker for risk stratification in Brugada syndrome

#### MACROVASCULAR COMPLICATIONS OF DIABETES MELLITUS AND RISK FACTORS IN CAMEROON: THE DOUALA REGISTRY

Bonny A,<sup>1</sup> Epacka M,<sup>1,2</sup> Mandengue SI,<sup>1,3</sup> Ellong A,<sup>1,2</sup> Nana A,<sup>3</sup> Moumbe S,<sup>2</sup> Ebana C<sup>1,2</sup>

<sup>1</sup>Faculty of Medicine, University of Douala, Cameroon

<sup>2</sup>Hôpital General Douala, Cameroon

<sup>3</sup>Faculty Sciences, University of Douala, Cameroon

e-mail: aimebonny@yahoo.fr

**Objectives:** To characterise the macrovascular complications, evaluate their prevalence in type 2 diabetes (DT2) patients who had at least one diabetic check up between 2000 and 2009, and to find a correlation between these complications and risk factors.

**Methods:** Retrospectively, clinical and laboratory data of DT2 patients were recorded in the setting of ambulatory care of patients who had at least one diabetic check up between 2000 and 2009 at the Douala General Hospital.

**Results:** Medical files of 140 of the diabetic patients were compiled. DT2 accounted for 88.6%, 78 men and 62 women, mean age 55 ± 12 years. Macro-angiopathies were distributed as follows: stroke, 5%; limbs ischaemic disease, 17.1% and coronary disease, 24%. All stroke patients had high blood pressure (HBP). Among the cardiac diseases, we found 45% with left ventricular hypertrophy, 42% with ECG-like myocardial ischaemia, 27% with 2-D ECG echo-like myocardial infarction, and 3% with left bundle branch block. The occurrence of these conditions was associated with hypertension ( $r = 0.5$ ,  $p < 0.0001$ ), duration of diabetes ( $r = 0.3$ ,  $p < 0.0001$ ), dyslipidaemia ( $r = 0.3$ ,  $p < 0.002$ ), microalbuminuria ( $r = 0.3$ ,  $p < 0.006$ ), 24-hour proteinuria ( $r = 0.6$ ,  $p = 0.0001$ ), body mass index ( $r = 0.3$ ,  $p = 0.001$ ) and HbA<sub>1c</sub> ( $r = 0.2$ ,  $p = 0.01$ ). HbA<sub>1c</sub> was negatively but not significantly ( $r = -0.05$ ,  $p = 0.5$ ) associated with the number of diabetic check ups.

**Conclusion:** Macrovascular complications in type 2 diabetes patients are common in Cameroon, and are more pronounced in those patients in whom HbA<sub>1c</sub> control is not regularly performed.

#### ETHNIC DIFFERENCES IN ELECTROCARDIOGRAM AMONG BLACK AND WHITE PEOPLE: THE FRENCH-CAMEROONIAN REGISTRY

Bonny A,<sup>1,2</sup> Bika C,<sup>3</sup> Larrazet F,<sup>2</sup> Amara W,<sup>4</sup> Madengue S<sup>3</sup>

<sup>1</sup>University Hospital, Douala, Cameroon

<sup>2</sup>Hôpital saint Camille, Bry sur marne, France

<sup>3</sup>University of Douala, Faculty of Sciences, Cameroon

<sup>4</sup>Hôpital Montfermeil, France

**Background:** Electrocardiogram (ECG) monitoring is a useful tool in the diagnosis and management of cardiovascular diseases, and the knowledge of ethnic differences can help to optimise the care. However a comparative analysis of ECG patterns of black African and Caucasian populations revealed several particularities. We report here the results of the French–Cameroonian registry.

**Methods:** We performed 12-lead ECGs on young adults between 18 and 35 years from the University of Douala, Cameroon (black African group) and the University of Paris, France (white Caucasian group). All subjects had filled in a questionnaire regarding demographics (age, gender, body mass index, ethnic origin) and clinical data (history of transient loss of consciousness, family history of sudden death, blood pressure, heart rate). Those who had ischaemic heart disease, a permanent pacemaker and a treatment-modifying ECG feature were excluded. At least two cardiologists, blinded to

the origin of the subject, were needed to interpret each ECG. Two-D echocardiograms were performed in cases of ECG abnormalities suggesting structural heart disease. We compared data mean values by chi-square and *t*-test methods. Strengths of associations were analysed by logistic regression methods.

**Results:** We included 243 subjects, 114 male and 162 blacks (ratio of blacks to whites 2:1). The mean age was 24 ± 3 years and BMI was 23 ± 3 kg/m<sup>2</sup>. Eight (3%) subjects experienced syncope and 18 (7%) had a family history of sudden cardiac death (SCD). In a univariate analysis, the QRS was wider in the whites (*p* = 0.001). Early repolarisation was similar in blacks and whites (16% in blacks vs 22% in whites, *p* = 0.08), especially the notched type (16 vs 14%, *p* = 0.18), whereas the slurred type was more frequent in whites (2.5 vs 11%, *p* = 0.01). QTc and negative T waves in the precordial leads were similar. Positive T waves (T+) in V1 were more frequent in blacks (22 vs 4%, *p* = 0.001). In a multivariate analysis, slurred pattern (*p* = 0.009; 95% CI: 1.71–47.99) and T(+) in V1 (*p* = 0.001; 95% CI: 1.03–1.1) remained significant.

**Conclusion:** ECG features in this young adult population of black Africans and Caucasian whites had many similarities, even with regard to repolarisation pattern. However, slurred type of early repolarisation seemed to be more frequent in whites, whereas positive T waves in V1 were more prevalent in blacks.

### CARDIAC REHABILITATION OUTSIDE THE HOSPITAL: A WAY TO CONTROL AND PREVENT CARDIOVASCULAR DISEASES IN AFRICA

Burgarella F, Burgarella S

Heart Friends Around The World, Strada della Boffalora, Bianzano, Italy

website: www.hfatw.org

e-mail: flavio.burgarella@gmail.com, sarah.burgarella@gmail.com

**Introduction:** With the aim of improving the prevention and control of cardiovascular diseases in Africa, in May 2010 a school of cardiology was organised by Heart Friends Around the World (HFATW) in San Pellegrino Terme, Bergamo, Italy. HFATW is a worldwide organisation affiliated to the World Heart Federation and aims to promote the prevention of cardiovascular diseases and rehabilitation of persons with cardiovascular diseases.

**Methods:** The school of cardiology was a full immersion week of courses, including meetings, lectures and outside practice. Eight young African cardiologists and Mrs Bola Ojo, current executive director of the African Heart Network, which includes all the cardiac foundations and associations from Africa, attended the school free of charge. The aim of the courses was to train the African cardiologists in prevention and treatment of cardiovascular diseases and rehabilitation of patients with cardiovascular diseases. These health issues are emerging increasing dramatically in developing countries, due to the lack of diagnostic equipment and medicines.

**Results:** The school proposed a new model for prevention of heart disease and rehabilitation of patients in African countries. This cardiac rehabilitation model is performed ‘outside hospital’, requiring only the presence of the cardiologist who already works within the hospital, together with a device for measuring blood pressure and an ECG for an electrocardiogram at rest, nothing else. After the cardiological evaluation performed using the walking test, during which the physician and the patient walk together for six minutes at medium-fast pace in the yard, along the road or in the fields ‘outside’ the hospital, they return to the medical centre and repeat the electrocardiogram. If this is similar to the one taken before the walking test and if the patient did not have pain, fatigue, or shortness of breath, the patient can begin his/her rehabilitation in safety. The training will consist of walking for about half an hour on most days of the week, along a path specifically created in the streets and fields surrounding the hospital. There may be an overseer, chosen among volunteers and patients who have already overcome the disease. The patient could then talk with him/her about prevention of heart disease, for example about heart damage due to smoking, high blood pressure, the

consumption of unhealthy foods and beverages, diabetes and obesity. In this way, cells for prevention and cardiac rehabilitation will be constituted at a cost close to zero.

**Conclusion:** The proposed model of cardiac rehabilitation can then be extended to all hospitals in African countries, with unimaginable benefits, considering the published data of a meta-analysis, which shows that the simple practice of physical training after a heart attack reduces cardiovascular mortality by 25%.

### MANAGEMENT OF INAPPROPRIATE SINUS TACHYCARDIA WITH IVABRADINE: A RETROSPECTIVE ANALYSIS OF SEVEN CASES

Bushidi M,<sup>1</sup> Obel IWP<sup>2</sup>

<sup>1</sup>Medi-Clinic Heart Hospital, Pretoria, South Africa

<sup>2</sup>Milpark Hospital, Johannesburg, South Africa

e-mail: bushidi@mweb.co.za

**Introduction:** Inappropriate sinus tachycardia (IST) is defined as a resting heart rate above 90 beats/minutes with normal P waves and is generally a diagnosis of exclusion. Many drugs such as beta-blockers and calcium channel blockers have systemic effects and are associated with side effects. Therefore a selective sinus node suppression agent may be a good option in trying to slow the heart rate without affecting the atrio-ventricular node, intra-ventricular conduction, blood pressure and myocardial contractility.

**Methods:** Here we analysed retrospectively seven cases of patients with supra-ventricular tachycardia that we thought was due to inappropriate sinus tachycardia. The use of beta-blocker or non-dihydropyridine calcium channel blocker was contra-indicated or ineffective. We therefore chose to use ivabradine. To diagnose inappropriate sinus tachycardia, the resting electrocardiogram, a 24-hour Holter monitoring, the pacemaker interrogation and an events loop recorder were used. The following parameters were considered during the retrospective analysis: improvement of the presenting symptoms, duration of follow up, dosage of ivabradine, duration of treatment, and reasons for therapy interruption if this latter occurred. Parameters assessed before and after the initiation of ivabradine included the heart rate, blood pressure changes and left ventricular ejection fraction

**Results:** All the patients were followed up for a period of between seven and 230 months (mean 75 months). The ivabradine dose given to patients ranged from 5 to 7.5 mg bd and patients received treatment for a period of two to 34 months. By the end of July 2010, four patients were still taking the medication. However, two patients had to stop because of side effects and one because the medical aid was not willing to reimburse the cost. We also observed that some patients reported uncomfortable symptoms that occurred after the initiation of ivabradine. Dizziness, tiredness, postural weakness, cold hands, burning hands and worsening of asthma occurred each in one case; vision disturbance occurred in two cases. However, three patients reported no new symptoms. The heart rate moved from a mean of 107.5 to 68.6 bpm on ivabradine, with symptomatic improvement. This reduction was gradual and persisted over time during ivabradine therapy. The blood pressure and left ventricular systolic function of all patients remained unchanged.

**Conclusion:** We describe seven cases of inappropriate sinus tachycardia that we managed with ivabradine. The administration of ivabradine not only managed to control the IST but also improve the patients’ symptoms. However this was just a retrospective observation done on seven patients; therefore a well-designed, preferably randomised and prospective study with a larger number of patients is needed to assess the effect of ivabradine on the management of IST.

### INCREASED RELATIVE WALL THICKNESS: A MARKER OF SUB-CLINICAL CARDIAC TARGET-ORGAN DAMAGE IN AFRICAN DIABETIC PATIENTS

Chillo P,<sup>1,3</sup> Lwakatare J,<sup>2</sup> Lutale J,<sup>2</sup> Gerds E<sup>3</sup>

<sup>1</sup>Department of Internal Medicine, Muhimbili National Hospital, Dar

Es Salaam, Tanzania

<sup>2</sup>Muhimbili University of Health and Allied Sciences, Dar Es Salaam, Tanzania

<sup>3</sup>Institute of Medicine, University of Bergen, Bergen, Norway  
e-mail: pilly.chillo@uib.no

**Introduction:** Diabetes and hypertension are associated with increased prevalence of abnormal left ventricular (LV) geometry in African-Americans. However, limited data are available on sub-clinical cardiac target-organ damage in African diabetic patients living in sub-Saharan Africa.

**Aim:** To assess the prevalence and covariates of abnormal LV geometry in type 1 and type 2 diabetic out-patients attending Muhimbili National Hospital in Dar Es Salaam, Tanzania.

**Methods:** Cardiovascular risk assessment and echocardiography were performed in 184 patients, 61 type 1 and 123 type 2 diabetics, mean age 44 years, 61% of them women. LV hypertrophy was taken as LV mass index  $> 116 \text{ g/m}^2$  in men and  $> 104 \text{ g/m}^2$  in women. Relative wall thickness (RWT) was calculated as LV posterior wall thickness/end-diastolic radius ratio and considered increased if  $\geq 0.43$ . LV geometry was defined from LV mass index and RWT in combination.

**Results:** Type 2 diabetics were older ( $55 \pm 10$  vs  $21 \pm 10$  years) and had a higher prevalence of hypertension (83 vs 18%), both  $p < 0.001$ . The prevalence of concentric hypertrophy, eccentric hypertrophy, concentric remodelling and normal geometry of the total population was 17.8, 4.1, 40.2 and 37.9%, respectively. In both groups, concentric remodelling was the most prevalent type of abnormal LV geometry (33% in type 1 and 44% in type 2,  $p = 0.193$ ). In multivariate analysis among type 1 diabetics, higher RWT ( $R^2 = 0.71$ ,  $p < 0.001$ ) was independently associated with higher systolic blood pressure ( $\beta = 0.49$ ,  $p < 0.001$ ), higher isovolumic relaxation time ( $\beta = 0.21$ ,  $p = 0.02$ ) and a finding of low ( $< 89.2\%$ ) stress-corrected mid-wall shortening ( $\beta = 0.47$ ,  $p < 0.001$ ). In type 2 diabetics, independent predictors of higher RWT ( $R^2 = 0.69$ ,  $p < 0.001$ ) were male gender ( $\beta = 0.12$ ,  $p = 0.007$ ), higher systolic blood pressure ( $\beta = 0.23$ ,  $p = 0.001$ ), a finding of estimated glomerular filtration rate  $< 60 \text{ ml/min/1.73}^2$  ( $\beta = 0.18$ ,  $p = 0.006$ ), a finding of low ( $< 89.2\%$ ) stress-corrected mid-wall shortening ( $\beta = 0.21$ ,  $p = 0.002$ ) and higher E/E' ratio ( $\beta = 0.17$ ,  $p = 0.03$ ). No independent associations were found with diabetes duration or control.

**Conclusion:** Abnormal LV geometry is common in both type 1 and type 2 diabetics in this study population. Increased RWT is primarily associated with systolic and diastolic LV dysfunction.

#### DIRECT-CURRENT CARIOVERSION IN ABIDJAN: REPORT OF A TEN-YEAR PRACTICE

Coulibaly I, Konin CK, Adoubi A, Traore F, Bamba-Kamagate D, N'guetta RA, Anzouan-Kacou JB, Ake-Trabouly E  
Cardiology Institute of Abidjan, Ivory Coast  
e-mail: iklo\_coulibaly@hotmail.com

Direct-current cardioversion is known to be an effective treatment for termination of arrhythmias. Although widely practised, little is known about the results and potential complications observed in our practice. This retrospective work aimed to report the results and complications encountered while using this technique in our cardiology setting during a ten-year period.

**Methods:** Charts of 102 patients who had undergone direct-current cardioversion were reviewed.

**Results:** During this period, 1 391 patients were admitted for arrhythmia, among whom 102 underwent direct-current cardioversion; 40 for atrial fibrillation, 28 for atrial flutter, 26 for ventricular tachycardia, five for junctional tachycardia and three for ventricular fibrillation. The mean age was  $48.7 \pm 17.7$  years. One hundred and eighty-one shocks were delivered with a mean energy of 253.1 joules. Ninety-four patients received anti-arrhythmic drugs before cardioversion, predominantly amiodarone in 69 patients (67.6%).

The procedure was scheduled in 74 patients and performed

in the emergency room in 28 patients. It was successful in 82 patients, among whom 28 reverted from atrial fibrillation, four from junctional tachycardia, and 21 from ventricular tachycardia. All the patients cardioverted for atrial flutter and ventricular fibrillation reverted in sinus rhythm. The procedure failed in 16 patients, predominantly the atrial fibrillation subgroup. Serious complications occurred in eight (7.8%) patients. There was one case of sinus node dysfunction, one case of pulmonary oedema, one major bleeding in a pregnant 15-year-old girl which resulted in abortion, and three cases of thrombo-embolism encompassing two cases of cerebrovascular accident and one of pulmonary embolism. Two patients died; one in the aftermath of surgical treatment for mitral valve stenosis and the other admitted with end-stage heart failure.

**Conclusion:** Direct-current cardioversion remains an effective therapeutic method in our practice. The complications encountered were not always due to the procedure but also the medical environment such as drug availability or underlying pathologies.

#### PATTERN AND OUTCOME OF CARDIOVASCULAR DISEASE AMONG CHILDREN PRESENTING AT ZANKLI MEDICAL CENTRE, ABUJA, NIGERIA

Daniels QQ, Ukiri R, Lawson F, Lawson L  
Zankli Medical Centre, Abuja, Nigeria  
e-mail: danielsqueenth@yahoo.com

**Introduction:** Cardiovascular disease (CVD) in children and adolescents is a large and understated public health problem. With the rising prevalence of CVD, the aim of this study was to determine the pattern and outcome of CVD in children and adolescents presenting at Zankli Medical Centre, Abuja, Nigeria.

**Methods:** This was a prospective study over a 13-month period at the cardiology unit of a private hospital, Zankli Medical Centre, Abuja. All patients aged from one day to 18 years referred to or seen at the cardiology section of the hospital and those admitted into the wards with features suggestive of cardiac pathology had a thorough cardiovascular evaluation, including investigations such as electrocardiography, echocardiography, Holter (24-hour ECG and blood pressure monitoring) among others to diagnose and determine the type of CVD. All cases were followed up until a definite outcome was determined.

**Results:** A total of 45 patients had CVD out of the 57 children and adolescents seen at the cardiology section of the hospital, giving a prevalence of 78.9%. There were 25 males and 20 females with a M:F ratio of 1.3:1. The mean age of all the patients with CVD was  $50.5 \pm 6.04$  years, with infants (42.2%) and adolescents (28.9%) being predominantly affected. The CVDs identified were congenital heart disease (49%), acquired heart disease (22.2%), rhythm abnormalities (13.3%), hypertension (4.4%) and isolated valvular and unclassified lesions (11.1%). The commonest complication was congestive heart failure. The case fatality rate was 4.4%. For surgical interventions done mainly abroad, the fatality rate was 22.2%. For referral to tertiary institutions in the country and abroad for further cardiac evaluation it was 22.2%, while 51.2% were either being followed up medically or awaiting surgical interventions at the time of analysis.

**Conclusion:** Cardiovascular disease is an emerging problem, and congenital heart disease is the commonest form seen in children in our cardiology unit, with the majority of them requiring surgical interventions not readily available in Nigeria.

#### SURGERY OF CONGENITAL HEART DISEASES IN SENEGAL: INDICATIONS AND RESULTS

Diop IB, Leye M, Diarra O, Ciss G, Sarr EHM, Manga S, Diallo A, Ndiaye M  
Department of Cardiology, Fann University Hospital, Dakar, Senegal  
e-mail: ibdsb@orange.sn

Early diagnosis, medical management and surgery for congenital heart diseases (CHDs) are frequent unsolved problems in most

African countries. In Senegal, surgical management of CHDs began in 1989. The objectives of the study were to analyse surgical indications for CHD and post-surgical results.

**Methods:** We conducted a retrospective study from 1989 to 2009 and analysed all the reports of patients with CHD operated on in Senegal and outside the country, mainly by humanitarian organisations. Data have been collected by reviewing patients' records, surgical protocols and post-operative follow up.

**Results:** One hundred and forty patients were involved, with a gender ratio of 0.94. The most frequent CHDs operated for were persistent ductus arteriosus 24.29%, tetralogy of Fallot 24.29%, ventricular septal defect 0.08% and endocardial cushion defect 0.08%. The mean age was  $74.96 \pm 96.23$  months (2 months to 50 years). Most frequent symptoms before surgery were dyspnoea (73%), cyanosis and polycythaemia (19%), cyanosis with squatting (14%), and anoxic spells (14%). Palliative surgery was done in 47 cases (33%) and complete repair in 93 patients (67%). Most of the patients were operated on in Dakar, and only five patients (4%) were operated on outside the country. Post-operative mortality was 18%.

**Conclusion:** Surgical management of CHDs is still a limited activity in our country. Several problems need to be solved: late diagnosis, difficulty in managing extracorporeal circulation in small body weights in our set up, and lack of human resources and equipment. Solving these difficulties will enable us to improve our results and have fewer patients on the waiting list.

#### TELEMEDICINE: TELE EDUCATION IN SENEGAL – WHAT ARE OUR NEEDS AND REALISATIONS?

Diop IB, Leye M, Ba AT, Seck T, Tall Fal S, Diop EHM, Diop Diagne NM

African Telemedicine Center, Fann University Hospital, Dakar, Senegal  
e-mail: ibdsb@orange.sn

**Introduction:** Telemedicine can be defined as the provision of healthcare through the use of information and communication technologies in situations where the health professional and the patient are not in the same location. In Senegal, there is a significant lack of medical specialists, which has a negative impact on health delivery. Continuous medical education (CME) and telemedicine could be a realistic solution to solve health problems in rural populations and for education of rural practitioners.

**Methods:** We used a questionnaire to evaluate CME and equipment needs for the practice of telemedicine in Dakar and pilot regional centres far from the capital where most of the specialists are concentrated. All pilot regional centres were visited. A national expert network was organised to deliver tele-expertise and CME, covering 18 medical specialties and enabling communication between centralised experts and health practitioners in regional centres. We used satellite, optic fibre and high-speed ADSL as technical support to transmit voice, data and images.

**Results:** In Senegal we have one doctor per 17 000 inhabitants and one nurse per 8 700 inhabitants. In the regional health centres, the needs and problems were identified by local visits and a questionnaire, which showed a need for mainly specific medical education, and a lack of specialised human resources and equipment. Solutions suggested by the local health practitioners were distance learning, tele-expertise and improving human resources and equipment.

**Conclusion:** This study shows how telemedicine can improve health delivery and medical education in remote areas. Telemedicine is also an opportunity for regional medical centres to benefit from new medical and communication equipment in order to improve health delivery for rural populations.

#### THE NAMIBIAN CHILDREN'S HEART PROJECT: A NEW CARDIAC SERVICE IN AFRICA

Hugo-Hamman C,<sup>1</sup> Du Toit H,<sup>2</sup> Vosloo S,<sup>3</sup> Kaaya M<sup>4</sup>

<sup>1</sup>Ministry of Health, Windhoek Central Hospital, Namibia; Christiaan Barnard Memorial Hospital, Cape Town, South Africa

<sup>2</sup>Ministry of Health, Windhoek Central Hospital, Namibia; Panorama Medi-Clinic, Cape Town, South Africa

<sup>3</sup>Christiaan Barnard Memorial Hospital, Cape Town, South Africa

<sup>4</sup>Ministry of Health, Katatura State Hospital, Windhoek, Namibia  
e-mail: christopher.hugo@gmail.com

**Introduction:** Until recently there were no services for Namibian children or adults with heart disease. The aim of this project, initiated by the Ministry of Health, is to develop a self-sufficient, sustainable cardiac service for children and adults in this country. The cardiac unit was commissioned in Windhoek in October 2010 and this paper describes our two-year experience.

**Methods:** This prospective study was conducted between September 2008 and December 2010 at Windhoek Central, Christiaan Barnard Memorial and Panorama Medi-Clinic hospitals. Patients were recruited from the paediatric and congenital heart disease and rheumatic heart disease clinics. Funding was initially provided by businessman and philanthropist Harold Pupkewitz and thereafter, by the Namibian Government.

**Results:** During the 2.3-year period, 71 indigent patients were referred to Cape Town for surgery or intervention. A further 20 received surgery at Windhoek Central Hospital. The age range was three months to 33 years (mean 8 years) and 14 patients were over 18 years. Cardiac catheterisation demonstrated three patients were inoperable and one did not require intervention or surgery. Two patients were referred back to Windhoek for further investigation of non-cardiac disease. Of 85 patients aged three months to 29 years, eight had interventional procedures and 76 had heart surgery. Fourteen patients had rheumatic heart disease and three adults had congenital heart disease. Tetralogy of Fallot (19), ventricular septal defect (17), patent ductus arteriosus (13) and atrial septal defects (5) were the commonest congenital heart diseases. There were two early deaths (operative mortality 2%) and two late deaths. There were eight re-operations in six patients. Three patients needed surgery for post-operative complications.

**Conclusions:** The absence of curative heart services for children has led to an older demographic with large numbers of adult survivors with congenital heart disease. It also means small numbers of children seen with critical congenital heart disease. This project demonstrates that goodwill, political commitment, regional cooperation and public-private partnerships can together bring great benefit to indigent, previously neglected children. Furthermore, they can lead to the development of self-sufficient services with thus far satisfactory results.

#### PULMONARY HYPERTENSION IN PATIENTS WITH TREATED PULMONARY TUBERCULOSIS: ANALYSIS OF 14 CONSECUTIVE CASES

Ibrahim AS,<sup>1</sup> Ahmed AEH,<sup>2,3</sup> Elshafie SM<sup>2</sup>

<sup>1</sup>Department of Cardiology, Elshaab Teaching Hospital, Khartoum Sudan

<sup>2</sup>Department of Respiratory Medicine, Elshaab Teaching Hospital, Khartoum, Sudan

<sup>3</sup>Department of Medicine, University of Khartoum, Khartoum, Sudan  
e-mail: drasibrahim@hotmail.com

**Background:** Pulmonary tuberculosis (PTB) is an increasing global health problem that continues to cause significant morbidity and mortality. The impact of PTB has been measured in terms of morbidity and mortality and little attention has been paid to continuing respiratory disability in those who have been cured. Pulmonary hypertension (PHT) is a serious respiratory disability that results from structural lung damage and chronic hypoxia. This study was conducted to investigate the presence of PHT in a cohort of treated PTB patients who presented with shortness of breath.

**Methods:** This is a cross-sectional study that included 14 consecutive patients who were cured of PTB and presented with shortness of breath. Demographic and clinical data were recorded for all patients. PHT was diagnosed using Doppler echocardiography.

**Results:** Fourteen patients who were treated for PTB and were found to have PHT were studied. All patients were sputum-smear negative at the time of the study. The mean age (SD) was  $43.1 \pm 13.6$  years and half of the patients were male. The mean number of years since PTB was diagnosed (SD) was  $9.4 \pm 10.9$  years. All patients had abnormal chest X-rays. The commonest radiological abnormality was fibro-cavitation, which occurred in 50% of patients. Estimated pulmonary artery systolic pressure (PASP) of 51 to 80 mmHg was found in nine patients (64.3%), whereas PASP of 40 to 50 mmHg was found in four patients (28.6%), and one patient had PASP above 80 mmHg.

**Conclusions:** Different grades of PHT occurred in this cohort of treated PTB patients, on average about nine years after cure. The findings of this study support implementation of strategies for early detection and prevention of PTB. For those who were cured of PTB, longer periods of disability should be implemented in assessment of disease burden.

### INVESTIGATION OF THE SHORT- AND LONG-TERM EFFECTS OF KHAT (*CATHA EDULIS* FORSK) ON THE RAT HEART

Jamal I, Bukachi F, Patel NB

Department of Medical Physiology, University of Nairobi, Kenya  
e-mail: imranlp\_687@yahoo.com

**Introduction:** Khat chewing is common in Yemen and East African countries. Many people chew khat for its euphoric and energetic effects. Its main active ingredient, cathinone, is said to cause most of the effects – excitement, loss of appetite and euphoria. The aim of the present study was to examine the effects of khat on the rat electrocardiogram (ECG).

**Methods:** Male Sprague Dawley rats (36–37 weeks old) were divided into two equal groups; control and experimental. Khat extraction was performed using the methanol extraction method. The khat extract (with normal saline as the vehicle) was injected intraperitoneally (60 mg/kg) into the experimental animals while normal saline was injected into the control animals. This was done for a period of 12 weeks. The effect of the extract on the ECG was compared with the effect of the vehicle, normal saline, in the control group. Body mass index (BMI) for each of the animals was also calculated using their weight and nose-to-anal length. Data analysis was performed using independent samples (unpaired) *t*-test;  $p < 0.05$  was considered significant.

**Results:** There were no changes in any of the ECG measurements after acute administration of the khat extract. Sinus rhythm and heart rate remained unchanged throughout the entire study period. Ventricular activity was affected earlier than atrial activity. At week three, the QRS duration was prolonged ( $30 \pm 0.8$  vs  $32 \pm 0.8$  ms,  $p < 0.05$ ). Changes in atrial activity were observed from week five of khat administration. The P-wave amplitude was decreased ( $73.5 \pm 4.9$  vs  $56.9 \pm 5.6$   $\mu$ V,  $p < 0.05$ ) and the PR interval was prolonged ( $49 \pm 1.6$  vs  $54 \pm 1.4$  ms,  $p < 0.05$ ). From week three of khat administration, changes in ventricular activity were noted, namely: prolonged QRS duration ( $34 \pm 0.6$  vs  $36 \pm 0.7$  ms,  $p < 0.05$ ); decreased Q-wave amplitude ( $2.6 \pm 1.9$  vs  $12.1 \pm 3.3$   $\mu$ V,  $p < 0.05$ ); accentuated R-wave amplitude ( $305 \pm 19.6$  vs  $408 \pm 42.7$   $\mu$ V,  $p < 0.05$ ); decreased T-wave amplitude ( $114 \pm 8.9$  vs  $77 \pm 13.1$   $\mu$ V,  $p < 0.05$ ); shortened QT<sub>c</sub> interval ( $159 \pm 15.1$  vs  $120 \pm 4.4$  ms,  $p < 0.05$ ) and depressed ST wave ( $-87.4 \pm 9.6$  vs  $-118.7 \pm 11.8$   $\mu$ V,  $p < 0.05$ ). T-wave inversion was also noted in 42.9% of the experimental animals. The long-term administration of khat was also associated with reduction in the BMI in the experimental group, which was observed from week nine to 13 of the study.

**Conclusion:** Acute administration of *Catha edulis* (khat) in rats had no effect on the rat ECG. However, long-term administration was associated with adverse effects on the heart such as depression of cardiac function, myocardial ischaemia and propensity for cardiac arrhythmias. In addition, long-term khat administration was associated with a reduction in BMI.

### PACEMAKER INFECTIONS IN DAKAR: A REPORT OF SIX CASES AT THE CARDIOLOGY DEPARTMENT OF ARISTIDE LE DANTEC TEACHING HOSPITAL

Kane AD, Ndiaye MB, Pessinaba S, Bodian M, Ed Driouch M, Mbaye A, Diao M, Sarr M, Kane A, Ba SA  
Cardiology Department of the Aristide Le Dantec Teaching Hospital, Dakar, Senegal

**Introduction:** Our views of indications for the technique of permanent cardiac pacing have expanded in the last 20 years. As with any foreign material, the risk of pacemaker infection exists. The objectives of this study were to describe the clinical, paraclinical and therapeutic infections secondary to the implantation of a pacemaker in the Cardiology Department of the Aristide Le Dantec Teaching Hospital. **Methods:** We conducted a retrospective study over a period of three years (January 2005 to December 2007). Inclusion criteria were clinical and or biological signs of infection within patients with permanent pacemakers. During this period, 107 patients had a pacemaker implanted, of which six patients developed an infection.

**Results:** The prevalence of pacemaker infection was 5.6%. There were three women and three men and mean age was 66.2 years (range 23–83). The average time of onset of clinical signs was 6.6 months, ranging from eight days to 12 months. Clinical signs were externalisation of the pace with suppuration (five cases), fever (one case) and inflammatory signs (one case). The factors favouring the occurrence of infection were: co-morbidity (four cases), pre-operative length of stay (eight days on average), using a temporary catheter (three cases), the number of people in the ward (average 4.5), postoperative haematoma (one case) and re-operation on the site (three cases). *Staphylococcus epidermidis* (two cases), *Staphylococcus aureus* (two cases) and *Klebsiella pneumoniae* (one case) were the organisms isolated at the local site. Transthoracic echocardiography showed no objective signs of endocarditis. The treatment was with antibiotics for an average of 50.4 days, and debridement with cleaning of the site (six cases). We noted four recurrences at six months and one death from septicemia at 12 months.

**Conclusion:** Infections with pacemaker are rare but serious. Their management may even result in the difficult removal of the implanted device, hence the importance of prevention, especially in our country, where pacemakers are still very expensive.

### OUR EXPERIENCE WITH A TTK-CHITRA PROSTHETIC HEART VALVE

Kapadia N,<sup>1</sup> Ravikumar R,<sup>2</sup> Choudhary S,<sup>1</sup> Cherian V,<sup>1</sup> Rao Suresh<sup>3</sup> Selvimahalingam,<sup>3</sup> Jagdeesh,<sup>3</sup> Awankumar,<sup>2</sup> Madanmohan AS,<sup>2</sup> Balakrishnan KR<sup>1</sup>

<sup>1</sup>Department of Cardiac Surgery, Fortis Malar Hospital, Chennai, India

<sup>2</sup>Department of Cardiology, Fortis Malar Hospital, Chennai, India

<sup>3</sup>Department of Cardiac Anesthesiology, Fortis Malar Hospital, Chennai, India

e-mail: nkk8991@rediffmail.com

**Introduction:** Rheumatic heart disease is still a major problem in Third-World and developing countries, where surgery is not affordable for many. The TTK-Chitra prosthetic valve is a tested, cheaper and reliable alternative to the expensive valves available, thus making valve-replacement surgery more affordable to a larger number of people. TTK-Chitra prosthetic valves have been implanted in more than 35 000 patients in many countries. It consists of a monolithic frame carved out of a single block of chrome cobalt alloy, long proven in cardiac valvular implants, with an occluder made of superbly biocompatible ultra-high molecular weight polyethylene (UHMW-PE). The sewing ring is made from implant-tested 100% polyester fabric, making it very easy to fix to the annulus using either interrupted pledgetted or continuous sutures.

**Methods:** Between December 2008 and January 2011, 156 patients (76 males and 80 females), aged 16 to 76 years (mean 36.5) had 179 TTK-Chitra prosthetic valve (TTK Healthcare, India) implantations done at our centre. Seventy-eight patients underwent mitral valve

replacement (MVR), 40 had aortic valve replacement (AVR), 23 both AVR and MVR (DVR), and 15 had AVR with mitral valve repair. Twelve patients had concomitant procedures, seven had coronary bypass surgery (CABG), one had ventricular septal defect closure, one had repair of a rupture of the sinus of Valsalva (RSOV), two had repair of an aneurysm of the ascending aorta, and one had an aneurysm of the aortic arch. There were three hospital deaths (2%) due to low cardiac output, and two late re-admission deaths (1.3%) after discharge, related to severe cardiac dysfunction (one), aortic embolism (one), but none related to the valves. Only one patient had mild haemolysis related to peri-valvular leak, which improved in three weeks. Atrial fibrillation was present in 12% of the patients. They were put on amiodarone routinely, as it was considered a risk factor for embolism. The international normalised ratio (INR) was maintained at 2–2.5 for MVR, around 2 for AVR, and 3 for DVR.

**Results:** One hundred and fifty-one patients are in regular follow up with INR tests and echocardiography. The mean gradient across the valves ranged from 4 to 6 mmHg in the mitral position and a mean of 16 mmHg in the aortic position. There was no pannus formation in either position, the patients are free of haemolysis, peri-prosthetic leak or valve-related thrombo-embolic events in follow ups of one to 24 months, a total of 189 patient years.

**Conclusion:** The TTK ring does not invite excessive fibrosis, thus avoiding pannus formation on the valve and minimising valve-related thromboembolic, obstructive or haemolytic complications. It has an excellent haemodynamic profile, fulfilling the ideal valve criteria.

#### THE CHANGING PATTERN OF CARDIAC DISEASE IN AFRICA: THE UGANDAN EXPERIENCE

Kayima J,<sup>1</sup> Mungoma M,<sup>1</sup> Mondo C,<sup>1,2</sup> Freers J<sup>1</sup>

<sup>1</sup>Department of Medicine, Cardiology Division, Makerere University College of Health Sciences, Mulago Hospital, Uganda

<sup>2</sup>Uganda Heart Institute, Uganda

e-mail address: jkayima@yahoo.com

**Introduction:** Trends in cardiac disease show a changing pattern in most of the developing world. Uganda is probably not spared this transition. Describing the changes in the profile of disease is important for the development of appropriate primary-care responses to cardiovascular disease and guidelines for their prevention and control. We compared the current cardiac presentations in a national referral hospital with those in the past, to document this transition.

**Methods:** We evaluated all the patients admitted to the cardiology division of Mulago Hospital from January to December 2010. Clinical examination and bedside echocardiography was done on all our patients to ascertain the cardiac diagnosis. These data were entered using epi-info and analysed using SPSS. We reviewed literature of previous studies done in the same hospital over the years and made a comparison with the current practice.

**Results:** Among 1 200 patients who were admitted to the cardiology unit of the Mulago Hospital in 2010, ischaemic heart disease accounted for 10.1% of all admissions. Hypertensive heart disease remains the commonest cause of cardiac admission accounting for 40.1% of all admissions. Other common causes included rheumatic heart disease (20.1%) and cardiomyopathy (15.5%). In a previous series, coronary heart disease was deemed rare in Uganda, as demonstrated in the analysis reported by Cooke just over a century ago and by Shaper and Shaper in 1958. In a 1996 echocardiography series, there was no mention of ischaemic heart disease as a possible diagnosis. The commonest diagnosis among cardiac patients admitted to Mulago Hospital was endomyocardial fibrosis (19.8%), followed by congenital heart disease (15%) and rheumatic heart disease (11%).

**Conclusion:** There is an increasing incidence of ischaemic heart disease in our patient series, which necessitates a change in the approach to primary- and secondary-prevention policies. The incidence of the traditional heart disease in the African context – hypertension and rheumatic heart disease – remains high, confirming that the double burden of infectious and non-infectious heart disease also exists in our context.

#### RHEUMATIC HEART DISEASE: AN ECHOCARDIOGRAPHIC PROFILE AT THE MTRH, ELDORET, KENYA

Koech MM, Barasa FA

Moi Teaching and Referral Hospital, Eldoret, Kenya

e-mail: felybarasa2008@yahoo.com

**Background:** Rheumatic heart disease is a sequel to post-pharyngeal streptococcal infection. The peak age of infection is five to 15 years, with 0.3 to 3% of the affected children developing cardiac manifestations, and its chronicity can run a lifetime. It is a significant cause of heart failure, recurrent thrombo-embolic phenomena and death in the young population in Africa. RHD remains a common public problem in Africa, contrary to Western countries where it has almost been eliminated. Prevention, therapeutic measures and research on this disease are further hampered by lack of resources. We conducted a retrospective descriptive study on the specific valvular distribution and patient characteristics of this condition at MTRH, a tertiary medical centre in western Kenya.

**Methods:** This was a retrospective analysis of computerised echocardiographic data at the hospital, gathered from January 2009 to June 2010. The clinical echocardiograms and data entry were done in real time by qualified echo technicians, under the supervision of a resident cardiologist. The American Echocardiographic Society protocols were followed. Permission to analyse this data was obtained from the local ethics and research board. Data were analysed using SSP version 10.0. Descriptive statistics were mainly used in analysing the data, with comparisons done using chi-square and Wilcoxon rank sum tests.

**Results:** A total of 3 850 patients were scanned, of whom 3 313 (86%) had abnormal echo studies. Rheumatic heart disease was the second commonest (at 18.6%) cause of abnormal studies after hypertensive heart diseases. Children aged 14 years and younger accounted for 33.2% (199) of all RHD patients, and those aged 15 years and older made up the other 66.7%. Among the children, the order of frequency of valvular lesion was as follows: pure mitral regurgitation (49.2%), mitral valvulitis (23.1%), aortic and regurgitation (13.1%), mixed mitral regurgitation/mitral stenosis (8%), and other valvular combinations (6.6%). In the adult category, this was the frequency: predominant mitral stenosis (37.8%), mitral regurgitation (36.8%), mixed aortic/mitral regurgitation (9.7%), mixed mitral/aortic regurgitation/aortic stenosis (8.0%), mitral valvulitis (4.0%), and other combinations (3.5%).

**Conclusion:** RHD remains a significant public problem in the western part of Kenya. The young adult population constituted more than two-thirds of the patients studied. Mitral valve disease is the commonest lesion, with pure regurgitation in paediatric and mixed regurgitant/stenotic lesions in adults.

#### MITRAL VALVE REPAIR IN RHEUMATIC HEART DISEASE: IS OUTCOME DEPENDANT ON THE PRE-OPERATIVE FUNCTIONAL STATUS OF THE MITRAL VALVE?

Koshy J, Geldenhuys A, Human P, Mtwale J, Brink J, Zilla P

University of Cape Town, Cape Town, South Africa

e-mail: jjths20@yahoo.com

**Background:** The natural history and pathogenesis of rheumatic mitral valve disease show differences in the time course, surgical anatomy, and relation to disease activity from pure regurgitant, stenotic and mixed lesions. This suggests different mechanisms for the end-points of a common primary pathological insult and has important implications affecting the outcome of surgical repair procedures performed on these valves.

**Methods:** Between January 2000 and December 2010, 242 adult (> 13 years) patients had a mitral valve repair, of which 28.5% included in this study had only mitral valve repair for rheumatic heart disease. Those patients with concomitant procedures and all other causes of mitral valve disease were excluded from the study. Outcomes of repairs were compared between mixed mitral valve disease and pure mitral regurgitation, which made up the bulk of the rheumatic repairs.

**Results:** A total of 69 mitral valve repair (only) procedures were performed in patients with rheumatic mitral valve disease during this period; 39% of rheumatic repairs were for mixed mitral valve disease, 56% for pure rheumatic mitral regurgitation and 4.3% for pure mitral stenosis. Patients in the repair group with pure mitral regurgitation tended to be of the same age group ( $37.6 \pm 15.2$  vs  $35.9 \pm 14.1$  years,  $p = 0.662$ ) and as symptomatic (NYHA class I/II:III/IV ratio = 1.3 vs 1.4,  $p = 1.000$ ) as those with mixed mitral valve disease. Actuarial freedom from re-operation at five and 10 years was  $89.7 \pm 4.2\%$  and  $89.7 \pm 4.2\%$  in the repair group with pure mitral regurgitation and  $85.2 \pm 5.8\%$  and  $77.7 \pm 6.4\%$  in the mixed mitral valve disease group ( $p = 0.0005$ ). In 14.5% of rheumatic repairs, the valves failed after a median of 34.7 months (0.6–191.6); 60% were in those who had mixed mitral valve disease and 40% in those who had mitral regurgitation alone. Of these patients, 90% showed regurgitation to deteriorate from a median score of 1 (0–2) to a median score of 4 (2–4) and 90% showed progressive stenosis from a median score of 0.5 (0–1) to 3 (2–3) after repair. The mortality of re-operations was 5.1% for repairs on pure mitral regurgitation and 0% for repairs on mixed mitral valve disease.

**Conclusion:** Mitral valve repair in patients with pure rheumatic mitral regurgitation seemed to have a greater freedom from valve failure/re-operation than those with mixed mitral valve disease.

#### TOTAL ARTERIAL REVASCULARISATION IN CORONARY ARTERY BYPASS SURGERY IN ASIANS: 20 YEARS' EXPERIENCE

Kumar P

Cardiac Surgery, Nanavati Hospital, Lilavati Hospital, Mumbai, India  
e-mail: drpavan7@gmail.com

**Introduction:** Coronary artery bypass surgery (CABG) has become the standard treatment worldwide for coronary artery disease. In the Asian population, coronary artery disease has become the top cardiovascular disorder requiring treatment in the majority of hospitals in India. Following world trends, over the last few years, our choice of conduits for CABG has shifted from the use of saphenous venous grafts to arterial conduits, as they have shown better patency rates in long-term follow up. The percentage of use of arterial conduits in multi-vessel CABG has steadily increased to 90% in our set up and we now use total arterial revascularisation (TAR) in diabetics, patients over 60 years of age, and females of short stature with minimal morbidity.

**Methods:** From January 1990 to December 2010, a total 4 166 patients underwent CABG, of whom 1 644 patients received TAR; 1 273 were male and 218 female. The majority of patients (78%) were younger than 60 years, 324 patients of TAR were on oral hypoglycaemics and 166 were insulin-dependent diabetics. Operative protocol involved the use of (1) a single internal mammary artery (IMA) (160 patients), bilateral IMA (1 279 patients); (2) single left radial artery (LRA) (1 239 patients), double LRA (56 patients); (3) gastro-epiploic artery (28 patients). These arterial conduits were used as pedicled IMAs, sequential IMAs, free IMAs, LIMA–RIMA Y conduits, LIMA–radial Y conduits, free radial conduits, and RIMA–radial conduits. These arterial conduits were used in 160 patients (CABG × one), in 490 patients (CABG × two), 775 patients (CABG × three), and 212 patients received TAR in quadruple vessels or more.

**Results:** Follow up of 1 644 patients who had undergone TAR showed declining morbidity over the years. Morbidity from excessive bleeding (re-exploration) was found in 12 patients, lung complications (prolonged ventilation over 48 hours) was found in 36 patients, minor sternal infection in 38 patients, major sternal complications requiring sternal rewiring in 10 patients, and sternal non-union in four patients. Radial artery harvest-related complications were minor, due to prior screening and selection of patients. Gastro-epiploic artery harvesting caused abdominal complications in 14 patients, so its usage has been stopped since 2001. Strict protocols and elimination of complications have resulted in zero per cent in-hospital mortality in TAR in the last 200 patients. Our aim of global revascularisation using only arterial

conduits has been achieved. Results in the various subgroups will be discussed in the presentation.

#### HYBRID DEVICE CLOSURE OF SEPTAL DEFECTS THROUGH A PERTHORACIC INCISION USING ECHO GUIDANCE

Ravi KR, Balakrishnan KR, Kapadia NK, Cherian V, Rao S, Harapriya B

Fortis Malar Hospitals, Chennai, India

e-mail : ravi63\_in@yahoo.com

**Introduction:** Hybrid cardiac procedures aim at overcoming the disadvantages of catheter laboratory-based procedures and conventional cardiac surgery. We propose a new approach for device closure of atrial septal defects (ASDs) and muscular ventricular septal defects (VSDs) using Nitinol ASD/VSD occluders through a perthoracic route.

**Method:** This procedure was used to close 18 ASDs and three VSDs over a seven-month period. Patient ages ranged from five months to 45 years (weight 7–56 kg). The percutaneous approach for closing ASDs and VSDs in cardiac catheter laboratories is extremely difficult in patients weighing less than 15 kg and requires a long procedure time. On the other hand, closure of ASDs and VSDs using a heart–lung machine requires a long recovery period in the ICU, with frequent need for blood transfusion along with a full sternotomy. In the present technique, the maximum ASD or VSD size was measured accurately by both TEE and TTE. Under general anaesthetic, a 4- to 7-cm right lateral submammary incision in the fourth intercostal space (in the case of ASD) or a 6- to 7-cm lower sternal incision (in the case of VSD) was made, and a small incision was made over the right atrium (RA) (in ASD) and right ventricle (RV) (in VSD), with purse-string control of bleeding. Transthoracic pre-operative echo using sterile jelly and TEE was used to image the defects. A 10–14 French Checkflow sheath was then passed through the defects into the left atrium (LA) (for ASD) and left ventricle (LV) (for VSD). Employing transthoracic echo guidance, one disc of the double-disc occluders (sized according to ASD or VSD size) was opened in the LA or LV and then the other disc was opened in the RA or RV. Adequacy of closure of the defects, judged by absence of tricuspid regurgitation, mitral regurgitation or left ventricular outflow tract gradients was ensured before unscrewing the rail to release the occluders.

**Results:** The procedure was successful in 15 out of 18 ASDs and all VSDs. Average operating time was 35 minutes. Sixteen patients were extubated within six hours of surgery and only two patients needed one unit of blood for transfusion. The average incision length in the ASD cases was 5 cm. In the maximum follow up of six months, one patient with VSD and severe pulmonary arterial hypertension had moderate tricuspid regurgitation, and no other complications were noted. All patients were put on aspirin for six months.

**Conclusion:** We believe this non-catheter laboratory-based technique using echo guidance will find widespread acceptance in countries in Africa and centres without cardiac catheter laboratories and using only operating theatres with CPB as back up. The technique also has inherent advantages in terms of patient safety, non-requirement of blood transfusion, absence of sternotomy incision and no radiation.

#### CARDIO-RENAL ANAEMIA SYNDROME IS COMMON IN CCF AND PORTENDS A POORER OUTCOME IN PATIENTS ATTENDING MULAGO HOSPITAL

Kuule JK,<sup>1</sup> Seremba E, Lwabi P, Freers J

Department of Internal Medicine, Gulu University Medical School, Uganda

e-mail: jkkuule2000@yahoo.com

**Background:** Anaemia is common in patients with congestive cardiac failure (CCF). Renal dysfunction has also been found to be common in CCF patients. We determined the co-existence of

anaemia and renal dysfunction in patients with CCF (cardio-renal anaemia syndrome) and assessed its effect on short-term outcomes in CCF patients attending a large referral hospital in Kampala, Uganda.

**Methods:** One hundred and fifty-seven clinically diagnosed CCF patients admitted to Mulago Hospital were classified using the New York Heart Association grading system. Haemoglobin and creatinine levels were determined. Patients were followed up for two weeks and their treatment outcome was recorded. Data were analysed using the SPSS 14 software package.

**Results:** Of the 157 patients, 101 (64.3%) had anaemia (haemoglobin concentration < 11.9 g/dl for women and < 12.9 g/dl for men) at admission. Renal dysfunction (> 1.2 ng/ml) was present in 95 (60.5%) of these CCF patients. Anaemia and renal dysfunction co-existed in 56 (35.7%) CCF patients. In-hospital mortality at the end of the two weeks of treatment was 10.2% and was significantly higher among patients with co-existing anaemia and renal dysfunction (OR 4.9, CI 1.07–22.35,  $p < 0.03$ ).

**Conclusion:** The prevalence of cardio-renal anaemia syndrome among patients with CCF attending Mulago Hospital was high and was associated with poorer short-term treatment outcomes.

#### HIV CARDIOMYOPATHY IS ASSOCIATED WITH A LOW BODY MASS INDEX: EVIDENCE FROM A CASE-COMPARISON STUDY

Lemmer CE, Badri M, Visser M, Mayosi BM  
Cardiac Clinic, Department of Medicine, Groote Schuur Hospital and University of Cape Town, Cape Town, South Africa  
e-mail: carolina.lemmer@uct.ac.za

**Introduction:** The cause of cardiomyopathy in patients infected with human immunodeficiency virus (HIV) remains largely unknown, although a number of predisposing factors have been identified. Malnutrition has been postulated as a contributory factor but the connection of malnutrition with HIV-associated cardiomyopathy has not been established in prospective studies.

**Methods:** We prospectively investigated the association between nutritional state measured by anthropometric measures of lean body mass and HIV-positive individuals with and without cardiomyopathy.

**Results:** Seventeen cases of HIV-associated cardiomyopathy (HIVAC) and a comparison group of 18 HIV-positive patients without heart disease were recruited. There were no significant differences in age, CD<sub>4</sub> cell count, HIV RNA viral load and WHO clinical stage of HIV disease between the two groups. HIVAC cases had evidence of malnutrition compared to those without cardiomyopathy: a significantly lower body mass index (cases: 20.9 kg/m<sup>2</sup>; controls: 27.0 kg/m<sup>2</sup>;  $p = 0.02$ ), mid-upper arm circumference (cases: 26.2 cm; controls: 27.3 cm;  $p = 0.02$ ), and bone-free arm muscle area (cases: 26.7 cm<sup>2</sup>; controls: 32.8 cm<sup>2</sup>;  $p = 0.02$ ). However, in a multi-variate step-wise logistic regression model, body mass index (BMI) was the only independent anthropometric risk factor for cardiomyopathy (odds ratio = 0.73; 95% CI: 0.64–0.97,  $p = 0.02$ ).

**Conclusion:** Cardiomyopathy is associated with a lower BMI in people who are living with HIV.

#### FREE-OF-CHARGE CARDIAC SURGERY IN AFRICA

Lindblom D, on behalf of the staff at the Salam Centre for Cardiac Surgery, Khartoum, Sudan, managed by Emergency NGO, Milan, Italy  
e-mail: dan.lindblom@karolinska.se

**Introduction:** Emergency is an Italian humanitarian organisation established in 1994 with the goal of providing high-quality free-of-charge medical assistance to victims of war and poverty. In 2007, Emergency established a centre in Khartoum, providing free-of-charge cardiac surgery. This is the only high-volume cardiac centre with 24/7/365 availability managed by a humanitarian organisation. The aim of this study was to present our experiences of the first four years in operation.

**Patients:** Between 2007 and October 2010 at the centre, 18 652 patients underwent cardiological examination, of whom 2 733 had cardiac surgery. Mean and median age was 26 years (13 days to 65 years); 50% were females, 12% of admitted patients came from countries outside Sudan, representing 18 different African countries. Risk factors in this region differ considerably from high-economy countries (lower age, less arteriosclerosis) but other factors are much more common (malnutrition, extreme pulmonary hypertension). More than half of our valve patients had severe pulmonary hypertension, according to the Euroscore definition (PAPs > 60 mmHg). According to WHO definitions, 47% were underweight (BMI < 18.5 kg/m<sup>2</sup>) and 20% had 'severe thinness' (BMI < 16 kg/m<sup>2</sup>). The centre participated in the 2010 worldwide update of the Euroscore database.

**Procedures:** Seventy-one per cent were valve procedures, mainly mitral or multi-valvular operations. Mechanical valves were used in most patients but valve repair was possible in 24% of patients undergoing isolated mitral valve procedures. Five per cent underwent CABG. Twenty-three per cent of the operations were for congenital disease, the most prevalent procedures being total correction of tetralogy of Fallot (28% of congenital procedures), ASD closure (17%) and VSD closure (15%).

**Follow-up:** All patients from outside Khartoum were requested to remain in Khartoum for 30 days postoperatively (staying with relatives or at the Emergency guesthouse) and all patients from Khartoum had a follow-up visit one month postoperatively. The 30-day follow-up is complete.

**Results:** The 30-day mortality rate was 3.1%. Re-operation for bleeding occurred in 6.5% and for mediastinitis in 0.1%. In the adult cohort operated on between May and July 2010 and therefore reported to Euroscore, the 30- and 90-day mortality rates were both 1.6%.

**Conclusions:** It is possible to establish and maintain a high-volume, high-quality cardiac surgical centre in low-economy countries.

#### ECHOCARDIOGRAPHIC DIAGNOSES AMONG HIV-INFECTED PATIENTS PRESENTING WITH CARDIAC SYMPTOMS AT MUHIMBILI NATIONAL HOSPITAL IN DAR ES SALAAM, TANZANIA

Lwakatare J,<sup>1</sup> Chillo P,<sup>1,2</sup> Bakari M<sup>1</sup>  
<sup>1</sup>Muhimbili National Hospital and Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania  
<sup>2</sup>Centre for International Health, University of Bergen, Norway  
e-mail: medi@raha.com

**Introduction:** The improved survival and ageing of HIV-infected patients following use of highly active antiretroviral therapy (HAART) has been associated with the presentation of late complications, including heart diseases. In sub-Saharan Africa, the majority of studies on cardiac involvement in HIV patients were done during the pre-HAART era and therefore there are limited data on cardiac involvement in HIV patients in this era of HAART. The aim of the present study was therefore to determine the pattern of echocardiographic diagnoses among HIV-infected patients presenting with cardiac symptoms at Muhimbili National Hospital in Dar es Salaam, Tanzania.

**Methods:** Patients known to be HIV positive and with cardiac symptoms were prospectively recruited from the hospital's care and treatment centre as well as from the medical wards. Clinical assessment, laboratory tests and echocardiography were performed. Two cardiologists independently assessed the echocardiographic findings.

**Results:** A total of 102 patients were recruited from September 2009 to April 2010. The patients' mean age was 42.4 years, 68.6% were women and 69% were on HAART. The commonest diagnosis was pericardial effusion, present in 41.2% of patients. The effusion was large in 5.9% and small in 35.3% of patients. Hypertensive heart disease was a diagnosis in 34.3%, while pulmonary hypertension and dilated cardiomyopathy were present in 12.7 and 9.8%, respectively. Six (5.9%) patients had mitral valve prolapse, two (2%) had aneurysmal aortic dilatation and 18 (17.6%) had normal echocardiographic findings. In multivariate analyses, tachycardia (OR 1.05, 95% CI: 1.013–1.090), higher white blood cell count (OR

1.27, 95% CI: 1.042–1.562) and low CD<sub>4</sub> cell count (OR 0.99, 95% CI: 0.993–0.999), all  $p < 0.05$ , were independently associated with a diagnosis of small pericardial effusion, while older age (OR 1.20, 95% CI: 1.106–1.300,  $p < 0.001$ ) was independently associated with hypertensive heart disease. Low CD<sub>4</sub> count was also independently associated with a diagnosis of dilated cardiomyopathy (OR 0.98, 95% CI: 0.978–0.998).

**Conclusion:** Cardiac abnormalities are common in HIV patients in this era of HAART. Hypertensive heart disease is common and may become an important cause of cardiac involvement in HIV-positive patients. We recommend echocardiographic assessment of all HIV-positive patients presenting with cardiac symptoms.

#### DEMOGRAPHIC, CLINICAL AND ELECTROCARDIOGRAPHIC CHARACTERISTICS OF CAMEROON NATIONAL SOCCER TEAM (INDOMITABLE LIONS A')

Bonny A,<sup>1</sup> Ngoh F,<sup>2</sup> Demanou H,<sup>3</sup> Mandengue S<sup>1,3</sup>

<sup>1</sup>Teaching Hospital, Faculty of Medicine, University of Douala, Cameroon

<sup>2</sup>Centre medico-sportif de l'Estuaire, Douala, Cameroon

<sup>3</sup>Faculty of Sciences, University of Douala, Cameroon

**Background:** The incidence of physical activity-related sudden cardiac death (SCD) is a concern among elite athletes. Pre-participation screening for elite athletes is currently recommended by several medical societies. Prior to the 2010 African Nation's Cup Championships, we performed physical examinations and electrocardiograms (ECG) on the Cameroon national team players from local soccer teams, known as 'Lions A'.

**Methods:** Players were evaluated as part of a mandatory pre-participation cardiovascular screening. Each individual completed a physical activity-related cardiovascular symptom-based questionnaire including past medical history, current medications and family history of cardiovascular diseases or unexplained deaths in relatives. Systolic and diastolic blood pressure (SBP and DBP) was measured according to ESC guidelines. Standard 12-lead ECGs were obtained. Left ventricular hypertrophy (LVH) was assessed by the Sokolow-Lyon criteria. Early repolarisation (ER) which consists of slurring or notching of the descending part of the R-wave was retained if J-point elevation was  $\geq 1$  mV in at least two consecutive inferior or lateral leads. Final ECG-based diagnosis was made if there was agreement of at least two physicians.

**Results:** We screened a total of 25 Indomitable Lions A' players. The mean age of participants was  $22 \pm 3$  years, mean body mass index was  $25 \pm 2$  kg/m<sup>2</sup>, 11 (44%) were overweight; fatty mass was  $19 \pm 2\%$ , water mass  $59 \pm 2\%$ , bone mass  $3 \pm 0.2$  kg, SBP was  $122 \pm 7$  mmHg and DBP  $74 \pm 7$  mmHg, and resting heart rate was  $54 \pm 8$  bpm. Pre-hypertension was found in eight (32%) players. ECG results showed LVH in eight (32%) players, mean PR interval was  $174 \pm 31$  ms. Seven (17%) had first-degree atrio-ventricular block, mean QRS duration was  $80 \pm 9$  ms, and negatives T waves were found in 10 (40%) players. QTc was  $392 \pm 22$  ms. One player had recurrent premature ventricular contraction from the right ventricle with negative T waves in the right precordial leads and was disqualified for further examination with cardiovascular imaging.

**Conclusion:** Cameroon-based home players exhibited cardiovascular anomalies and ECG could be used to discriminate low- from at least intermediate-risk athletes for cardiac events. Sub-Saharan-based athletes may require advanced pre-participation cardiovascular screening.

#### CLINICAL CHARACTERISTICS AND ELECTROCARDIOGRAPHIC FEATURES OF ELITE BLACK AFRICAN ATHLETES: THE CAMEROON SOCCER REGISTRY

Mandengue S,<sup>1</sup> Bonny A,<sup>2,3</sup> Djoumessi H,<sup>1</sup> Ngoh F,<sup>4</sup> Ditah I,<sup>5</sup> Larrazet F<sup>3</sup>

<sup>1</sup>Laboratory of Sport Medicine, Faculty of Sciences, University of Douala, Cameroon <sup>2</sup>University Hospital of Douala, Cameroon

<sup>3</sup>Hôpital Saint Camille, Bry sur merne, France

<sup>4</sup>Clinic de l'estuaire, Douala, Cameroon

<sup>5</sup>Department of Medicine, Wayne State University, Detroit, USA

**Background:** Sudden cardiac death (SCD) related to physical activity is increasing among elite athletes worldwide. Based on reports from medical societies, pre-participation screening for elite athletes is recommended. We performed physical examinations and electrocardiography (ECG) testing on all soccer players in the Cameroon football league.

**Methods and Results:** Athletes were evaluated as part of a mandatory pre-participation cardiovascular screening. They filled in a questionnaire that included cardiovascular symptoms, with particular emphasis on the relationship with physical exertion, past medical history, regular medications and family history of inherited cardiovascular conditions, SCD, epilepsy or unexplained deaths in first-degree relatives. Blood pressure (BP) was measured according to ESC guidelines. Standard 12-lead ECGs were recorded. Left ventricular hypertrophy (LVH) was assessed by the Sokolow-Lyon criteria. Early repolarisation (ER) which consists of slurring or notching features of the descending part of the R wave was retained if J-point elevation was  $\geq 1$  mV in at least two consecutive inferior or lateral leads. The final ECG diagnosis was retained if at least two of the three physicians were in agreement. We included 64 athletes in our analysis, based on the availability of ECG results. All were male, aged between 17 and 33 years (mean,  $23 \pm 3$ ). The mean body mass index (BMI) was  $24 \pm 2$  kg/m<sup>2</sup>. Forty-three (67%) players had pre-hypertension (BP between 130/85 and 139/89 mmHg) and four (6%) had hypertension. Mean SBP was  $132 \pm 8$  mmHg and DBP was  $73 \pm 10$  mmHg. Mean heart rate (HR) was  $56 \pm 11$  bpm ( $34-87$  bpm). On ECG, 24 (39%) athletes had first-degree atrio-ventricular block, mean QRS complex width was  $91 \pm 12$  ms, corrected mean QT interval (QTc) was  $395 \pm 33$  ms ( $324-475$  ms), of which six (9%) were prolonged (QTc  $> 440$  ms). Two (3%) players had QTc  $> 460$  ms but none reached QTc  $> 500$  ms, which is highly suggestive of long QT syndrome. LVH was present in eight (12%) athletes. Twenty-seven (42%) participants had J-point elevation: 34 and 8% involvement of lateral and inferior leads, respectively. Seven (19%) had J-point elevation  $> 2$  mV. A notching pattern was noted in 28% and slurring in 14%. J-point elevation  $> 2$  mV was present in 19%. All athletes were asymptomatic. One reported a family history of SCD and his ECG displayed slurred ER with J-point elevation  $> 2$  mV.

**Conclusion:** Some Cameroon football league players showed a high-risk profile for cardiovascular events. Pre-hypertension was a frequent condition. Asymptomatic isolated long QT interval and early repolarisation on electrocardiogram were also frequent. Self-selection in this group may limit interpretation of results. Genetic testing is warranted.

#### EFFECTS OF CHRONIC MILD STRESS ON THE CARDIOVASCULAR SYSTEM IN MALE RATS

Matheka CW,<sup>1</sup> Kiama TN,<sup>1</sup> Bukachi FO<sup>1,2,3</sup>

<sup>1</sup>School of Medicine, UoN, Kenya

<sup>2</sup>Kenyatta National Hospital, Kenya

<sup>3</sup>Nairobi Heart Centre, Kenya

e-mail: mcw102005@yahoo.co.uk; mcwambua@students.uonbi.ac.ke

**Introduction:** Cardiovascular diseases are a major health concern. They are currently the leading cause of mortality in the world. Their prevalence and incidence is rapidly increasing in the developing world due to the effects of urbanisation. Popular opinion has it that psychosocial factors are a major risk factor for cardiovascular events. This study aimed at investigating the cardiovascular effects of chronic mild stress (CMS) on male rats.

**Methods:** A glucose test, lipid profile, II-lead electrocardiogram and a 1% sucrose-preference test were performed in 30 male Sprague Dawley rats. The experimental animals were subjected to chronic mild stress (CMS) for six weeks, after which measurements were repeated. The sucrose-preference test was however performed weekly for the

whole study duration. Glucose was measured using an On-call® plus blood glucose meter while the lipid profile was performed using the Cadiochek® PA analyser. ECG recordings were done before and after the CMS using the Powerlab equipment. Results were presented as mean  $\pm$  SEM. The student's *t*-test was used to calculate the significance levels, with a *p*-value  $< 0.05$  indicating statistical significance.

**Results:** The findings of this study were that CMS caused a significant increase in the heart rate ( $330.3 \pm 1.41$  vs  $375.3 \pm 9.3$  beats per minute,  $p < 0.05$ ), a decrease in the RR interval ( $193.9 \pm 13.7$  vs  $161.7 \pm 4.3$  ms,  $p < 0.05$ ) without any rhythm disturbances, a decrease in the PR interval ( $45.0 \pm 1.2$  vs  $40.9 \pm 1.2$  ms,  $p < 0.05$ ) and QTc interval prolongation ( $121.9 \pm 7.5$  vs  $145.1 \pm 6.4$  ms,  $p < 0.05$ ). CMS was also found to cause Q-wave amplitude decrease ( $-1.6 \pm 4.8$  vs  $-16.3 \pm 4.7$   $\mu$ v,  $p < 0.05$ ) and decreased heart rate variability in the CMS group ( $11.0 \pm 4.3$  vs  $1.6 \pm 0.15$ ,  $p < 0.05$ ). This study also found that the CMS caused significant increases in triglyceride (TG) levels ( $0.75 \pm 0.03$  vs  $0.90 \pm 0.06$  mmol/l,  $p < 0.05$ ), the TG/HDL ratio ( $1.46 \pm 0.10$  vs  $2.00 \pm 0.10$ ,  $p < 0.05$ ) and the atherogenic index ( $2.38 \pm 0.01$  vs  $2.41 \pm 0.01$ ,  $p < 0.05$ ). CMS caused anhedonia, reflected as reduced sucrose preference, and also caused a non-significant increase in the plasma glucose levels ( $2.69 \pm 0.13$  vs  $2.87 \pm 0.12$  mmol/l,  $p = 0.337$ ). No correlations between biochemical markers and electrocardiographic changes were found in this study.

**Conclusion:** CMS induced anhedonia in male rats and caused ECG changes within six weeks. CMS did not cause any rhythm disturbances in rats but caused increased resting heart rate. It also caused specific atrial and ventricular electrocardiographic changes. CMS also caused altered lipid metabolism that led to elevated TGs, TG/HDL ratios and an elevated atherogenic index. All these changes could have been caused by deregulation of the autonomic nervous system to the heart.

#### EFFICACY OF COMPLEMENTARY AND ALTERNATIVE MEDICINE FOR TYPE 2 DIABETES MELLITUS: A REVIEW

Matheka D, Kiama T, Bukachi F

Department of Medical Physiology, University of Nairobi, Kenya  
e-mail: dunmwag2@gmail.com

Diabetes mellitus, a chronic metabolic disease with a high prevalence, was associated with significant morbidity and mortality of 6.4% globally in 2010 and it is projected to be 7.7% by 2030. Lifestyle management measures such as exercise, a low-fat vegan (vegetarian) diet and weight control are essential and effective in improving glucose homeostasis. However, they may be insufficient, or patient compliance may be difficult, hence rendering conventional therapies, such as oral glucose-lowering agents and insulin injections necessary in many patients. Besides their adverse effects, oral glucose-lowering drugs are not always satisfactory in maintaining normal glucose levels and avoiding the late-stage complications of diabetes. Consequently, patients with diabetes and healthcare professionals are increasingly turning to complementary and alternative medicines (CAM) with anti-hyperglycaemic effects. The prevalence of use of CAM is estimated at 17 to 72.8% among people with diabetes. Commonly used hypoglycaemic medicinal herbs [*Ginseng* species, *Momordica charantia* (karela), *Trigonella foenum graecum*, *Gymnema sylvestris*, *Allium cepa* (onion), *Allium sativum* (garlic), *Pterocarpus masupium*, *Vaccinium myrtillus*, *Atriplex halimus*, *Aloe vera*, and others] and other alternative therapies (chromium, vanadium, magnesium, vitamin E, acupuncture, hot-tub therapy, and others) are reviewed. Comparisons of the side effects and mechanisms of action between conventional glucose-lowering drugs and CAM therapies are highlighted. Standardisation and comparison of the efficacy of CAM therapies with conventional drugs is needed.

#### MYOCARDIAL INFARCTION IN PREGNANCY

Matshela MR

Inkosi Albert Luthuli Central Hospital, Durban, South Africa  
e-mail: rossymat@telkomsa.net

Myocardial infarction is rare in pregnancy. The prevalence of myocardial infarction during pregnancy is estimated at one per 10 000 pregnancies. Since many cases are missed, however, the actual incidence ratios may be higher. When it does occur, it is associated with potentially devastating consequences to both the mother and baby, being accompanied by an increase in maternal and neonatal mortality. Pregnancy, because of its hypercoagulable state, is associated with increased risk of acute myocardial infarction. This has recently been published in a state-of-the-art article. Older age at conception and enabling more women to conceive seem to be contributing to this prevalence. While most cases of myocardial infarction in non-pregnant patients are due to coronary atherosclerosis, other cause may be responsible for this during pregnancy.

Coronary artery disease is a major health problem overall. The prevalence of coronary artery disease in female patients is increasing due to changing lifestyle patterns, including cigarette smoking, diabetes and stress. Furthermore, women are delaying childbearing age until older age, allowing time for risk factors to cluster. Although rare in pregnant women, during pregnancy, acute coronary syndrome is estimated to occur three to four times more often compared with the non-pregnant women in this age group. This is also related to hypercoagulable states of pregnancy and pregnancy-related volume overload states. Another important time of risk is during labour and the few weeks post delivery. There have been reported cases of spontaneous coronary dissection as one of the common cause in these patients.

Myocardial ischaemia during pregnancy can mimic typical symptoms related to pregnancy itself. The changes in the cardiac, haemodynamic, haemostatic and hormonal situation during pregnancy and in the puerperium form a broad spectrum of causes of acute coronary syndrome. This contributes to the increased mortality rate among pregnant women with acute coronary syndrome. In our centre we have had at least three reported cases of acute coronary syndrome in pregnancy and these will be described in the presentation.

#### CARCINOID HEART DISEASE

Matshela MR

Inkosi Albert Luthuli Central Hospital, Durban, South Africa  
e-mail: rossymat@telkomsa.net

**Clinical presentations:** A high index of suspicion is needed to diagnose carcinoid heart disease. The time from onset of carcinoid symptoms to the diagnosis of carcinoid heart disease is usually approximately 24 to 48 months but may be as long as five years. Patients with florid carcinoid symptoms have a 50% chance of cardiac involvement. Physical examination will reveal features of regurgitant lesions and most commonly systolic murmur of the tricuspid regurgitation along the sternal border. There may be a concomitant murmur of pulmonary stenosis or regurgitation or both. Careful interpretation of the jugular venous pressure is of importance in the assessment of these patients. A large V wave may be the first finding on physical examination, suggestive of significant tricuspid regurgitation. Advanced signs of carcinoid heart disease are associated with a poorer outcome.

Chest X-ray and electrocardiogram have limited value in the diagnosis of carcinoid heart disease. The chest X-ray is normal in 50% of patients and the remainder have non-specific changes. It may reveal cardiac enlargement and pleural effusions or nodules. In 30 to 50% of cases the electrocardiogram is normal and the most common abnormal findings are non-specific ST-T wave changes and sinus tachycardia. P pulmonale or right bundle branch block may also be seen on occasions. Severely symptomatic patients usually have low QRS voltage; this usually occurs in patients with advanced stages of the disease.

**Echocardiography:** 2-D echocardiography: tricuspid valve leaflets are typically thickened and shortened. The leaflets become increasingly retracted with reduced mobility. The septal and anterior leaflets are predominantly affected. In advanced stages of tricuspid valve disease, the leaflets become fixed in a semi-open position, resulting

in severe tricuspid regurgitation and degrees of concomitant stenosis due to the fixed orifice.

**Pulmonary valve:** the cusps appear thickened with retraction and reduced mobility. If severely retracted, cusps may be difficult to visualise. Pulmonary annulus constriction may occur as a result of plaque deposition. Doppler echocardiographic assessment of the pulmonary valve is particularly helpful because of challenging demonstration of anatomical changes. The right atrium and ventricle become increasingly dilated.

**CW Doppler tracing:** severe tricuspid regurgitation characterised by a dagger-shaped profile with an early peak velocity and a rapid decline, indicating rapid pressure equalisation between the right-sided cardiac chambers.

### PREVALENCE AND SIGNIFICANCE OF SICKLE CELL TRAIT GENOTYPE IN NIGERIAN PATIENTS WITH ESSENTIAL HYPERTENSION

Mijinyawa M,<sup>1</sup> Ahmed S,<sup>2</sup> Sanusi M,<sup>1</sup> Kwaru A,<sup>2</sup> Abba A<sup>2</sup>

<sup>1</sup>Department of Medicine, Aminu Kano Teaching Hospital, Kano, Nigeria

<sup>2</sup>Department of Haematology, Aminu Kano Teaching Hospital, Kano, Nigeria

e-mail: msanim2000@yahoo.com

**Introduction:** Global epidemiology had shown that hypertension is more severe, more common and occurs at a relatively younger age in blacks than in white Europeans. Studies have shown that people with sickle cell trait (SCT) have significantly higher blood viscosity than people with the normal haemoglobin genotype. Moreover, haemoreological studies have revealed that systemic arterial blood pressure is influenced by blood viscosity. We therefore hypothesised that SCT genotype is a possible risk factor for essential hypertension and it might be partly responsible for the high prevalence and severity of hypertension in blacks. Hence, this study was aimed at evaluating the haematological parameters and the prevalence of SCT in a cohort of hypertensive patients. It also evaluated the impact of SCT genotype on response to anti-hypertensive therapy.

**Methods:** A total of 330 consecutive patients with documented essential hypertension and normal renal function were recruited from the cardiology clinic of the Aminu Kano Teaching Hospital, Kano. An equal number of age- and gender-matched normotensive volunteers was selected as control subjects. The demographic data and blood pressures of each subject were recorded at recruitment.

The prevalence of SCT genotypes and haematological parameters of hypertensive and normotensive controls were determined and compared. Furthermore, in the hypertensive group, the blood pressures of patients with the SCT genotype were compared with that of patients with the normal genotype. Statistical analyses were performed using computer software SPSS version 11.0 and comparisons between subject groups were based on the Student's *t*-test. A *p*-value of less than 0.05 was taken as significant.

**Results:** The normotensive control subjects had mean systolic and diastolic pressures of 118 and 75 mmHg, respectively, while the hypertensive patients had corresponding values of 155 and 95 mmHg, respectively. The hypertensive patients had a haematocrit of 0.37 l/l, which was significantly lower than the value of 0.44 l/l seen among the normotensive controls (*p* < 0.05). The prevalence of SCT among the hypertensive patients was 26%, which was not significantly higher than the prevalence of 23% seen among the normotensive control group (*p* > 0.05). Regression analysis for the SCT genotype as a possible risk factor for hypertension gave an odds ratio of 0.58, *p* = 0.08. Hypertensive patients with SCT had mean systolic and diastolic pressures of 158 and 95 mmHg, which were significantly higher than the corresponding values of 145 and 86 mmHg seen in patients with HbAA genotype (*p* < 0.05).

**Conclusion:** These results suggest that SCT was not a risk factor for hypertension but was associated with a poor response to anti-hypertensive therapy in affected patients. Hence hypertensives with SCT need closer monitoring.

### RUPTURE OF ATHEROSCLEROTIC POPLITEAL ARTERY PSEUDO-ANEURYSM FOLLOWING TOTAL KNEE ARTHROPLASTY

Mwambu TP, Oketcho M, Omo A, Omagino J, Wambuzi S, Mijumbi C  
Division of Cardiothoracic and Vascular Surgery, Uganda Heart Institute, Mulago National Referral Hospital Complex, Kampala, Uganda

e-mail: mabisitpm@gmail.com

**Introduction:** Injury to the popliteal artery following total knee arthroplasty (TKA) occurs in about 0.03 to 0.17% of cases. Although total knee arthroplasty is considered an effective treatment option for severe osteoarthritis and rheumatoid arthritis of the knee, the close proximity of the popliteal artery to the knee joint poses a risk for its injury, which can result into a neuropathic foot or limb loss. Pseudo-aneurysms do occur following TKA and can lead to vessel occlusion or rupture, causing large popliteal haematomas. No clear mechanism has been attributed to the mode of popliteal artery injury during TKA although direct trauma and tourniquet injury have been shown to be among the commonest associated modes. Atherosclerosis has been shown to weaken vascular walls and predispose to aneurysm formation in various arteries of the body. Mild trauma to an already weakened vessel wall could therefore predispose to pseudo-aneurysm formation, with subsequent rupture. Various vascular reconstructive techniques have been employed to reconstruct the popliteal artery following injury, including direct repair, popliteal artery bypass using a reverse saphenous vein graft, and percutaneous transluminal angioplasty with stent insertion.

**Case report:** We report a case of a 67-year-old female hypertensive who presented with a three-day history of a pulsatile, painful, progressive swelling in the left popliteal fossa two weeks after a left TKA. She had previously undergone right TKA one year earlier, and received anticoagulation as prophylaxis for deep-vein thrombosis following the recent TKA. Doppler ultrasound was suggestive of a ruptured pseudo-aneurysm of the left popliteal artery, with good perfusion of the distal limb. Radiographs showed calcifications of the popliteal artery above the knee, with a total knee-replacement implant *in situ*. Via an S-incision in the popliteal fossa, the popliteal fossa was dissected and the artery found to be severely atherosclerotic and calcified, with an anteriorly ruptured pseudo-aneurysm causing a large haematoma involving the knee cavity. We evacuated the popliteal haematoma, performed aneurysmectomy and reconstructed the popliteal artery using an ipsilateral reverse saphenous vein graft. Good lower limb perfusion and function was achieved with no sensory or motor loss.

**Conclusion:** Injury of the popliteal vessels although uncommon, continues to elude surgeons during TKA. A careful pre-operative assessment of the popliteal vessels prior to TKA is important as a prerequisite to minimising vascular injury. Extra caution should be taken to avoid popliteal artery injury during TKA where a high index of suspicion of atherosclerosis exists. Prompt diagnosis and vascular repair are important in limiting morbidity and saving the limb.

### THE INVESTIGATION OF MANAGEMENT OF PERICARDITIS (IMPI) RETROSPECTIVE SURVIVAL ANALYSIS SUB-STUDY

Mubanga M, Pandie S, Ntsekhe M, Mayosi B

<sup>1</sup>Cardiac Clinic and Cardiovascular Genetics Laboratory, Hatter Institute for Cardiovascular Research, Department of Medicine, Groote Schuur Hospital and University of Cape Town, Cape Town, South Africa

e-mail: mwenyamubanga@gmail.com

**Introduction:** There were 9.4 million new cases and 1.8 million deaths globally from tuberculosis (TB) in 2009, with continuing increases in Africa because of the human immunodeficiency virus (HIV) epidemic. HIV infection is associated with a rising incidence of all extrapulmonary forms of TB, including TB pericarditis. It is believed that the long-term outcomes of proven TB pericarditis are

poorer than non-proven TB pericarditis.

**Aim:** To compare the all-cause mortality in patients with proven versus non-proven TB pericarditis, and to identify the risk factors associated with mortality in patients with proven TB pericarditis.

**Methods:** Survival in patients with proven and non-proven TB pericarditis was examined using Kaplan-Meier methods, and the survival curves between the two groups were compared using the log-rank test by means of SPSS software. Cox proportional hazard regression modelling was used to determine whether cardiac events, demographic factors or medical interventions used were independent predictors for mortality. Significance tests were two tailed, and statistical significance was at the 5% alpha level.

**Results:** One hundred and eighty-five patients were enrolled in the pilot study. The diagnosis of TB pericarditis was uncertain in 68 (37%) patients and in six (3%) an alternative diagnosis was found. The 111 patients with a diagnosis of TB pericarditis met the criteria for 'definite or proven' or 'probable or non-proven' TB pericarditis. Those with uncertain and alternate diagnoses were excluded from further analysis. There were no significant age or gender differences between patients included and excluded from the study. Men outnumbered women, but the difference was not significant. Eighty-three per cent of patients were under 45 years old. Of the 12 patients with proven TB pericarditis, seven (58%) were male. Six (60%) of 10 patients tested for HIV were positive. No patients in this group received antiretroviral therapy.

**Conclusion:** These data show a trend for higher short-term mortality with proven TB pericarditis versus non-proven TB pericarditis.

#### PREVALENCE AND RISK FACTORS ASSOCIATED WITH HYPERTENSION AMONG ARMED-FORCES PERSONNEL IN KENYA

Mundan VK,<sup>1,2</sup> Muiva MN,<sup>1</sup> Kimani ST,<sup>1</sup> Samia M,<sup>2</sup> Bukachi F<sup>3</sup>

<sup>1</sup>School of Nursing Sciences, University of Nairobi, Nairobi, Kenya

<sup>2</sup>Armed forces Memorial Hospital, Nairobi, Kenya

<sup>3</sup>Department of Mmedical Physiology, University of Nairobi, Nairobi, Kenya

**Introduction:** Hypertension remains a major risk factor for the development of cardiovascular diseases (CVDs) worldwide. Statistics show a rising morbidity and mortality in developing countries, especially in sub-Saharan Africa, as a result of hypertension. Military personnel are physically fit as a result of engaging in physical activities and regular exercise, thus reducing chances of developing CVDs. However, hypertension has been observed to be on the rise among the armed-forces population.

**Objective:** To determine the prevalence and risk factors associated with hypertension among military personnel in Kenya.

**Methods:** This was a cross-sectional, randomised case-control study carried out at Armed Forces Memorial Hospital in Nairobi. A total of 340 (170 hypertensive and 170 normotensive) subjects were recruited into this study. A structured questionnaire based on the WHO step-wise approach for surveillance of chronic diseases was used for data collection. Physiological and anthropometric measurements were obtained from subjects in the two groups. Data were analysed using STATA version 11 to compare the two groups and determine the influence of diverse risk factor on hypertension.

**Results:** The mean age  $\pm$  SD of hypertensive and normotensive subjects was  $45.1 \pm 7.7$  and  $40.8 \pm 7.3$  years, respectively. On average the hypertensive patients were 4.82 older than the normotensives ( $p < 0.0001$ ). There was a strong ( $\chi^2 = 34.33$ , d.f. = 3;  $p < 0.0001$ ) statistical association between the frequency of alcohol consumption and hypertension. Approximately 11% of cases were current smokers compared to 4.2% in the control group. There was a significant association between current smoking and hypertension (OR = 0.17; 95% CI: 0.14–0.89). The findings show that cases of hypertension had poor nutritional indicators compared to the controls. In addition, cases were more likely to be overweight (59.76 vs 28.24%) or obese (19.53 vs 3.53%) compared to the controls.

**Conclusion:** Our study findings revealed that higher anthropomet-

ric measurements, cigarette smoking and certain dietary habits are significant risks for hypertension among the armed forces. The level of physical fitness among this population was 95% (excellent) as per the fitness index results. Our study findings provide an impetus for the urgent need to encourage healthy lifestyles as a primary-prevention strategy and explore other possible risk factors for the development of CVDs and hypertension among this population.

#### HISTOLOGICAL FINDINGS OF STRIATED MUSCLE BIOPSIES FROM PATIENTS WITH ENDOMYOCARDIAL FIBROSIS IN MULAGO HOSPITAL: A CASE SERIES

Mungoma M,<sup>1</sup> Freers J,<sup>2</sup> Mayanja HK,<sup>3</sup> Wamala D,<sup>3</sup> Katamba A,<sup>3</sup> Ouma JD<sup>4</sup>

<sup>1</sup>Department of Medicine, Division of Cardiology, Mulago National Referral Hospital, Kampala, Uganda

<sup>2</sup>Department of Medicine, Division of Cardiology, Makerere University, Kampala, Uganda

<sup>3</sup>Makerere University College of Health Sciences, Kampala, Uganda

<sup>4</sup>Management Sciences for Health, Kampala, Uganda  
e-mail: mmungos@yahoo.com

**Background:** Endomyocardial fibrosis (EMF) is globally rare, but is commonly seen in some countries such as Uganda, India, Nigeria and Mozambique. It is strongly associated with poverty, dietary deficiencies, certain ethnicities and blood eosinophilia. In a recent study on peritoneal biopsies, two specimens were serendipitously sampled of abdominal wall striated muscle, both of which revealed muscle fibrosis on histology.

**Objective:** To describe histological changes in striated skeletal muscle biopsies in EMF patients.

**Methods:** This was a cross-sectional, explorative study to describe the histology of skeletal muscle taken from the gastrocnemius and biceps muscles. It was conducted at Mulago Hospital Cardiology Unit, Uganda Heart Institute and the Medical Outpatients Department, Cardiac Clinic between September and December 2009. All patients with an echocardiographic diagnosis of EMF meeting the selection criteria were consecutively recruited. Using a standardised questionnaire, data on clinical variables were collected. Blood was examined for eosinophilia. Muscle tissue was biopsied from the gastrocnemius and biceps muscles and examined for histological changes using haematoxylin and eosin stain for muscle pathology and Masson's trichrome staining technique for connective tissue. The proportion of patients with EMF having striated muscle changes was determined.

**Results:** Social demographic characteristics of the 25 patients with EMF enrolled were similar to those previously seen. There were twice as many females as males, most of them in early adulthood. Major histological changes observed were muscle atrophy, seen in 24 (96%) participants, muscle fibrosis occurred in 23 (92%) participants, while degenerative muscle changes occurred in 15 (60%). Eosinophilia, long thought to have an association with EMF, was observed in 26% of patients, which is in agreement with some but not all findings from earlier studies. Since eosinophilia is more prominent in the early stages of EMF, our sample consisted of mainly patients in the chronic stages of the disease.

**Conclusion:** Striated muscle fibrosis, atrophy and degenerative muscle changes were the predominant striated muscle changes observed in the EMF patients studied. Striated muscle involvement appeared to be patchy in the majority of patients. With this evidence showing skeletal muscle fibrosis, atrophy and degenerative muscle changes, together with previous evidence of peritoneal inflammation and fibrosis, EMF should be considered as a generalised disease entity.

#### WHAT WOULD YOU DO? OBSTRUCTION OF BI-DIRECTIONAL GLENN SHUNT IN TRICUSPID ATRESIA, RESTRICTIVE VENTRICULAR SEPTAL DEFECT, SEVERE PULMONARY STENOSIS

Mutai L,<sup>1</sup> Munene J<sup>1</sup>

<sup>1</sup>The Mater Hospital, Nairobi, Kenya

<sup>3</sup>Kenyatta National Hospital, Nairobi, Kenya  
e-mail: drloicemutai@yahoo.com

Tricuspid atresia is a rare congenital heart disease that often occurs in association with a ventricular septal defect (VSD), which may be restrictive or non-restrictive. When associated with restrictive VSD, there is often a third anomaly, pulmonary stenosis (PS). These patients often present with severe cyanosis and need early shunting to improve pulmonary circulation. When associated with non-restrictive VSD and often the absence of pulmonary stenosis, patients present early with recurrent respiratory infections, excessive sweating and congestive cardiac failure. Tricuspid atresia may also occur in association with transposition or malposition of the great arteries.

We present a month-old infant who had tricuspid atresia, restrictive VSD, severe PS and normally related great arteries. He underwent bi-directional Glenn shunt and was well for seven days. Thereafter he started desaturating and at the time was noted to have superficial veins on the abdomen. He quickly developed superior vena cava syndrome and acidosis. He was diagnosed to have a blocked shunt.

How would you have managed him at this point?

#### PERCUTANEOUS CORONARY INTERVENTION IN WESTERN AFRICA: EXPERIENCE OF THE IVORY COAST

N'Guetta R, Seka R, Ekou A, Anzouan-Kacou JB, N'Cho MP, Adoh AM

Institut de Cardiologie d'Abidjan, Ivory Coast  
e-mail : rolandnguetta@hotmail.com

**Introduction:** Percutaneous coronary intervention (PCI) is an essential therapeutic procedure in the management of ischaemic heart diseases. This technique is available in a few countries in sub-Saharan Africa. The aim of this study was to report the Ivorian experience in PCI.

**Methods:** We carried out a transverse prospective study over a nine-month period (April to December 2010). This study included consecutive patients admitted to the Abidjan Heart Institute for PCI. The indications and results of PCI were analysed.

**Results:** Twenty-one PCIs were realised. Among the patients, there was a male predominance with a gender ratio of 9.5. The mean age of the patients was  $52.7 \pm 9.5$  years, with extremes of 34 and 65 years. The indications for PCI were dominated by myocardial infarction (13 cases, 61.9%). The other indications were represented by seven cases of unstable angina (33.3%) and one case of ischaemic cardiac failure (4.8%). The patients had single-vessel disease in 47.6% of the cases, double-vessel disease in 33.3% and triple-vessel disease in 19% of cases. PCI was successfully carried out on 19 patients. Two failures of PCI due to an inability to cross the lesions with the guide wire were noted. No complications and no deaths related to PCI were observed.

**Conclusion:** PCI is now carried out in current practice in the Ivory Coast. The indications are predominantly myocardial infarction. The early results are promising. The implementation of this technique should enable doctors to improve the prognosis of patients with ischaemic heart disease living in the Ivory Coast and in western Africa.

#### DEVELOPMENT OF THE VANGUARD DEMONSTRATION SITE FOR RHD SCREENING AMONG SCHOOL-AGED LEARNERS IN THE WESTERN CAPE, SOUTH AFRICA

Nkepu S, Engel ME, Lemmer C, Zuhlke L

Department of Medicine, Health Sciences Faculty, University of Cape Town, South Africa  
e-mail: simpwi.nkepu@uct.ac.za

**Background:** In South Africa, anecdotal information suggests that rheumatic heart disease (RHD) is still the leading cause of acquired heart disease in young adults. Recent data on the prevalence of RHD in school-aged learners remain scanty, with two earlier studies

suggesting an estimate around seven per 1 000. However this figure is thought to be an underestimation given that the screening was performed using auscultation, which is less-sensitive than echocardiography.

**Objective:** We have developed, as part of ASAPAN, an echocardiography-based RHD screening programme for learners within the Vanguard community of the Western Cape. Outcomes include determining the prevalence of RHD, monitoring the disease progression in screen-positive participants referred for appropriate follow up, and evaluating the cost effectiveness of such a programme.

**Methods:** We present the issues involved in the establishment of the demonstration site, the lessons learned, and the ongoing challenges facing the research team, having screened in excess of 1 800 participants. In brief, we detail our experience in five areas:

- engaging the community on all levels
- completing a situational analysis and gathering background data, including the sampling frame and the random sampling procedure
- consent process
- on-site data collection and management
- post-screening responsibilities and continued community involvement.

**Conclusion:** We conclude that screening for RHD is feasible in the community setting using schools as the sampling frame. We firmly believe that our experience will serve as a meaningful resource for other similar research programmes.

#### CLINICAL CHARACTERISTICS AND OUTCOME OF FAMILIAL AND IDIOPATHIC DILATED CARDIOMYOPATHY IN SOUTH AFRICA: A CASE-COMPARISON STUDY

Ntusi NBA,<sup>1</sup> Badri M,<sup>1</sup> Gumede F,<sup>2</sup> Wonkam A,<sup>3</sup> Mayosi BM,<sup>1</sup>

<sup>1</sup>Cardiac Clinic, Department of Medicine, Groote Schuur Hospital and University of Cape Town, Cape Town, South Africa

<sup>2</sup>Department of Statistical Sciences, Groote Schuur Hospital and University of Cape Town, Cape Town, South Africa

<sup>3</sup>Division of Human Genetics, Department of Clinical Laboratory Services, University of Cape Town, Cape Town, South Africa

**Background:** Dilated cardiomyopathy (DCM) is characterised by left ventricular dilatation and systolic dysfunction that is not due to hypertension or valvular, pericardial, coronary and congenital heart disease. The aetiology of DCM determines prognosis. Familial DCM, due to mutations in various genes, may account for 30 to 50% of DCM cases. The outcome of familial and idiopathic DCM in Africans is unknown.

**Purpose:** To compare the clinical characteristics and outcome of familial and idiopathic DCM in African patients.

**Methods:** Retrospective analysis was done of the medical records of patients diagnosed with familial and idiopathic DCM at the Cardiac Clinic, Groote Schuur Hospital in Cape Town, South Africa between 1 February 1996 and 31 December 2009. Measurements from clinical assessment, chest radiography, electrocardiography, two-dimensional and Doppler colour-flow echocardiography and cardiac catheterisation (where available) were reviewed.

**Results:** Eighty patients with idiopathic DCM and 40 with familial DCM were studied. The mean age at diagnosis of familial patients was  $25.58 \pm 15.11$  years, compared to  $39.92 \pm 16.43$  years in the idiopathic DCM patients ( $p < 0.001$ ). In addition, familial cases had a lower prevalence of electrocardiographic and echocardiographic abnormalities than those with idiopathic DCM, except for T-wave changes, which were more common in familial DCM. On electrocardiography, in familial and idiopathic DCM, respectively, increased voltage was found in 19.4 vs 50.0% ( $p = 0.003$ ), Q waves were found in 12.9 vs 27.0% ( $p = 0.028$ ), and T-wave inversion in 90.3 vs 68.8% ( $p = 0.014$ ). On echocardiography, left ventricular dimensions were greater ( $p = 0.022$ ) and both left ventricular ejection fraction ( $p = 0.026$ ) and fractional shortening ( $p = 0.048$ ) were lower in idiopathic DCM compared to familial cases.

Beta-blockers ( $p = 0.007$ ) and digoxin ( $p = 0.028$ ) were prescribed

more commonly in idiopathic DCM. However, there was no difference in mortality between the two groups over the follow-up period ( $p = 0.595$ ). The prevalence of chronic heart failure, atrial fibrillation, pulmonary hypertension and the use of cardiac resynchronisation therapy and orthotopic heart transplantation were similar in both groups of patients. The use of digoxin in idiopathic DCM emerged as a significant predictor of mortality in the time-to-event analysis (OR 1.62, 95% CI: 1.04–3.98,  $p = 0.037$ ) but not in familial DCM patients. In both groups, NYHA functional class III and IV symptoms were powerful predictors of mortality on multivariate analysis (OR 3.85, 95% CI: 1.30–48.47,  $p < 0.001$ ). Heart transplantation was a strong predictor of survival (OR 4.72, 95% CI: 1.31–2.60,  $p = 0.026$ ).

**Conclusion:** Patients with familial DCM presented at a younger age, with a lower frequency of electrocardiographic and echocardiographic abnormalities than those with idiopathic DCM. However, mortality was the same in the two groups. The use of digoxin was associated with increased mortality in patients with idiopathic DCM. Patients with chronic heart failure and elevated NYHA functional class despite optimal medical therapy need to be considered and referred for early assessment for orthotopic heart transplantation, as this intervention is clearly protective.

#### FREQUENCY AND CLINICAL GENETICS OF FAMILIAL DILATED CARDIOMYOPATHY IN CAPE TOWN: IMPLICATIONS FOR THE EVALUATION OF PATIENTS WITH UNEXPLAINED CARDIOMYOPATHY

Ntusi NBA,<sup>1</sup> Wonkam A,<sup>2</sup> Shaboodien G,<sup>1</sup> Badri M,<sup>1</sup> Mayosi BM<sup>1</sup>

<sup>1</sup>Cardiac Clinic and Cardiovascular Genetics Laboratory, Hatter Institute for Cardiovascular Research, Department of Medicine, Groote Schuur Hospital and University of Cape Town, Cape Town, South Africa

<sup>2</sup>Division of Human Genetics, Department of Clinical Laboratory Sciences, University of Cape Town, Cape Town, South Africa  
e-mail: ntobekon@yahoo.com

**Background:** Studies from Europe and North America suggest that familial dilated cardiomyopathy (DCM) may account for 25 to 50% of DCM cases. There is little information on the frequency and clinical genetics of familial DCM in Africa.

**Purpose:** To determine the frequency and likely mode of inheritance of familial DCM in patients referred for investigation of the cause of DCM at a tertiary centre in Cape Town.

**Methods:** We conducted a retrospective analysis of consecutive patients diagnosed with DCM between 1 February 1996 and 31 December 2009 to determine the frequency of familial DCM. The diagnosis of familial DCM was based on a family history of at least one first-degree relative having DCM and/or sudden unexplained death under the age of 35 years. Pedigree analysis was performed to determine the likely mode of inheritance of familial DCM.

**Results:** Twenty-nine (26.6%) out of 109 unrelated cases with DCM had familial disease, and had a significantly younger mean age of onset of cardiomyopathy than non-familial DCM cases ( $28.01 \pm 15.33$  years vs  $39.1 \pm 12.6$  years,  $p = 0.001$ ). The male predominance ( $n = 21$ , 72.4%) and presence in all racial groups [15 (48.3%) were coloured African, 10 (34.5%) were black African, four (13.8%) were white African, and one (3.4%) was of Indian descent] in familial DCM was similar to the non-familial cases. Two of the 29 patients with familial DCM (7%) had at least one relative who was diagnosed with peripartum cardiomyopathy. Pedigree analysis of the 29 families was consistent with autosomal-dominant inheritance in 72.4%, autosomal-recessive inheritance in 17.2% and X-linked recessive inheritance in 10.4% of the subjects.

**Conclusions:** Familial DCM affects at least a quarter of African patients with DCM, presents at a young age, and follows an autosomal-dominant pattern of inheritance in the majority of families. Family screening for familial DCM is indicated in all patients with unexplained DCM, including patients with peripartum cardiomyopathy.

#### EVALUATION OF A PROJECT INTEGRATING CARDIOVASCULAR CARE INTO HIV PROGRAMMES

Nyabera RA,<sup>1</sup> Yonga G,<sup>1</sup> Mwangemi F,<sup>2</sup> Bukachi F<sup>1</sup>

<sup>1</sup>Kenya Cardiac Society, Nairobi, Kenya

<sup>2</sup>Family Health International, Kenya office  
e-mail: alooroseanne@gmail.com

**Introduction:** The prevalence of cardiovascular disease (CVD) has been found to be higher among the HIV-positive population than the HIV-negative population. Factors that determine this association have been thought to be multiple and include pre-test behavioural risk, probable atherogenicity of HIV plus opportunistic infections and effect of antiretroviral and opportunistic infection therapy. The Kenya Cardiac Society (KCS) and Family Health International (FHI), Kenya office have designed a project for integration of cardiovascular risk factors and disease evaluation and management into the HIV care and treatment programmes. Pilot implementation was done in 2009 and 2010. The results of monitoring and evaluation of the implementation are reported.

**Methods:** Three HIV care and treatment sites in Rift Valley province and two sites in Coast province were selected. Training of healthcare providers was conducted initially, and regularly repeated as needed during the duration of the project. Appropriate equipment for the basic evaluation of cardiovascular risk factors and common CVDs were provided for the participating centres. A referral process was also established for those found to have CVDs that required specialist treatment. Client-care pathways and flow were also established and implemented. The pilot project commenced in August 2009 and continued to December 2010. Three-monthly monitoring and evaluation visits to the sites were conducted to assess inputs, process and outputs.

**Results:** Clients (5 786) were registered from the five sites; 33% female, 67% male, median age 35 years. Eighty per cent were HIV positive; 26% were counselling and testing clients, 17% were on care and 57% on antiretroviral therapy (ART). The space available for integration of services was adequate in three sites but inadequate in two. The counselling and clinician consultation services areas were easily integrated. The knowledge and skills uptake was good at the initial training and throughout the survey. However, more than 50% of the trained staff were deployed elsewhere during the project. The care pathways were adequately implemented in all sites but one-third of the CVD equipment was not in a serviceable condition. The majority of staff and clients retained adequate knowledge on the CVD–HIV interaction and had a positive attitude towards the service. The documentation and reporting of information was good in three sites but challenged in two other sites. High blood pressure was present in 19% of the HIV-negative and 32% of the HIV-positive clients. Those on ART had a prevalence of high blood sugar levels of 6% and high cholesterol values of 2%.

**Conclusion:** Integration of CVD screening and management into routine HIV care and treatment is feasible. CVD can be identified early among HIV-infected individuals through routine integrated activities. Further operations research and assessment of CVD risks and disease in HIV-positive patients is required. The lessons learnt in this project can be utilised in integrating care for communicable and non-communicable diseases.

#### HEART DISEASE IN SUB-SAHARAN AFRICA, 1950–2010: A SYSTEMATIC REVIEW

Ogah OS,<sup>1</sup> Falase AO,<sup>1</sup> Oggunniyi A,<sup>1</sup> Carrington M,<sup>2</sup> Stewart S,<sup>2</sup> Sliwa K<sup>3</sup>

<sup>1</sup>Department of Medicine, University College Hospital, Ibadan, Nigeria

<sup>2</sup>Preventative Health Baker IDI Heart and Diabetes Institute, Melbourne, Australia

<sup>3</sup>Hatter Cardiovascular Research Institute, Faculty of Health Sciences, University of Cape Town, South Africa

e-mail: osogah56156@yahoo.com or osogah56156@gmail.com

**Introduction:** Eighty per cent of CVD-related deaths occur in developing or low-income countries, including sub-Saharan Africa. The aim of this review was to map the known pattern of heart diseases in the continent, as well as assess the changing pattern of heart disease in this region undergoing epidemiological transition.

**Methods:** We carried out a Medline/Pubmed search of published data on heart disease in the sub-region from 1 January 1950 to 31 December 2009. This was supplemented with a search of other databases such as African index medicus, African journals on-line (AJOL), the World Bank database, WHO global infobase, as well as the global cardiovascular infobase and global health library.

**Results:** Most studies on heart disease in Africa were hospital based. There are few population-based studies. Heart diseases were mainly non-ischæmic, such as hypertensive heart disease, rheumatic valvular heart disease, cardiomyopathy, pericardial diseases and cor-pulmonale. Endemic cardiomyopathies such as endomyocardial fibrosis and peripartum heart disease were common in sub-Saharan Africa. Ischæmic heart disease is emerging due to urbanisation, adoption of a Western lifestyle and diet, and risk-prone behaviours.

**Conclusions:** Community- and population-based studies on heart disease are needed to adequately characterise the patterns of heart disease as well as their associated risk factors that are peculiar to the sub-region. This will help in the development of interventions for heart diseases in a sub-region in epidemiological transition.

#### SPECTRUM OF HYPERTENSION AND HYPERTENSION-RELATED DISEASES IN ABUJA, NIGERIA

Ojji DB,<sup>1</sup> Ajayi SO,<sup>2</sup> Mamven MH,<sup>2</sup> Sliwa K<sup>3</sup>

<sup>1</sup>Cardiology Unit, Department of Medicine, University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria

<sup>2</sup>Nephrology Unit, Department of Medicine, University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria

<sup>3</sup>Hatter Cardiovascular Research Institute, Faculty of Medicine, University of Cape Town, South Africa

e-mail: dikeojji@yahoo.co.uk

**Introduction:** In spite of the high prevalence of hypertension and its complications in sub-Saharan Africa, there is still a paucity of data describing the pattern of presentation of hypertension and its complications.

**Methods:** We prospectively collected the data of all hypertensive patients presenting at the Cardiology Unit of the University of Abuja Teaching Hospital over a four-year period.

**Results:** We studied 1 494 subjects; 753 patients (50.4%) were female, while 741 (49.6%) were male. The mean age of all subjects was 51 ± 13.8 years, with the males having a mean age of 51.1 ± 11.3 years and the females a mean age of 50.3 ± 12.7 years; 338 subjects (22.6%) presented with dyspnoea on mild to moderate exertion, 113 (7.6%) presented with palpitations and 36 (2.4%) presented with easy fatigability; 332 (22.2%) presented in heart failure, 69 (4.6%) had one form of arrhythmia or another, 65 (4.3%) had cerebrovascular accident, 126 (8.4%) had concomitant diabetes mellitus, 16 (1.1%) had chronic kidney disease, nine (0.6%) had concomitant retroviral disease and six (0.4%) had hypertensive encephalopathy.

Out of the 1 149 subjects who had transthoracic echocardiography, 262 subjects (22.8%) had interventricular septal wall thickness in diastole greater than 13 mm, 187 (16.3%) had left ventricular posterior wall thickness in diastole greater than 13 mm, and 111 (9.7%) had both interventricular septal wall and left ventricular posterior wall thicknesses in diastole greater than 13 mm each. Furthermore, of the 1 149 subjects that had transthoracic echocardiography, 266 (23.2%) had estimated left ventricular ejection fraction less than 50%.

**Conclusion:** The burden of hypertension and its complications in our environment is quite enormous with more than half of our subjects having one form of complication or the other on initial presentation. The need therefore for effective primary and secondary preventive measures to be mapped out to tackle this problem cannot be over-emphasised.

#### PATTERN OF ADULT CONGENITAL HEART DISEASE IN LAGOS, NIGERIA

Olusegun-Joseph DA,<sup>1</sup> Ajuluchukwu JNA,<sup>2</sup> Winzu CC,<sup>1</sup> Okobi AE,<sup>1</sup> Mbakwem AC,<sup>2</sup> Oke DA,<sup>2</sup> Amadi CE,<sup>1</sup> Nkanor EY<sup>1</sup>.

<sup>1</sup>Lagos University Teaching Hospital, Lagos, Nigeria

<sup>2</sup>College of Medicine, University of Lagos, Nigeria

e-mail: danielsangrt@gmail.com

**Introduction:** The number of cases of congenital heart disease in adults (ACHD) is on the increase. This poses an added challenge to the cardiologist and the health sector in general. This study aimed to assess the pattern and frequency of adult congenital heart disease in our centre.

**Methodology:** This was a retrospective study of patients with congenital heart disease who had echocardiography done from March 2001 to December 2010. The data was obtained from our echocardiography register.

**Results:** Of these, 131 patients with a diagnosis of ACHD between the ages of 12 and 74 years were evaluated out of a total of 8 377 who had had echocardiography for the period under review, making up 1.56% of cases. Seventy of the subjects were males (53.4%) while 61 (46.5%) were females. Ventricular septal defect (VSD) was the most common cardiac anomaly, with a relative frequency of 60 (45.8%), followed by atrial septal defect (ASD) 47 (35.9%), tetralogy of Fallot (TOF) nine (6.9%), patent ductus arteriosus (PDA) four (3.1%), Ebstein's anomaly, four (3.1%), dextrocardia, two (1.5%), cor triatrium, two (1.5%), endocardial cushion defect, one (0.8%), patent foramen ovale, one (0.8%), and combined VSD and ASD, one (0.8%). Breathlessness on exertion and palpitations were the most common presentation.

**Conclusion:** This study revealed that ACHD presenting later in life was commoner in males than females, which is the same trend as in most of the literature. Ventricular septal defect is the most common defect in our centre, while TOF is the most common cyanotic congenital heart disease. This population of people is on the increase worldwide and we need to be prepared for the specific challenges that they may have.

#### THE PREVALENCE, DISTRIBUTION AND CLINICAL OUTCOMES OF ELECTROCARDIOGRAPHIC REPOLARISATION PATTERNS IN MALE ATHLETES OF AFRICAN/AFRO-CARIBBEAN ORIGIN

Papadakis M,<sup>1,2</sup> Carre F,<sup>3</sup> Kervio G,<sup>3</sup> Rawlins J,<sup>1,2</sup> Panoulas VF,<sup>2</sup> Chandra N,<sup>1,2</sup> Basavarajaiah S,<sup>2</sup> Carby L,<sup>2</sup> Fonseca T,<sup>2</sup> Sharma S<sup>1,2</sup>

<sup>1</sup>St George's University of London, London, UK

<sup>2</sup>University Hospital Lewisham, London, UK

<sup>3</sup>French Institute of Health and Medical Research (INSERM), Rennes, France

e-mail: mihalispapadakis@hotmail.com

**Aims:** Athletic training in black male athletes (BA) is associated with marked ECG repolarisation changes that overlap with hypertrophic cardiomyopathy (HCM). Differentiating between the two entities is prudent since BA exhibit a higher prevalence of exercise-related sudden death from HCM compared with white athletes (WA).

**Methods:** Between 1996 and 2010, 904 BA underwent serial cardiac evaluations including ECG and echocardiography. Athletes exhibiting T-wave inversions were further investigated for HCM. Results were compared with 1 819 WA, 119 black controls (BC) and 52 black HCM patients. Athletes were followed up for 69.7 ± 29.6 months.

**Results:** T-wave inversions were present in 82.7% of HCM patients, 22.8% of BA, 10.1% of BC and 3.7% of WA. In athletes, the major determinant of T-wave inversions was black ethnicity. T-wave inversions in BA (12.7%) were predominantly confined to contiguous anterior leads (V1–V4). Only 4.1% of BA exhibited T-wave inversions in the lateral leads. In contrast, both BC and HCM patients exhibited lower prevalences of T-wave inversions in leads V1–V4 (4.2 and 3.8%, respectively) with most T-wave inversions in HCM patients (76.9%) involving the lateral leads. During follow up, one

BA survived cardiac arrest and two athletes (one BA, one WA) were diagnosed with HCM. All three exhibited T-wave inversions in the lateral leads.

**Conclusions:** T-wave inversions in leads V1–V4 appear to represent an ethnic variant of ‘athlete’s heart’. Conversely, T-wave inversions in the lateral leads may represent the initial expression of underlying cardiomyopathy and merit further evaluation and regular surveillance.

#### MANAGEMENT OF HYPERTENSION IN LOW-RESOURCE SETTINGS: A NEW SOLAR-POWERED BLOOD PRESSURE-MEASURING DEVICE

Parati G,<sup>1</sup> Kilama MO,<sup>2</sup> Faini A,<sup>1</sup> Facelli E,<sup>3</sup> Ocen K,<sup>2</sup> Opira C,<sup>4</sup> Mendiss S,<sup>5</sup> Wuang J,<sup>6</sup> Atkins N,<sup>7</sup> O’Brien E<sup>8</sup>

<sup>1</sup>University of Milano-Bicocca & Istituto Auxologico Italiano, Milan, Italy

<sup>2</sup>Benedict Medical Center, Kampala, Uganda

<sup>3</sup>Mtendere Hospital, Chirundu, Zambia

<sup>4</sup>Lacor Hospital, Gulu, Uganda

<sup>5</sup>Chronic Disease Prevention and Management, World Health Organisation, Geneva, Switzerland

<sup>6</sup>Centre for Epidemiological Studies and Clinical Trials, Ruijin Hospital and Jiaotong University School of Medicine Ruijin, Shanghai, China

<sup>7</sup>Dabl<sup>®</sup> Educational Trust, Blackrock, Dublin, Ireland

<sup>8</sup>Conway Institute of Biomolecular and Biomedical Research, University College Dublin, Belfield, Dublin, Ireland

**Introduction:** The prevalence of high blood pressure (BP) is increasing worldwide, while BP monitoring and treatment remain inadequate, particularly in low-resource settings (LRS). A major challenge is the unavailability of reliable, durable and affordable BP-measuring devices.

**Aim:** To identify, validate and field-test a device fulfilling World Health Organisation (WHO) requirements. The Omron HEM-SOLAR device fulfilled these requirements, and was validated and field-tested in LRS (Uganda and Zambia).

**Methods:** Three devices – the Omron HEM-SOLAR, the Microlife BP 3AS1-2 and the A&D UA-705 – were validated using the International Protocol of the European Society of Hypertension (ESH). The Omron HEM-SOLAR was selected for field-testing, which was conducted in three centres (two in Uganda and one in Zambia). The semi-automatic Omron HEM-SOLAR was compared with the auscultatory mercury sphygmomanometer in 716 subjects (15–75 years) consecutively attending these centres for various medical problems.

**Results:** The Omron HEM-SOLAR fulfilled the accuracy criteria of the ESH International Protocol for systolic and diastolic BP. On the basis of having fulfilled the validation criteria in an earlier study for both systolic and diastolic BP and being the only one of the three devices that did not develop operational problems during the validation study, it was selected for field-testing. Complete data was available in 700 field-test subjects; average systolic and diastolic BP were 120.5 ± 21.6/74.6 ± 13.8 mmHg and 122.3 ± 21.8/71.2 ± 14.0 mmHg with the mercury sphygmomanometer and the Omron HEM-SOLAR, respectively (*p* = ns). Twenty per cent of the subjects were classified as hypertensive with the mercury sphygmomanometer and 19% with the Omron HEM-SOLAR; between-device agreement in defining BP status was 94% for systolic BP. In 576 subjects evaluated at baseline and after one month, the difference in BP levels between methods did not change, while rating of the Omron HEM-SOLAR device performance showed a tendency towards better scores than at the first assessment. The Omron HEM-SOLAR was rated as ‘good’ or ‘very good’ in 82% and as ‘preferred’ in 95% of cases by investigators, compared to the mercury sphygmomanometer, mainly because of its easy use and the availability of automated measures (85%) and solar power (79%). It was also found more comfortable to use (69%), while the mercury sphygmomanometer was subjectively rated as more durable in 30% of cases. Performance criteria were also rated

highly by the users.

**Conclusions:** This study shows that the Omron HEM-SOLAR is an accurate device both in laboratory validation and in field-testing, is preferred by healthcare workers and is easy and practical to use. Considering its low cost, operational simplicity and other advantages, such as being solar powered, it is likely to be a valuable tool for improving BP measurement and control, particularly in LRS settings with non-physician health workers.

#### CLINICAL PRESENTATION AND BACTERIOLOGY OF DIABETIC FOOT ULCERS IN MULAGO HOSPITAL

Pario A, Nambuya A, Nakwagala FN

Kaddumulindwa Deogratious Endocrinology Unit, Makerere University Medical School, Kampala, Uganda

**Introduction:** Diabetic foot ulcers are a common cause of morbidity and mortality in Mulago Hospital. The presence and severity of peripheral neuropathy and peripheral arterial disease determines treatment options and ulcer outcome. Infection of diabetic foot ulcers is a commonly encountered problem and is an important cause of morbidity, prolonged hospital admission and amputations. Multidrug-resistant organisms (MDROs) are emerging in diabetic foot infections. The clinical presentation and bacteriological profile of diabetic foot ulcers in Mulago Hospital is not known.

**Aims:** To describe the clinical presentation of peripheral neuropathy and peripheral arterial disease, and to identify the common bacterial isolates from diabetic foot ulcers and their susceptibility patterns to commonly used antibiotics in Mulago Hospital.

**Methods:** This was prospective study involving 60 patients with diabetic foot ulcers admitted to the endocrinology unit at Mulago Hospital between July and December 2010. Cases were recruited consecutively after provision of written consent. The socio-demographics of the patients and relevant clinical history on the diabetic foot ulcers were noted. Both feet were examined for peripheral neuropathy and peripheral arterial disease using standard clinical methods. Deep-tissue swabs from the ulcers were taken for both aerobic and anaerobic cultures and for susceptibility tests, using standard microbiological methods.

**Results:** The majority (56.7%) of the patients had neuro-ischaemic foot ulcers, followed by ischaemic and neuropathic ulcers in equal proportions (18.3%) and unclassified (no features of neuropathy and ischaemia) (6.7%). Gram-negative aerobes were most frequently isolated (80.6%), followed by gram-positive aerobes (19.4%). No anaerobe was isolated. Polymicrobial infection was 41.7%, and 84% of the isolates were positive for MDROs. ESBL production and MRSA were noted in 43.5 and 60% of the bacterial isolates, respectively.

**Conclusion:** Diabetic foot ulcers in this population of patients were mostly neuro-ischaemic with varying severity of neuropathy. Most ulcers occurred in the setting of normal dorsalis artery pulse and impaired/absent posterior tibial artery pulse. Infection was mostly aerobic Gram-negative with a high prevalence of MDROs. Emerging ESBL and MRSA were noted in diabetic foot infections. The results of our study can be used to start empirical antibiotic therapy in patients with diabetic foot ulcers but there is a need for continuous surveillance of resistant bacteria to provide the basis of empirical therapy to reduce limb loss and death.

#### VITAMIN C AND OTHER MICRONUTRIENT DEFICIENCIES IN URBAN BLACK AFRICAN PATIENTS WITH HEART FAILURE IN SOUTH AFRICA: IDENTIFYING THE NEED FOR TARGETED NUTRITIONAL INTERVENTION PROGRAMMES

Pretorius S,<sup>1</sup> Stewart S,<sup>1,2</sup> Walker K,<sup>2</sup> Crowther N,<sup>3</sup> Snyman T,<sup>3</sup> Sliwa K<sup>1</sup>

<sup>1</sup>Soweto Cardiovascular Research Unit, Department of Cardiology, Chris Hani Baragwanath Hospital, University of the Witwatersrand, South Africa

<sup>2</sup>Preventative Cardiology, Baker Heart Research Institute, Australia  
<sup>3</sup> Department of Chemical Pathology, University of the Witwatersrand, South Africa  
 e-mail: sandra.pretorius@nashuaisp.co.za

**Background:** Reports from the developed world suggest that many patients with heart failure (HF) suffer from malnutrition, with the potential for impaired quality of life, disease progression and high morbidity and mortality rates. Malnutrition may be of particular importance in the natural history of HF in the developing world. It is generally accepted that sodium intake should be restricted in persons with CHF, but it is equally important to recognise and correct malnutrition and deficiencies in specific micronutrients (e.g. vitamin C deficiency may contribute to oxidative stress in a predominance of patients with non-ischaemic cardiomyopathy) but there is a paucity of such data.

**Methods:** We collected demographic, anthropometric (including body mass index: BMI) and clinical data from 41 consecutive black African patients with HF from Soweto, South Africa, who were enrolled in a HF management trial. Baseline, macro- and micronutrient intakes were measured with a validated quantitative food-frequency questionnaire. Nutrient intake profiles were then compared to WHO/FAO recommended intakes using 'Food Finder 3' (based on RSA food composition tables).

**Results:** There were 21 men, who were significantly older than the 20 women ( $51 \pm 14$  vs  $47 \pm 18$  years;  $p < 0.05$ ), but with a similar BMI profile ( $26 \pm 5$  vs  $26 \pm 7$  kg/m<sup>2</sup>, respectively;  $p = ns$ ). The predominant form of HF was hypertensive HF (58%). Compared to the WHO/FAO recommendations, both men and women were deficient in respect of their intake of vitamin C. In men, vitamin C nutritional intake was  $84 \pm 88$  vs  $90$  mg/d (WHO/FAO). Similarly, in women, vitamin C intake was  $50 \pm 42$  vs  $75$  mg/d (WHO/FAO). As a result, plasma vitamin C concentrations were markedly deficient in both men ( $5.2 \pm 4.3$   $\mu$ mol/l: normal range 23–85  $\mu$ mol/l) and women ( $7.8 \pm 10.1$   $\mu$ mol/l: normal range 23–85  $\mu$ mol/l). Both men and women had inadequate nutritional intake of selenium, [ $40 \pm 19$  and  $37 \pm 25$  mcg/day, respectively vs  $55$  mcg/d (WHO/FAO)] and folate [ $231 \pm 109$  and  $190 \pm 112$  mcg/day respectively vs  $400$  mcg/d (WHO/FAO)].

**Conclusions:** These preliminary data highlight potentially inadequate consumption of vitamin C and other micronutrients in a group of black African patients from an urban African community. Given the potential importance of vitamin C in reducing oxidative stress and the cardio-protective benefits of these other micronutrients, a focus on improving fruit, vegetable and wholegrain food consumption (both in terms of HF prevention and management) via 'healthier food' programmes that are economical and culturally specific may be particularly effective in this context.

#### PREVALENCE OF HYPERTENSION AND ADEQUACY OF ITS CONTROL IN CHRONIC KIDNEY DISEASE PATIENTS AT KENYATTA NATIONAL HOSPITAL

Rajula AC, Ogola EN, Kayima J, Maritim M  
 University of Nairobi, Nairobi, Kenya  
 e-mail: allanrajula@yahoo.com

**Introduction:** Chronic kidney disease (CKD) is a growing problem worldwide. The prevalence in the developing world remains largely unknown, but is estimated at about 150 to 200 patients per million population. CKD is a major risk factor for cardiovascular disease (CVD). Hypertension is common in CKD. It not only increases the risk of progression to end-stage renal failure but also markedly increases the risk of CVD. Control of hypertension has been shown to be feasible in several studies, with marked reduction in cardiovascular risk. The adequacy of blood pressure control in CKD patients in our set-up is unknown and this study aimed to identify its magnitude. **Methods:** Patients were recruited over a three-month period from January to March 2009. Files of patients attending the renal clinic at the Kenyatta National Hospital were screened for eligibility. Suitable,

consenting patients underwent urinalysis and a serum creatinine estimation using the Cockcroft-Gault formula. CKD diagnosis and classification were as per the KDOQI working group. A history of hypertension and drug use was obtained. BP was measured as per WHO guidelines. Hypertension was defined as BP  $\geq 130/80$  mmHg or on anti-hypertensive medication. Data analysis was done using SPSS version 11.5, using appropriate statistical methods.

**Results:** Ninety-six patients were recruited, 50 males and 46 females; mean age  $48.2 \pm 19.9$  years. The prevalence of hypertension was 76%, of whom 16.6% had achieved target BP. There was a trend of increasing hypertension prevalence with increasing CKD stage, which however did not reach statistical significance. Socio-demographic variables did not predict the presence of hypertension.

**Conclusions:** There was a high prevalence of hypertension in the CKD population, with poor BP control. There was a tendency towards correlation with CKD stage but socio-demographic factors were not predictive. There is a need for more aggressive BP control in the CKD population.

#### PREVALENCE OF CARDIOVASCULAR RISK FACTORS IN SOUTH AFRICAN WOMEN RECEIVING LIPID-LOWERING THERAPY: RESULTS FROM THE CEPHEUS SOUTH AFRICA STUDY

Rapeport N, Schamroth C  
 Milpark Hospital, Johannesburg, South Africa  
 e-mail: nrapeport@global.co.za

**Objectives:** Although the prevalence of risk factors for vascular disease in developing nations may be known, the distribution of these factors between the different ethnic groups is largely unknown, and this is particularly evident in women. The Centralised Pan-South African survey on the under-treatment of Hypercholesterolemia in patients Using lipid-lowering drugS (CEPHEUS) evaluated what proportion of patients treated with lipid-lowering drugs were achieving goal, and provided information on their risk factors.

**Methods:** Patients who had been on lipid-lowering drugs for at least three months, with no dosage adjustment for a minimum of six weeks were included.

**Results:** Of the 2 996 patients enrolled, 1 424 (47%) were female; 510 patients were of urbanised African ancestry [342 (67%) female]. Compared to the women of other ethnic groups (567 Caucasian, 259 mixed ancestry, 256 Asian), patients of African ancestry were more obese (BMI 34 vs 29, 31 and 29 kg/m<sup>2</sup>, respectively), and had a higher prevalence of hypertension (88 vs 64, 84 and 67%) and type 2 diabetes mellitus (74 vs 26, 54 and 55%). Diabetic control was poorer (HbA<sub>1c</sub> 8.7 vs 6.3, 7.4 and 7.5%). These patients were younger (mean age 57 vs 62, 59 and 58 years), and few had established vascular disease or a history of smoking.

**Conclusions:** Female patients of African ancestry receive lipid-lowering therapy primarily due to the presence of diabetes mellitus rather than the presence of vascular disease. They have the highest prevalence of obesity, hypertension and diabetes mellitus (with poor control) compared to women of other ethnic groups.

#### TISSUE DOPPLER AND STRAIN ANALYSIS OF PATIENTS UNDERGOING PCI FOR ACUTE MYOCARDIAL INFARCTION WITH HEART FAILURE OR CARDIOGENIC SHOCK

Ratnagiri R, Balakrishnan KR, Kapadia NK  
 Fortis Malar Hospitals, Chennai, India  
 e-mail: ravi63\_in@yahoo.com

**Introduction:** This study aimed at studying the correlation between tissue Doppler parameters and eventual short-term clinical course in sick patients with acute myocardial infarction.

**Methods:** We analysed 40 patients before and after PCI for anterior myocardial infarction with cardiogenic shock or heart failure (Killip 3 or 4) with tissue Doppler and strain imaging using a Philips IE33 system. There were 28 males and 12 females in the group. The

age range was 31–78 years; 14 patients were in cardiogenic shock on admission and 28 in left ventricular failure; 30 had anterior MI with LAD occlusion and 10 with inferior or lateral MI. All patients were taken up for urgent PCI with stent implant within two hours of admission. Tissue Doppler echo was done on admission and 12, 24, 36, 72 and 96 hours after PCI. The PCI was successful with TIMI 3 flow in 98% of cases; 35 cases required IABP support. The mortality at 72 hours was 32% (13 out of 40 cases); 50% of cases remained in LVF at 96 hours. Patients with valvular stenosis were excluded from the study. Parameters assessed were global ejection fraction, regional wall motion changes, valve regurgitation, TVI-based velocity gradient with segmental TT plot, septal to lateral wall delay, regional strain rate evaluation with CAMM plot and ‘bullet’ map, Dp/dt measurement using MR jet,  $e/e'$  ratio to assess LA pressures and myocardial performance index measurements (Tei Index). Baseline EF was 18–38% (average 24%),  $e/e'$  ratios 12–18 (average 15), dp/dt 1 100–840 (average 980) and Tei index 0.37–0.66 (average 0.55). Survival at 30 days was 60%.

**Results:** Post PCI, the patients who were not in LVF or low cardiac output had significantly improved dp/dt values ( $p < 0.01$ ), improved Tei index ( $p < 0.01$ ), improved global EF ( $p < 0.01$ ) and improved segmental TVI-based TT plots and strain rate values ( $p > 0.001$ ). Also all patients who showed recovery from LVF or shock had improved tissue Doppler parameters at 36 hours with no late improvement at 96 hours.

**Conclusion:** Tissue Doppler parameters can be a good guide to assess recovery from PCI after acute myocardial infarction (Killip 3 or 4). Early recovery of tissue Doppler parameters at 36 hours seems to predict eventual recovery. Also tissue Doppler may be used as a routine tool in the coronary care unit to monitor sick patients after acute MI.

### SMOKING AND TOBACCO CONTROL IN NIGERIA

Rabiu DO, Laing L

Department of Public Health Sciences, School of Public Health, University of Alberta, Canada  
e-mail: Oladeler@ualberta.ca

**Introduction:** Smoking accounts for a large proportion of deaths in the world. Despite the associated health risks, many people still continue to smoke. In Africa for example, cigarette consumption is increasing and it is an incontrovertible fact that the massive wave of tobacco control and smoking bans in the Western world led to this increase. In Africa, the reality is that the burden of tobacco use is huge, as it is elsewhere in the world, and it contributes to the burden of other diseases such as cancer, respiratory diseases and cardiovascular diseases (non-communicable diseases). One of the major risk factors for non-communicable diseases in Africa is tobacco use. This study was significant in understanding why people continue to smoke and what could reduce the rate of smoking in the Nigerian population. A reduction in the burden of tobacco use will lead to a significant reduction in the burden of cardiovascular diseases in Africa.

**Methods:** In this critical ethnographical study, we focused on why smokers continue to smoke in Nigeria, as well as what the strength of evidence is that Western tobacco control policies will work in Africa. Data were collected through a systematic review and fieldwork in Nigeria, which included participant observation, in-depth interviews and focus groups.

**Results:** We searched for common themes throughout the data, compared the themes in each transcribed note, looked for commonalities and differences, and identified the overall themes that best described the experiences and responses of participants.

**Conclusion:** This study adds to the body of literature on global tobacco control. The majority of Nigerians believe that the principles and knowledge from Western tobacco control policies is remarkable, but ultimately, what will work to reduce smoking rate in the population is to have tobacco control policies tailored specifically to the needs of the Nigerian population. Clearly, there is a need for effective public education campaigns against smoking in Nigeria. Many of the

smokers that we interviewed had limited knowledge on the adverse health effects of smoking and seriously underestimated the dangers of cigarette smoking.

### THE PREVALENCE AND RELATIONSHIP TO HYPERTENSION OF THE R563Q MUTATION OF THE $\beta$ -CHAIN OF THE EPITHELIAL SODIUM CHANNEL IN SOUTHERN AFRICA

Rayner B, Jones E, Owen T

Divisions of Nephrology and Hypertension, and Chemical Pathology, University of Cape Town, South Africa

Multiple factors underlie susceptibility to essential hypertension, including significant genetic and environmental effects. Salt sensitivity appears more prevalent in people of indigenous African origin. The epithelial sodium channel (ENaC) is an attractive candidate gene for salt sensitivity as it is the final regulator of sodium balance. The R563Q mutation of the ENaC is associated with low renin/low aldosterone hypertension in black Africans and people of mixed ancestry, hypertension in a family study and severe early pre-eclampsia.

**Aim:** The purpose was to investigate the prevalence of the R563Q mutation in the multi-ethnic populations of South Africa, its association with hypertension and blood pressure, and the response to amiloride in patients with the R563Q mutation with resistant hypertension.

**Methods:** Samples were obtained from hypertensives and normotensive controls attending hypertension clinics in Cape Town and Johannesburg, and from unselected San living in the northern Cape and Namibia. Patient demographics were recorded and DNA was analysed for the R563Q mutation. In Cape Town, patients with the R563Q mutation referred for resistant hypertension received amiloride 5–10 mg daily and their response to treatment was monitored. The study was approved by the University of Cape Town Research Ethics Committee.

**Results:** A total of 1 939 (1 468 hypertensives and 471 normotensive controls) unrelated subjects were assessed for the R563Q mutation in Cape Town and Johannesburg. Eighty-seven (5.9%) of the hypertensives were R563Q positive versus eight (1.7%) of the normotensive controls ( $p < 0.0005$  for association with hypertension). In the Namibian and Khomani San, 19.5 and 18.8% of unselected subjects were R563Q positive, but there was no association with hypertension. Overall, the Hardy–Weinberg frequencies in the combined San groups reached borderline statistical significance ( $\chi^2 = 2.7908$ ,  $p = 0.095$ ). Sodium intake was significantly lower in the San compared to the urban subjects (7.3 vs 12.2 mmol/mmol,  $p = 0.016$ ). Aldosterone levels were significantly lower in the R563Q-positive group, 52 vs 96 pmol/l ( $p = 0.035$ ). Twenty-two R563Q-positive patients with resistant hypertension received amiloride 5–10 mg. The mean reduction in blood pressure was 36/17 mmHg ( $p < 0.0001$  for systolic and diastolic BP).

**Conclusion:** The R563Q mutation is strongly associated with hypertension in urban areas in South Africa. Given the very high prevalence of the mutation in the San people, this is likely the origin of the mutation, but it is not associated with hypertension, presumably due to their lower sodium intake. Screening patients with resistant hypertension in South Africa for the R563Q mutation provides a feasible pharmacogenetic approach to treatment.

### HCV CARDIOMYOPATHY: MORE DATA FOR UNDERESTIMATED AETIOLOGY OF CARDIAC DISEASES IN AFRICA

Saleh A,<sup>1</sup> Negm H,<sup>1</sup> Matsumori A,<sup>2</sup> Fouad H,<sup>3</sup> Onsy A,<sup>3</sup> Hamdy E<sup>4</sup>

<sup>1</sup>Cardiovascular and Ultrasonography Research Unit (CURU), Academy of Scientific Research and Technology, Cairo, Egypt

<sup>2</sup>Cardiology Department, Faculty of Medicine, Tokyo University, Japan

<sup>3</sup>Cardiology Department, Faculty of Medicine, AinShams University, Cairo, Egypt

<sup>4</sup>Clinical Pathology Department, Faculty of Medicine, Cairo University, Cairo, Egypt

e-mail: salehcardio@hotmail.com

**Introduction:** The disease burden of hepatitis C (HCV) is substantially increasing in the Egyptian community and it is estimated that the prevalence has reached 22% of the total population. Recently, there was a global alert for cardiovascular complications of HCV.

**Objective:** To evaluate the left ventricular (LV) diastolic functions of HCV patients using tissue Doppler imaging and NT-proBNP.

**Methods:** Thirty HCV patients and 30 age-, gender- and BMI-matched controls were evaluated by PCR, ECG, echocardiography, conventional Doppler, pulsed-wave tissue Doppler (PW-TD), strain rate imaging and NT-proBNP to assess LV diastolic function. Mean age was  $32.8 \pm 5.1$  years in the HCV group and  $29.8 \pm 6.6$  years in the control group. Cardiovascular anomalies and predisposing factors were excluded.

**Results:** The HCV group showed a statistically significant increase in QTc interval, A wave, and deceleration time ( $p < 0.05$ ), a highly significant decrease in tissue Doppler Ea ( $p < 0.001$ ), Aa ( $p < 0.001$ ), and Ea/Aa ratio, a highly significantly increased E/Ea ratio ( $p < 0.001$ ), and significant increase in SRa ( $p < 0.05$ ). NT-proBNP levels showed a highly significant increase, with a mean value of  $222 \pm 283$  pg/ml in the HCV group and  $32.7 \pm 21.2$  pg/ml in the control group ( $p < 0.001$ ). The best cut-off value of NT-proBNP to detect diastolic dysfunction in the HCV group was 213 pg/ml. No statistical differences in SRe/SRa and E/SRe ratios were observed, however they had a significant correlation with NT-proBNP level and tissue Doppler parameters.

**Conclusion:** These data show the first direct evidence that HCV infection causes diastolic dysfunction without any other predisposing factors, probably due to chronic inflammatory reaction with mild fibrosis in the heart. Previous studies did not follow strict inclusion and exclusion criteria to confirm the independent role of HCV in causing diastolic dysfunction. Tissue Doppler was more sensitive in diagnosing diastolic dysfunction than conventional Doppler. NT-proBNP is a strong indicator of diastolic dysfunction in HCV patients and is directly related to the level of viraemia, hence we recommend its routine use as a follow-up tool in HCV patients.

### THE COST OF OUTPATIENT MANAGEMENT OF CHRONIC HEART FAILURE IN CHILDREN WITH CONGENITAL HEART DISEASE

Sadoh WE,<sup>1</sup> Nwaneri DU,<sup>2</sup> Owobu AC<sup>3</sup>

Department of Child Health, University of Benin Teaching Hospital, Benin City, Edo State, Nigeria

e-mail: sadohehi@yahoo.com

**Introduction:** Common congenital heart diseases such as ventricular septal defects, patent ductus arteriosus, atrial septal defects and atrioventricular canal defects are associated with recurrent heart failure and bronchopneumonia. In Western countries, these structural heart diseases are corrected surgically or closed via catheter devices as soon as they are detected. In developing countries on the other hand, these interventions are often delayed or not done because of non-availability or inadequate facilities. Therefore affected children are often on chronic anti-failure medications and are required to attend clinics regularly. This study was carried out to evaluate the cost burden to the families of children with structural heart diseases being managed on an outpatient basis for chronic heart failure.

**Methods:** This longitudinal study was conducted in the paediatric cardiology clinic of the University of Benin Teaching Hospital, Nigeria. The families of children with congenital heart disease who were being managed in the clinic for chronic heart failure were recruited for the study. With the aid of a structured questionnaire, data on the family's monthly income, cost of anti-failure medicines, transportation and the number of man-hours spent on clinic visitations were collected on a monthly basis for three consecutive months. The percentage of the mean monthly income spent on medicines, transportation and the total cost of care was also computed.

**Results:** Thirty-two families were recruited for the study. There were 32 children; 16 males and 16 females, both groups with a mean age

of  $2.2 \pm 1.7$  years. The mean monthly income was  $\$314.93 \pm 271.36$ , while the mean percentage of income spent on total care was  $16.3 \pm 26.2\%$ , with a range of 0.7–122%. Eleven (34.4%) of the patients spent over 10% of their family's income on total care. Families from a low socioeconomic class spent a significantly higher percentage of income on medicines and total care compared to those in middle or high socioeconomic classes,  $p = 0.0095$  and  $0.041$ , respectively. Only three (0.09%) patients had surgery for their condition.

**Conclusion:** The mean percentage of income spent on care was significant and amounted to catastrophic health expenditure for 34.4% of the families. There is a need to improve the existing cardiac centres as well as establish new ones. Government subsidy of the cost of open-heart surgery for children with congenital heart diseases is recommended.

### EFFECTS OF HAART ON CARDIOVASCULAR RISK PROFILE OF HIV/AIDS PATIENTS IN AMINU KANO TEACHING HOSPITAL, KANO, NIGERIA

Sani MU,<sup>1</sup> Muhammad S,<sup>1</sup> Okeahialam BN<sup>2</sup>

<sup>1</sup>Department of Medicine, Bayero University Kano/Aminu Kano Teaching Hospital, Kano, Nigeria

<sup>2</sup>Department of Medicine, Jos University Teaching Hospital, Jos, Nigeria

e-mail: sanimahmoud@yahoo.com

**Introduction:** There are an estimated 33.2 million persons living with HIV worldwide. Highly active antiretroviral therapy (HAART) allows patients to live longer, and so they are more likely to develop the long-term complications of AIDS, including cardiovascular complications. HAART has become more accessible to HIV/AIDS patients worldwide, including Nigeria. There is growing concern that the metabolic complications associated with HIV and HAART, including dyslipidaemia and hyperglycaemia may increase cardiovascular risk and lead to cardiovascular diseases. We therefore set out to describe the cardiovascular risk profile of HIV/AIDS patients on HAART in our environment.

**Methods:** This was a cross-sectional, comparative study carried out in Aminu Kano Teaching Hospital (AKTH). Between May and August 2009, HIV-positive subjects who attended the HIV speciality clinic in AKTH were recruited. The study patients were those who had been on HAART for at least six months, compared to age- and gender-matched HAART-naïve subjects. Patients who satisfied the inclusion criteria were recruited consecutively until the required sample size was obtained. Data were collected using the pre-tested interviewer-administered questionnaire. Socio-demographic information, anthropometric measurements and blood pressure and electrocardiograms were obtained from the subjects in a standardised manner. Venous samples were collected for the necessary investigations and analysed at the hospital's central laboratory.

**Results:** Two hundred subjects were studied, 100 were on HAART (group 1) and the other 100 (group 2) were HAART naïve. The mean age for all the participants was  $32.5 \pm 7.55$  years, while the corresponding means for groups 1 and 2 were  $32.81 \pm 7.63$  years and  $32.36 \pm 7.50$  years, respectively. The prevalence of hypertension was 17% in group 1 and 2% in group 2 subjects ( $p \leq 0.001$ ), while generalised obesity was found in 11% of group 1 and 2% of group 2 patients ( $p = 0.010$ ). Other abnormalities found in groups 1 and 2 respectively were as follows: high total cholesterol (31 vs 7%,  $p \leq 0.001$ ), low HDL cholesterol (61 vs 76%,  $p = 0.022$ ), high LDL cholesterol (36 vs 26%,  $p = 0.126$ ), high triglycerides (19 vs 13%,  $p = 0.247$ ), impaired fasting glycaemia (5 vs 2%,  $p = 0.247$ ) and the metabolic syndrome (21 vs 9%,  $p = 0.017$ ). Diabetes mellitus was found in 3% of both groups ( $p = 1.0$ ).

**Conclusion:** HIV-infected patients on HAART demonstrated a high prevalence of hypertension, dyslipidaemia and the metabolic syndrome. However, we found no significant effect of HAART on diabetes and impaired fasting glucose levels.

**ASSESSMENT OF THROMBOLYSIS IN MYOCARDIAL INFARCTION IN DAKAR'S CARDIOLOGICAL ENVIRONMENT**

Sarr SA, Diao M, Ndiaye MB, Bodian M, Dia MM, Kane AD, Sarr M, Ba SA  
 Cardiology Department, Fann University Hospital, Dakar, Senegal

**Introduction:** Generally in Africa, thrombolysis constitutes the main method of coronary reperfusion therapy for the management of acute myocardial infarction. Its frequent use is delayed by constraints such as availability of thrombolytics, their high cost and also lateness of diagnosis and management.

**Objectives:** To evaluate thrombolysis in the cardiological environment by assessing its modalities and the results of its use.

**Methods:** We collected 49 medical files of patients admitted for myocardial infarction. Streptokinase therapy was the thrombolytic treatment used for all patients.

**Results:** All the patients were admitted with chest pain. The average period between the onset of chest pain and the beginning of thrombolysis was 6.29 hours. Heart failure and arrhythmias were the most frequent complications, found in 20.4% of cases. The clinical signs of successful thrombolysis were observed in 76% of cases. Two cases of accelerated indioventricular rhythm were noticed (4.08%). Complications due to thrombolysis were found in 24.5% of cases. In 75% of cases, bleeding was the main cause of complications. Anaemia was present in five cases among those who bled, and the average level of haemoglobin was 10.5 g/dl. Further complications were sudden arterial hypotension during thrombolysis (14.3%), dizziness (4.08%) and hypersensitivity ('allergy') in one patient. The univariate analysis however revealed a meaningful difference in the bleeding frequency between patients who received clopidogrel and those who did not ( $p = 0.01$ ). The mortality rate during hospitalisation was 12.24% and death appeared meaningfully related to Killip stage IV dyspnoea ( $p = 0, 01$ ).

**Conclusion:** Thrombolysis constitutes the main therapeutic route for coronary reperfusion when managing myocardial infarction. However, bleeding complicates thrombolysis, hence our dual interest to master its contraindications and perform a close follow up on all patients involved.

**PREVALENCE OF CARDIOVASCULAR RISK FACTORS AND CONTROL OF HYPERLIPIDAEMIA IN SOUTH AFRICA: RESULTS FROM THE CEPHEUS SOUTH AFRICA STUDY**

Schamroth C,<sup>1</sup> Raal F,<sup>2</sup> Vandenhoven G,<sup>3</sup> Temmerman A-M<sup>3</sup>

<sup>1</sup>Department of Cardiology, Milpark Hospital, Johannesburg, South Africa

<sup>2</sup>Department of Medicine, Johannesburg Hospital, Johannesburg, South Africa

<sup>3</sup>Astra-Zeneca

**Objectives:** The control of risk factors and hyperlipidaemia in developing nations is largely unknown, and this is particularly evident in a paucity of data regarding patients of African ancestry. The CEntralised Pan-South African survey on the under-treatment of HypErcholesterolemia in patients Using lipid-lowering drugS (CEPHEUS) evaluated cardiovascular risk factors and what proportion of patients treated with lipid-lowering drugs achieved goal.

**Methods:** Patients who had been on lipid-lowering drugs for at least three months, with no dosage adjustment for a minimum of six weeks were included.

**Results:** We enrolled 2 996 patients, 1 572 (52%) were males and the mean age was 59.4 years; 510 (17%) were urbanised patients of African ancestry. Compared to the other ethnic groups [1 385 (46%) Caucasian, 481 (16%) mixed ancestry, 620 (20%) Asian], patients of African ancestry were more obese (BMI 32 vs 29, 30 and 28 kg/m<sup>2</sup>, respectively), and had a higher prevalence of hypertension (87 vs 64, 80 and 66%) and type 2 diabetes mellitus (73 vs 31, 54 and 55%). Overall 42% patients of African ancestry were not at ESC/South African guideline LDL-C goal versus 47% of the entire study cohort.

**Conclusions:** The results indicate that the management of hypercho-

lesterolaemia in South Africa (a developing nation) is comparable to data available from other surveys in developed nations. Patients of African ancestry presented with higher risk factors, in particular hypertension and diabetes, but were just as likely to be under-treated as their non-black counterparts.

**HIV AS A RISK FACTOR FOR CARDIAC DISEASE IN BOTSWANA: A CROSS-SECTIONAL STUDY**

Schwartz T,<sup>1</sup> Girgis M,<sup>2</sup> Steen TW,<sup>3</sup> Sjaastad I<sup>4</sup>

<sup>1</sup>Institute for Experimental Medical Research, Oslo University Hospital, Oslo, Norway; Institute for Clinical Medicine, Medical Faculty, University of Oslo, Norway; Princess Marina Hospital, Ministry of Health, Gaborone, Botswana; Department for International Collaboration, Haukeland University Hospital, Bergen, Norway

<sup>2</sup>Princess Marina Hospital, Ministry of Health, Gaborone, Botswana

<sup>3</sup>Ministry of Health, Gaborone, Botswana; Health and Welfare Authority, Oslo, Norway

<sup>4</sup>Institute for Experimental Medical Research, Oslo University Hospital, Oslo, Norway; Institute for Clinical Medicine, Medical Faculty, University of Oslo, Norway; Department of Cardiology, Oslo University Hospital, Oslo, Norway

e-mail: thomas.schwartz@medisin.uio.no

**Aims:** We examined the HIV prevalence among patients with severe heart disease and assessed how human immunodeficiency virus (HIV) has influenced the spectrum of heart diseases in Botswana. Furthermore, we evaluated the specificity of cardiothoracic ratio (CT-ratio) on chest X-ray (CXR) as a marker for cardiac disease in a sub-Saharan setting.

**Methods:** The total study group of 239 patients aged 14–97 years with cardiomegaly, CT-ratio > 0.53 on CXR, were referred to Botswana's sole hospital-based echocardiographic centre. A clinical examination and echocardiography were performed; 118 patients aged 15–49 years with known HIV status represented the reproductive age group.

**Results:** In the total study group, cardiomyopathies (33%), pericarditis (18%), hypertensive heart disease (18%), rheumatic heart disease (9%) and right-sided heart failure (8%) were the main causes of cardiomegaly. Only three patients had a normal echocardiogram; 116 (49%) patients were in NYHA class 3 or 4. In the reproductive age group, HIV prevalence was threefold higher than in the general population, 70 vs 25%, relative risk (RR) = 2.8 (95% CI = 2.5–3.2). We observed a different spectrum of cardiac diseases among the HIV-infected, compared to the HIV-negative individuals. HIV infection was strongly associated with pericarditis and non-peripartum cardiomyopathy (both 35%), RR = 3.6 (95% CI = 3.2–4.1). In those without HIV infection, peripartum cardiomyopathy (29%), hypertensive heart disease (20%) and rheumatic heart disease (20%) were the most common causes of cardiomegaly. The HIV-infected patients had a higher heart rate (104 vs 93 beats/minute) and lower systolic (111 vs 130 mmHg,  $p = 0.006$ ) and diastolic blood pressure (70 vs 79 mmHg,  $p = 0.048$ ) than those without HIV infection.

**Conclusions:** Increased CT-ratio on CXR has a high specificity in detecting severe heart disease (98%) and can be a useful screening tool in areas with limited resources. HIV infection implied a substantially increased risk of developing heart disease. Pericarditis and cardiomyopathy were the most prevalent causes of cardiomegaly in HIV-positive patients. Our findings highlight the profound impact HIV has had on heart diseases in sub-Saharan Africa.

**INOTROPIC FUNCTION OF THE HEART IN PATIENTS WITH VASCULAR ENDOTHELIAL DYSFUNCTIONS**

Shah M,<sup>1,2</sup> Keter E,<sup>1</sup> Monro J,<sup>1</sup> Julu P<sup>1,2</sup>

<sup>1</sup>Breakspear Medical Group, Hemel Hempstead, Hertfordshire, England

<sup>2</sup>Barts and The Royal London NHS Trust and Queen Mary University, London, England

e-mail: musshah@yahoo.co.uk

**Introduction:** Dysautonomia affecting cardiovascular regulation, particularly supine blood pressure and cardiac output, can lead to hypo-perfusion of peripheral tissues. This can develop into vascular endothelial dysfunctions due to prolonged tissue hypoxia. We measured and monitored the inotropic function of the heart in patients with suspected vascular endothelial dysfunctions caused by prolonged peripheral tissue hypoxia.

**Methods:** Consecutive patients who had presenting symptoms of fatigue, orthostatic dizziness, brain fogs plus any other signs of dysautonomia were recruited for assessment of inotropic functions of the heart during isometric exercise of the dominant hand for a duration of three minutes. Each patient was connected to the neuroSco for a continuous record of a modified Einthoven's electrocardiograph (ECG) lead II, simultaneously and in real-time with beat-to-beat arterial blood pressure (BP), cardiac vagal tone (CVT), cardiac sensitivity to baroreflex (CSB), breathing movements, arterial blood gases measured transcutaneously, left ventricular contractility index and an estimation of the duration of the isometric contraction of the heart beat by beat from the pre-ejection period. Left ventricular contractility index was calculated from BP waveform as the rate of pressure increase (dp/dt) during the ejection period of the cardiac cycle. The pre-ejection period was calculated as the time interval between the ECG-QRS complex and the beginning of the ejection period. All these measurements are displayed and stored synchronously and are time-stamped for later analyses of causal relationship.

**Results:** We studied 25 patients, 10 males and 15 females. There was inotropic fatigue during isometric exercise in patients with vascular endothelial dysfunctions, compared with the sustained positive inotropic effect of this exercise in healthy controls in our previous observation. The inotropic fatigue was associated with increased pre-ejection period, indicating that the heart took longer performing isometric contraction than it would otherwise do in healthy subjects. There were no significant differences or any other clearly visible changes in the ECG during inotropic fatigue.

**Conclusion:** Our study shows that dysautonomia causes a more complex cardiovascular dysfunction than is currently realised. Regulation of inotropic function of the heart is not usually assessed in clinics and yet our results suggest that it may be fundamental to clinical symptoms such as exercise intolerance or post-exercise fatigue, because the inotropic fatigue will prevent the realisation of appropriate cardiac output required during physical strain. Prolongation of the duration of isometric contraction of the heart has implications for oxygen consumption and cardiac efficiency during physical strain in these patients.

#### **PREDISPOSING FACTORS AND CLINICAL CHARACTERISTICS OF ATRIAL FIBRILLATION AND FLUTTER AT THE AGA KHAN UNIVERISTY HOSPITAL, NAIROBI**

Shavadia J, Otieno H, Yonga G, Jinah A  
Aga Khan Univeristy Hospital, Nairobi  
e-mail: jay.shavadia@aku.edu

**Introduction:** Scant data exist on the epidemiology and clinical characteristics of atrial fibrillation in Kenya. Traditionally, atrial fibrillation in sub-Saharan Africa is as a result of rheumatic valve disease. However, with economic transition in sub-Saharan Africa, risk factors and associated complications of this arrhythmia are likely to change.

**Methods:** A retrospective observational survey was carried out between January 2008 and November 2010 of all hospital admissions at the Aga Khan University Hospital, Nairobi. Patients with a discharge diagnosis of either atrial fibrillation (AF) or atrial flutter (AFL) were included for analysis. The data-collection tool was similar to the one utilised in the RE-LY registry.

**Results:** Of the 22 144 adult medical admissions to the hospital, 162 patients presented with either AF or AFL (prevalence 0.73%), with AF accounting for 95% ( $n = 154$ ) of the overall. The mean age at presentation was  $67 \pm 17$  years, and the male gender represented 56% ( $n = 91$ ) of the cases. The mean systolic (SBP) and diastolic

(DBP) blood pressure at admission were  $131 \pm 28$  and  $78 \pm 16$  mmHg, respectively, with 45% ( $n = 74$ ) of the patients presenting with a rapid heart rate (resting rate  $> 90$  beats/min). The distribution of atrial fibrillation was as follows: paroxysmal 40%, persistent 20% and permanent 40%, with lone AF accounting for 1.8% ( $n = 3$ ) of the cases.

Common associated medical conditions with AF and AFL included hypertension (68%,  $n = 110$ ), diabetes mellitus (33%,  $n = 53$ ), coronary artery disease (19%,  $n = 31$ ), chronic obstructive airways disease (7%,  $n = 11$ ), excess alcohol intake (5%,  $n = 8$ ), hyperthyroidism (3.7%,  $n = 6$ ) and valvular abnormalities (12%,  $n = 19$ ). Of all the valvular abnormalities, rheumatic valve disease was present in only one-third ( $n = 6$ ) of the cases. Heart failure was present in 38% ( $n = 61$ ) of our patients. One-third of our patients ( $n = 52$ ) presented with symptoms due to rhythm disorders (palpitations, dizziness or syncope) and 15% presented initially with a thromboembolic complication as the initial presentation of AF/AFL. Rate-control medications were administered to 78% ( $n = 127$ ) of all cases, with beta-blockers and digoxin being the more commonly prescribed. DC cardioversion was performed in 8% ( $n = 13$ ), while spontaneous and chemical cardioversion occurred in 8% ( $n = 13$ ) and 5.6% ( $n = 9$ ), respectively. Seventy-seven per cent ( $n = 118$ ) of the patients had a CHADS<sub>2</sub>VASc score  $\geq 2$ , but one-quarter ( $n = 25$ ) of these eligible patients did not receive any form of oral anticoagulation.

**Conclusion:** In our population of AF/AFL patients, hypertension and diabetes mellitus, unlike rheumatic mitral stenosis, were the most commonly associated co-morbidities. A significant proportion of high-risk-for-stroke patients do not receive any form of anticoagulation, and this may account for the large proportion of thromboembolic events as the initial presentation of AF. Stroke risk stratification hence needs to be emphasised and appropriately managed.

#### **ETHNIC DIFFERENCES IN THE PHENOTYPIC EXPRESSION OF HYPERTROPHIC CARDIOMYOPATHY**

Sheikh N,<sup>1</sup> Papadakis M,<sup>1,2</sup> Chandra N,<sup>1,2</sup> Raju H,<sup>1,2</sup> Ghani S,<sup>1</sup> Muggenthaler M,<sup>1</sup> Zaidi A,<sup>1</sup> Gati S,<sup>1,2</sup> Bastiaenen R,<sup>1</sup> Sharma S<sup>1,2</sup>  
<sup>1</sup>St George's University of London, London, United Kingdom  
<sup>2</sup>University Hospital, Lewisham, London, United Kingdom  
e-mail: nabeelsheikh99@yahoo.com

**Introduction:** Hypertrophic cardiomyopathy (HCM) is a heterogeneous condition, with variable expression of phenotype. Current studies are based on predominantly Caucasian cohorts (white patients: WP), therefore the phenotypic manifestations of HCM in individuals of African/Afro-Caribbean origin (black patients: BP) are not fully realised. Data in athletes and hypertensive patients indicate that black ethnicity is associated with a greater prevalence of repolarisation abnormalities on the ECG as well as a greater magnitude of left ventricular hypertrophy (LVH), highlighting the importance of defining the HCM phenotype in this ethnic group.

**Methods:** Between 2001 and 2010, 155 consecutive patients with HCM (52 BP, 103 WP) were assessed in three specialist cardiomyopathy clinics in south London. All individuals underwent comprehensive cardiac evaluation including 12-lead ECG and echocardiography. Patients subject to therapeutic interventions potentially affecting repolarisation patterns were excluded.

**Results:** Black patients exhibited significantly different echocardiographic patterns of LVH, with more concentric (44.2 vs 30.1%) and apical (28.8 vs 11.7%) hypertrophy compared to WP, who exhibited more asymmetric septal hypertrophy (57.3 vs 25.0%) ( $p = 0.004$ ). Black patients exhibited a similar magnitude of LVH compared to WP (maximum left ventricular wall thickness  $17.3 \pm 4.9$  vs  $18.8 \pm 4.1$  mm,  $p = 0.069$ ). Relating to ECG repolarisation abnormalities, BP exhibited significantly more T-wave inversions in the lateral leads (76.9 vs 60.2%,  $p = 0.038$ ) and deep ( $\geq 0.2$  mV) T-wave inversions (69.2 vs 51.5%,  $p = 0.035$ ). Black patients also tended to display more ST-segment depression (50.0 vs 35.0%,  $p = 0.071$ ), although this was not statistically significant. In contrast, WP had significantly more pathological Q waves (23.3 vs 9.6%,  $p = 0.039$ ).

**Conclusions:** Ethnicity appears to exert a significant effect on the ECG and echocardiographic patterns in patients with HCM. A significant proportion of black patients exhibited concentric LVH, highlighting the diagnostic challenges in distinguishing HCM from hypertensive heart disease and physiological adaptation to exercise in black individuals. The greater prevalence of deep T-wave and T-wave inversions in the lateral leads underscores the importance of further evaluation of black individuals with such ECG repolarisation abnormalities, which may represent the initial expression of HCM.

**ETHNIC DIFFERENCES IN REPOLARISATION PATTERNS AND LEFT VENTRICULAR REMODELING IN HIGHLY TRAINED MALE ADOLESCENT (14–18 YEARS) ATHLETES**

Sheikh N,<sup>1</sup> Papadakis M,<sup>1,2</sup> Carre F,<sup>3</sup> Kervio G,<sup>3</sup> Rawlins J,<sup>1</sup> Panoulas V,<sup>2</sup> Chandra N,<sup>1,2</sup> Raju H,<sup>1,2</sup> Ghani S,<sup>1</sup> Muggenthaler M,<sup>1</sup> Zaidi A,<sup>1</sup> Gati S,<sup>1</sup> Bastiaenen R,<sup>1</sup> Sharma S<sup>1</sup>

<sup>1</sup>St George’s University of London, London, United Kingdom  
<sup>2</sup>University Hospital, Lewisham, London, United Kingdom  
<sup>3</sup>French Institute of Health and Medical Research, University of Rennes, Rennes, France  
 e-mail: nabeelsheikh99@yahoo.com

**Introduction:** Studies in adult black athletes (BA) demonstrate a high prevalence of ECG repolarisation changes and echocardiographic left ventricular hypertrophy (LVH) that may overlap with hypertrophic cardiomyopathy (HCM). The prevalence of ECG repolarisation changes and echocardiographic LVH in adolescent BA, the group most vulnerable to exercise-related sudden death from HCM, is unknown.

**Methods:** This study evaluated 219 male adolescent BA (14–18 years, inclusive) with 12-lead ECG and 2-D echocardiography. Results were compared with 1 440 male adolescent WA. Athletes with T-wave inversions and morphological LVH were invited for further investigation with an exercise stress test, 24-hour Holter and CMR.

**Results:** ST-segment elevation was common in both groups but more frequent in BA (63.5 vs 14.9%,  $p < 0.001$ ), while ST-segment depression was exceedingly rare. Both T-wave inversions (21.5 vs 2.9%,  $p < 0.001$ ) and deep T-wave inversions (11 vs 0.3%,  $p < 0.001$ ) were commoner in BA. Black athletes demonstrated greater left ventricular wall thickness ( $10.4 \pm 1.6$  vs  $9.4 \pm 1.2$  mm,  $p < 0.001$ ) compared to WA. Twenty-three (10.5%) BA exhibited a left ventricular wall thickness  $> 12$  mm versus only six (0.4%) WA ( $p < 0.001$ ) showing a similar thickness. None of the athletes exhibited the broader phenotype of HCM on further investigation. In multivariable analysis, black ethnicity was the strongest independent predictor for the presence of T-wave inversions (OR 3.56, 95% CI: 1.56–8.13,  $p = 0.003$ ) and LVH (OR 3.17, 95% CI: 1.77–5.71,  $p < 0.001$ ).

**Conclusions:** As with adult athletes, T-wave inversions and LVH were more prevalent in adolescent BA compared to WA. These findings have important implications in the pre-participation screening era, particularly in countries with a high proportion of BA competing at elite levels, since extrapolation of ECG and echocardiographic criteria, solely derived from Caucasian cohorts, would result in 25.6% of BA requiring further investigations for cardiac pathology.

**CONGENITAL HEART SURGERY: STANDARDISED RATIO OF SURGICAL PERFORMANCE ACCORDING TO THE ARISTOTLE COMPLEXITY SCORE**

Sinzobahamvya N, Arenz C, Sata S, Photiadis J, Haun C, Schindler E, Asfour B, Hraska V  
 German Paediatric Heart Centre, Asklepios Clinic, Sankt Augustin, Germany  
 e-mail: n.sinzobahamvya@asklepios.com

**Objectives:** The Aristotle score quantifies complexity involved in congenital heart surgery by estimating potential for mortality, potential for morbidity and anticipated difficulty of surgical technique.

It defines surgical performance as ‘complexity score times hospital survival’. We studied how expected and observed surgical performances evolved over time.

**Methods:** The 1 818 main procedures carried out from 2006 to 2009 were analysed. Aristotle basic scores and corresponding hospital survival were determined. Related observed surgical performance was thereafter estimated. Expected survival was derived from mortality risks published by O’Brien and co-authors (*J Thorac Cardiovasc Surg* 2009; **138**: 1139–53) in order to calculate the expected performance. Observed performance divided by expected performance was called standardised ratio of surgical performance. This ratio should evolve above 100%.

**Results:** Mean Aristotle basic score was  $7.84 \pm 2.66$ . Forty patients died: observed hospital survival was 97.8% (1 778/1 818). Eighty-eight deaths were anticipated: expected survival was 95.2% (1 730/1 818). Mean observed and expected surgical performances reached  $7.67 \pm 2.60$  and  $7.46 \pm 2.53$ , respectively. Therefore the global standardised ratio of performance attained 102.82% for the whole period. The ratio increased from 2006 (ratio = 101.46%) to 2009 (103.92%). Performance was outstanding for the Norwood procedure, repair of common arterial trunk, aortic arch repair associated with closure of ventricular septal defect and Ross-Konno procedure, with standardised ratios of 118.86, 112.38, 110.86 and 110.33%, respectively. With a ratio of 85.77%, performance was unsatisfactory for pulmonary artery banding.

**Conclusions:** The standardised ratio of surgical performance estimates the efficiency of congenital heart surgery programmes over time, as a whole, as well as for individual surgical procedures. It integrates into one value procedure complexity, postoperative survival and comparison with expected outcome. It paves the way for an accurate comparison of surgical performances across institutions with different case mixes.

**TORSADES DE POINTES**

Solomons HD  
 Johannesburg, South Africa  
 Cell: 083 449 5344

Torsades de pointes means twisting of the points, and is a French term, first described by Dessertenne in 1966. It refers to a specific variety of ventricular tachycardia and is characterised by a twist of the QRS complex around the isoelectric baseline. The blood pressure drops and ventricular fibrillation can result in sudden death. Torsades de pointes is associated with a long QT interval and predisposes the patient to an R-on-T phenomenon, here the R wave representing ventricular depolarisation occurs simultaneously to the relative refractory period at the end of repolarisation. An R-on-T can initiate torsades. The heart rotates on its electrical axis at least 180 degrees. LQTS prolongs the QT interval, and produces long and short RR intervals, and early premature ventricular contraction. Causes include diarrhoea, hypomagnesaemia and hypokalaemia, anti-arrhythmic drugs, hypoxia, acidosis, heart failure, left ventricular hypertrophy, bradycardia, female gender, hypothermia, and sub-arachnoid haemorrhage. Treatment is to withdraw the offending drug, infuse magnesium sulphate, electrical therapy, e.g. implantable cardioverter defibrillator.

**TRANSIENT ISCHAEMIC ATTACKS (TIAS) WITH BARLOW’S SYNDROME**

Solomons HD  
 Johannesburg, South Africa  
 Cell: 083 449 5344

Barlow’s syndrome is a posterior billowing mitral syndrome with associated chest pain and a mid-systolic click. Barlow’s syndrome is also known as floppy disk syndrome. There is a high incidence of TIAs (transient ischaemic attacks) with this syndrome. This relates to activation of platelets as they hit the billowing leaflet. Scanning

electron microscopy shows activation of the platelets, which change from a disc to a sphere. These platelets then aggregate to form micro-emboli. The micro-emboli then lodge in the brain and form micro-infarcts. These micro-infarcts cause major neurological signs, which manifest as cerebro-vascular infarcts.

A double-blind analysis shows the beneficial results of aspirin versus dipyridomol. There is a high incidence of transient ischaemic attacks in billowing mitral leaflet syndrome and the majority of these cases are preventable with cyclo-oxygenase inhibitors. So, theoretically or teleologically speaking, it is possible to use any non-steroidal anti-inflammatory to prevent these harsh sequelae. Platelet aggregation studies to collagen, ristocetin, arachidonic acid and adrenaline show the platelets to be hyperaggregable. This is especially the case in billowing mitral leaflet syndrome where the platelets become hyperaggregable on hitting the prolapsed valve.

### REPERFUSION THERAPY FOR ACUTE ST-ELEVATION MYOCARDIAL INFARCTION (STEMI)

Steingo Leonard

Morningside Mediclinic, Sandton, South Africa  
e-mail: lensteingo@telkomsa.net

**Introduction:** Reperfusion therapy for STEMI involves using thrombolytics or primary percutaneous coronary intervention (PCI), or other strategies including facilitated, rescue or delayed PCI. This presentation will discuss the different forms of reperfusion therapy, including the importance of taking into account the delay in door-to-balloon time (DBT) and clinical risk of the patient. The ultimate aim of reperfusion therapy is to restore coronary blood flow to the culprit vessel as quickly and as efficiently as possible.

**Methods:** I reviewed data from the CADILLAC (Controlled Abciximab and Device Investigation to Lower Late Angioplasty Complications), HORIZONS-AMI (Harmonizing Outcomes with Revascularization and Stents in Acute Myocardial Infarction) and other trials concerning reperfusion therapy, including a recent trial, When Is Door-to-Balloon Time Critical?

**Results:** Short- and long-term outcomes in individuals treated with either primary PTCA or thrombolytic therapy showed better results with primary PCI. The article from Brodie, Gersh *et al.* shows that the one-year mortality rate was lower in patients with short versus long DBT (< 90 min vs > 90 min; 3.1 vs 4.3%,  $p < 0.045$ ). Short DBTs were associated with a lower mortality rate in patients with early presentation (< 90 min; 1.9 vs 3.8%,  $p < 0.029$ ) but not those with later presentation (> 90 min; 4.0 vs 4.6%,  $p < 0.47$ ). Short DBTs showed similar trends for a lower mortality rate in high-risk (5.7 vs 7.4%,  $p < 0.12$ ) and low-risk (1.1 vs 1.6%,  $p < 0.25$ ) patients. Short DBTs had similar relative risk reductions in patients with early presentation in high-risk (3.7 vs 7.0%,  $p < 0.08$ ) and low-risk (0.8 vs 1.5%,  $p < 0.32$ ) patients, although the absolute benefit was greatest in high-risk patients. Facilitated PCI strategies have not yet shown any advantage over primary PCI (ASSENT-4 PCI investigators, FINESSE investigators).

**Conclusion:** It has been shown conclusively that the shorter the reperfusion time in acute STEMI, the better the prognosis. Overall, primary PCI is the method of choice for reperfusion therapy. Shorter door-to-balloon times have an advantage in patients presenting early after onset of chest pain and in higher-risk patients. If primary PCI is available, all patients presenting within about two to three hours from onset of chest pain should be given this option, provided DTB time is less than 90 minutes. It remains to be proven whether facilitated PCI might be beneficial in high-risk STEMI patients presenting early after the onset of symptoms.

### ECHO FINDINGS IN CRS AT UPTH

Tabansi PN,<sup>1</sup> Otaigbe BE,<sup>1</sup> Agbedeyi GO<sup>2</sup>

<sup>1</sup>Department of Pediatrics and Child Health, University of Port Harcourt/University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria

<sup>2</sup>Department of Paediatrics, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria  
e-mail: petronillatabansi@yahoo.com

**Introduction:** Congenital rubella syndrome (CRS) is seen in children whose mothers are infected with rubella during pregnancy especially in the first trimester. CRS is known to affect thousands of children in the developing world because rubella vaccination is not available routinely in most of these countries. It is estimated that between 100 000 and 238 000 children are born with CRS worldwide – most in the developing countries where incidence rates range from 0.4–4.3 per 1 000 live births. These are appalling figures when compared with those from developed nations such as the United States, which report an incidence of 0.01–0.08 per 10 000 live births. Babies born to these mothers have congenital heart diseases (CHD), cataracts, deafness, low birth weight, failure to thrive and signs of CNS damage. Of these, CHD is life threatening and early detection and diagnosis is necessary for improved quality of life.

**Objective:** This study was undertaken to ascertain the echocardiographic findings in confirmed cases of CRS presenting at the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt.

**Methods:** A prospective study was carried out on all confirmed cases of CRS (using the World Health Organisation criteria) seen at the paediatric cardiology clinic of the UPTH from January 2006 to November 2010. The UPTH is the main tertiary healthcare facility in Rivers State, located in the Niger-Delta area of Nigeria and is a major referral centre in the region. A proforma was used to obtain patient's biodata, birth weight, history of rash in pregnancy and prior maternal rubella vaccination. Physical examination and echocardiography were performed by the consultant paediatric cardiologist. All patients were also assessed by the ophthalmologists and otorhinolaryngologists. Echocardiography was done using a Sonosite Micromaxx machine.

**Results:** There were 250 cases of echocardiographically confirmed CHD seen during the study period, of which seven were confirmed cases of CRS. All the cases had microcephaly, 57.1% had microphthalmia and cataracts, and 28.6% were blind. Deafness was seen in 42.9% of cases. Patent ductus arteriosus (PDA) was the commonest cardiac defect seen either in isolation or in combination with a VSD or ASD. Only one child had no cardiac defect. None of the mothers had received rubella vaccination.

**Conclusion:** CRS does exist, although it is under-detected in Port Harcourt and can be readily diagnosed using the WHO case definitions. PDA is the commonest CHD seen in these cases. A heightened awareness is needed among healthcare workers for prompt detection and intervention. We recommend that all health workers be educated on CRS, and routine rubella vaccination be introduced into the immunisation programme for all children in Nigeria, so as to avoid the unnecessary socio-economic, psychological and physical burden associated with care of affected children.

### OCCURRENCE, AETIOLOGY AND MANAGEMENT OF CONGESTIVE HEART FAILURE IN SUB-SAHARAN AFRICA: EXPERIENCE OF THE CARDIAC CENTRE IN SHISONG, CAMEROON

Tantchou TJC, Ambassa JC, Giamberti A,<sup>1</sup> Cirri S,<sup>1</sup> Frigiola A,<sup>1</sup> Butera G<sup>1</sup>

Cardiac Centre, St Elizabeth Catholic General Hospital, Shisong, Kumbo, Cameroon

<sup>1</sup>Department of Paediatric and Adult Cardiology and Cardiac Surgery and GUCH Unit; Policlinico San Donato IRCCS, Milan, Italy  
e-mail: tantchouj@yahoo.fr

**Background:** The aim of the study was to investigate the occurrence, aetiology and management of congestive heart failure in the Cardiac Centre of the St Elizabeth Catholic General Hospital, Shisong in Cameroon.

**Methods:** Between November 2002 and November 2008, a popula-

tion of 8 121 patients were consulted in the referral Cardiac Centre of St Elizabeth Catholic General Hospital. Of these patients, 462 were diagnosed with congestive heart failure according to the modified Framingham criteria for the diagnosis of heart failure. Complementary investigations used to confirm and establish the aetiology of the disease were chest X-ray, electrocardiography and two-dimensional Doppler echocardiography.

**Results:** Results showed the occurrence of congestive heart failure in our centre was 5.7%. Congestive heart failure was diagnosed in 198 females and 264 males, aged between eight and 86 years old, the mean age being  $42.5 \pm 18$  years. Post-rheumatic valvulopathies (14.6%) and congenital heart diseases (1.9%) were the first aetiological factors of congestive heart failure in the young, and cardiomyopathies (8.3%) in the elderly, followed by hypertensive cardiomyopathy (4.4%). Congestive heart failure was also seen in adults with congenital heart diseases (0.01%). In this zone of Cameroon, we found HIV cardiomyopathy (1.6%) and cor pulmonale (8%) were represented aetiological factors not mentioned in previous studies conducted in urban areas of Cameroon. The mean duration of hospital stay for treatment was 13 days, ranging between seven and 21 days, and mortality was 9.2%. All the medications recommended for the treatment of congestive heart failure are available in our centre but many patients are not compliant with the therapy or cannot afford it. Financial limitation is exacerbating the disease and causing premature death.

**Conclusion:** Our data show a high incidence of congestive heart failure, mainly due to post-rheumatic valvulopathies in young patients in our centre. A national programme to fight against rheumatic fever and its complications are of great urgency in our country. The treatment of congestive heart failure is challenging in our milieu, characterised by poor compliance and financial limitations.

#### EARLY RESULTS AND FOLLOW UP IN PATIENTS WITH MITRAL VALVE REPLACEMENT FOR POST-RHEUMATIC VALVULOPATHY CORRECTION

Tantchou TJC, Ambassa J-C, Giamberti A,<sup>1</sup> Butera G<sup>1</sup>

Cardiac Centre, St Elizabeth Catholic General Hospital, Shisong, Kumbo, Cameroon

<sup>1</sup>Department of Paediatric and Adult Cardiology and Cardiac Surgery and GUCH Unit; Policlinico San Donato IRCCS, Milan, Italy

e-mail: tantchouj@yahoo.fr

**Aim:** To study the early outcome and follow up in older children with mitral valve replacement for correction of post-rheumatic valvulopathy.

**Methods:** This retrospective analysis included 29 patients (14 male and 15 female, with a mean age of  $10.5 \pm 6.5$  years (range 9.5–17 years) who underwent mitral valve replacement for correction of moderate to severe post-rheumatic valvulopathy from April 2003 to June 2009. Data from patients' records, operative intervention, and pre-operative and postoperative two-dimensional echocardiographic studies were reviewed. Patients and their family were contacted a month, and three months after surgery and then every three months. The duration of the follow up was from six months to 91 months.

**Results:** Twenty-nine patients (14 males and 15 females) aged between 9.5 and 17 years with a mean age of  $10.5 \pm 6.5$  years underwent mitral valve replacement with a mechanical prosthesis. Mitral valve regurgitation was the commonest echocardiographic diagnosis present in 51.7% of patients; 13.3% of patients had mixed mitral valve disease and 35% had pure mitral stenosis. Before surgery, three patients were in class IV, 10 were in class III, 12 in class II and four in class I according to the New York Heart Association's classification. Patients were extubated from five to 10 hours after surgery with low doses of inotropes. The mean stay in intensive care unit was  $1.5 \pm 0.5$  days. The drains were removed on the third  $\pm 1.5$  post-surgical day in the ward. In the early post-surgical period, the ejection fraction (EF) changed from  $45.3 \pm 1.5$  to  $56.1 \pm 1.4\%$  ( $p < 0.005$ ) in three months, and stayed almost the same after six months  $57.2 \pm 2.7\%$  ( $p > 0.05$ ). At nine months EF was  $55.1 \pm 1.8\%$  ( $p > 0.05$ ) and at 12 months,

$58.4 \pm 1.7\%$  ( $p > 0.05$ ). At the latest patient check up, the EF was  $56.2 \pm 1.3\%$  ( $p > 0.05$ ), however the basal part of the interventricular septum was hypokinetic. The changes in left ventricular diastolic diameter (LVIDD) were as follows: from  $57.2 \pm 1.5$  to  $55.3 \pm 1.1$  mm ( $p < 0.05$ ) after three months, and  $54.2 \pm 2.7$  mm ( $p > 0.05$ ) after six months. After nine months, it was  $55 \pm 1.8$  mm ( $p > 0.05$ ) and after 12 months,  $55.3 \pm 1.7$  mm ( $p > 0.05$ ). It was  $54.6 \pm 0.9$  mm at the last check up of the patients.

**Conclusion:** The study showed very good early results in the post-surgical follow up of patients with valve replacement for the correction of post-rheumatic valvulopathies. Post-surgical echocardiograms were characterised by motion abnormalities in the basal part of the interventricular septum.

#### CHALLENGES IN THE MANAGEMENT OF RHEUMATIC HEART DISEASE: A MULTIDISCIPLINARY CASE PRESENTATION

Tombe M

Bokamoso Private Hospital, Botswana

e-mail: tombemartin@yahoo.com

A female patient, born in 1962, developed rheumatic heart disease, which was managed exclusively in Africa. From 2006, I followed her up for 16 years at Mpilo Central Hospital in Bulawayo, Zimbabwe. The purpose of this presentation is to give a multidisciplinary synopsis of a 16-year follow up of the patient. This will highlight some aspects of the challenges involved, and give room for discussion on updates on rheumatic heart disease and evidence-based medicine in Africa.

#### SECONDARY HYPERTENSION IN ADOLESCENTS: A REPORT ON TWO CASES

Tombe M

Bokamoso Private Hospital, Botswana

e-mail: tombemartin@yahoo.com

**Introduction:** Hypertension is a major public health problem. In most cases it primarily affects older people, and secondary hypertension is rare. Young age, family history and biochemical abnormalities are some clues indicating secondary hypertension. Some secondary hypertensions are curable. This paper aims at presenting similar cases of hypertension in two teenagers. It will hopefully stimulate awareness and improve diagnosis.

**Case 1:** TH was a 14-year-old female who presented on 19 October 2007 with the inability to walk of about two days' duration. She had a history of hypertension for two years. She was on valsartan/hydrochlorothiazide 80/12.5 mg, bisoprolol 25 mg and amlodipine 10 mg once daily. One of her sisters had died aged 18 years of paralysis and hypertension and the mother also had hypertension. TH's blood pressure was 170/107 mmHg and she had proximal weakness. There were no eye or heart complications. Her potassium level was low, 1.9 mmol/l, bicarbonate was 100 mmol/l and the CPK was 43 590 U/l. The creatinine was slightly raised, at 320  $\mu$ mol/l as was her urea at 24 mmol/l. The diagnosis was primary hyperaldosteronism complicated by rhabdomyolysis. She received potassium chloride intravenously, 40 mmol four-hourly, followed by 1.2 g orally three times daily. She was referred to an endocrinologist in South Africa. Her CT scan showed normal suprarenal glands and kidneys. The serum aldosterone was high. The mother also had similar results. The diagnosis was glucocorticoid-remedied hypertension. Spironolactone was stopped and the blood pressure was controlled with prednisolone 30 mg twice daily. She was lost to follow up.

**Case 2:** MK was a 15-year-old female who presented on 11 May 2009 with a one-day history of headache and vomiting. She had a suspected history of secondary hypertension for one year, which was not confirmed because she had changed doctors. She received telmisartan 40 mg, amlodipine 5 mg and spironolactone 20–50 mg once daily. There was no family history of hypertension. Her blood

pressure was 210/155 mmHg and she had no eye or heart abnormalities. Her potassium level was low, 2.4 mmol/l. Her urea and creatinine levels were normal as was the urine. Abdominal ultrasound and CT scan showed a left renal cyst in the lower pole. Her aldosterone and renin levels were high. A renal biopsy showed reninoma. She had a partial left nephrectomy and the histology confirmed reninoma. Her drugs were withdrawn over three months. The blood pressure, renin and the aldosterone levels were normal 15 months post-operatively. The final diagnosis was reninoma, secondary hyperaldosteronism and secondary hypertension, all of which were cured.

**Conclusion:** This paper highlights the importance of a basic clinical approach to help unravel rare cases of secondary hypertension.

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#### **WORST OF TWO WORLDS: TURNING THREATS INTO OPPORTUNITIES**

Yonga G

National Chair, Kenya Cardiac Society; Chair, Department of Medicine, Aga Khan University, East Africa  
e-mail: yongag@gmail.com

Before the burden of communicable diseases (malaria, HIV, tuberculosis, pneumonia, etc) have been adequately controlled, the burden of disease from non-communicable diseases (NCD) (diabetes, cardiovascular disease, cancer, chronic lung disease, etc) are already significant in Kenya and sub-Saharan Africa in general. The economic burden placed on already-challenged budgets of low- and middle-income countries is daunting and calls for innovations in their healthcare systems and policies. Kenya and most other sub-Saharan

African countries are yet to meet the Abuja Declaration target of increasing healthcare expenditure to 15% of budget.

Most sub-Saharan African countries have only recently started NCD departments and/or NCD programmes and they still remain largely under-prioritised and under-funded. The international NCD Alliance has advocated for strengthening of health systems in low- and middle-income countries, and innovative chronic disease-care models that focus on the population's healthcare needs and services, rather than on diseases. Some of the advocated strategies are strengthening already-existing structures of healthcare delivery to provide services for both communicable and non-communicable diseases, and innovative integration of preventive and curative services. Models of care should also integrate the NCDs, rather than approach them as individual diseases.

From 2009 to 2010, we conducted a project in five level 4 and 5 hospitals to explore the feasibility of integrating the management of communicable diseases with non-communicable diseases. Another ongoing project since 2010 is to explore common risk factors for non-communicable diseases among urban children, adolescents and work places, and to plan intervention. Interim results confirm the complexity of the epidemiological transition of disease and the need for innovative healthcare reform, both in the preventive and curative services. These projects, together with others, reveal interesting interactions between communicable diseases and NCDs at the level of causation/mechanism of disease and also at the level of socio-economic determinants of disease. They also reveal possible opportunities for integration of care at an individual and population level. Capacity building, a multi-sectoral approach, and public-private partnerships will also be required to improve the healthcare system.

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