bromide assay on bovine pulmonary aortic endothelial cells (BPAEC). When grown to confluence, BPAEC cells were induced with stress and then treated with the 3 extracts (50 and100µg/mL) over 48 hours with and without Nw-nitro-L-arginine methyl ester (NOS inhitor), S-(2-Boronoethyl)-L-cysteine hydrochloride (arginase inhibitor) and L-arginine supplement. Apoptosis, mitochondrial activity, nitric oxide production and arginase activity was measured using caspase 3, resazurin, nitrite and arginase activity assay kits.
**Results:** Results showed that P. cyan mushroom extracts have poor antioxidant activity. The results also showed that stress induced cells had lower mitochondrial activity as well as higher caspase 3 and arginase activities than the normal cells.
**Conclusion:** The results suggested that P. cyan, extracted with hot water, is safer and has beneficial arginase-downregulation effects. However, the results also suggested that the cold-water extracts of P. cyan have upregulating-arginase activity which may promote BP increase. Caution needs to be exercised, especially when consumed by individuals who suffer from conditions such as hypertension.

## Effectiveness and tolerability of Perindopril plus Amlodipine single pill combination (with or without diuretics) in Nigeria: The 13-City hypertension study

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**Introduction:** Although the benefits of antihypertensive combination therapy, including single pill combinations (SPCs) like Perindopril plus Amlodipine, are well known, efficacious combinations for the black African population are a subject of debate and large population efficacy studies using contemporary antihypertensive combinations are still missing in this population group. We therefore decided to evaluate the blood pressure (BP) lowering efficacy and tolerability of Perindopril plus Amlodipine SPC in black African patients residing in Nigeria.
**Methods:** The 13-City Hypertension Study was a multicentre, prospective, observational programme amongst hypertensive patients with 4-week, 8-week and 12-week follow-up using Perindopril plus Amlodipine existing doses 10/10, 5/10, 10/5 and 5/5mg prescribed in accordance with local prescribing information. The effectiveness of treatment was assessed as the change from baseline in mean sitting systolic and diastolic BP and the proportion of patients achieving the therapeutic goal of BP less than 140/90mmHg. Safety and tolerability of this combination were also assessed.
**Results:** The mean age of the 937 patients analysed was 57.1 years and 51.7% were female, 812 (86.7%), 654 (69.8%) and 345 (36.8%) of the patients were followed up at 4, 8 and 12 weeks respectively. Systolic BP was significantly reduced by 17.2mmHg, 22.0mmHg and 21.5mmHg at 4, 8 and 12 weeks respectively compared to baseline value ($p<0.0001$ week 4, 8, 12 vs. baseline), while diastolic BP was significantly reduced by 9.3mmHg, 10.5mmHg and 12.4mmHg at 4, 8 and 12 weeks, respectively. Overall, 9.5% of the study population were placed on thiazide or thiazide-like diuretic. Side effects were reported in 1.9% of patients, with a dry cough in 0.64% being the commonest and angioedema in a single patient.
**Conclusion:** The 13-City Hypertension Study has shown that Perindopril plus Amlodipine SPC provided clinically meaningful reductions in BP and that it was well tolerated in a black African population.

## Assessing the impact of switching to the tobacco heating system on cardiovascular events: Translating basic science into clinical benefit

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**Introduction:** Cigarette smoke (CS) is causally linked to the development of cardiovascular disease (CVD). Tobacco harm reduction, by substituting cigarettes with less harmful products, is a complementary approach to current strategies for smokers who would otherwise continue to smoke. The Tobacco Heating System (THS) 2.2 is a novel tobacco product that heats tobacco, instead of burning it, never allowing the temperature to exceed 350°C. The combustion process is thereby prevented from taking place and this produces substantially lower levels of toxicants compared with CS.
**Methods:** Philip Morris International's (PMI) pre-clinical and clinical assessment programme aims to demonstrate that switching to THS has the potential to reduce the risk of smoking-related diseases vs. continued smoking.
**Results:** The results of the THS assessment programme demonstrated positive cardiovascular effects in both in vitro, in vivo, as well as in clinical assessments. Since the start of THS commercialisation in November 2014, and cumulatively up to the end of 2018, 11 cases of MI and 5 cases of ischaemic stroke were reported by users. In most of these cases, no information was provided about the smoking history or the time of switching to THS, which makes it difficult to assess the causal relationship from a medical point of view.
**Conclusion:** The evidence available to date indicates that switching to THS has the potential to reduce the risk of smoking-related diseases, such as CVD. As a next step, PMI will complement its THS assessment programme with cardiovascular outcome studies intended to further support the clinical benefits of switching to THS compared to continuous smoking. Biomarkers linked to the development of smoking-related disease were analysed following a 6-month randomised, controlled clinical study with THS, which demonstrated a consistent improvement in these.

## The RHD Action Small Grants programme: Small investment, big return!

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**Introduction:** Rheumatic Heart Disease (RHD) remains endemic in low- and middle-income countries (LMICs), despite its virtual elimination in high-income countries. RHD Action was launched to amplify global efforts to control RHD in 2015 by the World Heart Federation and Reach, with demonstration projects