

## ● Blood pressure

# A breakthrough for measuring BP in the developing world



**Prof Eoin O'Brien**, Professor of Molecular Pharmacology at the Conway Institute of Biomolecular and Biomedical Research, UCD, on a new initiative for tackling hypertension in developing countries

**O**ne-in-four adults worldwide are classified as hypertensive, which equates to about 1 billion individuals, and this number is expected to grow to 1.5 billion (about 30 per cent of the global population) by 2025.

About 8 million deaths worldwide could be attributed to high blood pressure in 2001.

Overall, more than 80 per cent of the burden of disease is in low- and middle-income regions, and a greater proportion of the burden is in young age groups in these regions, as opposed to those in high-income countries.

Suboptimal BP control is estimated to be responsible for 62 per cent of cerebrovascular disease and 49 per cent of coronary heart disease.

Hypertension is the most important risk factor for stroke, both in high-income and developing countries.

This finding is particularly relevant because it highlights the need for health authorities in these regions to develop strategies to screen the general population for high blood pressure and, if necessary, offer affordable treatment to reduce the burden of stroke.

Of all risks, hypertension is the most amenable to change in low-income settings because screening programmes need modest equipment and little specialised expertise.

As healthcare improves and the threat of AIDS is overcome, increased longevity of the African population can be expected to lead to an increase in the morbidity and mortality related to vascular disease.

## Stroke and MI

Treatment of hypertension has been associated with an approximate 40 per cent reduction in the risk of stroke and 15 per cent reduction in the risk of myocardial infarction (MI). However, the diagnosis and treatment of hypertension in low-resource countries is generally deplorable.

One major problem is failure to identify hypertension due to the unavailability of suitable blood pressure measurement devices.

The mercury sphygmomanometer remains the most popular device for measuring blood pressure in these settings, but this technique is fraught with error, requires observer training in the tech-



The African population growth can be expected to lead to an increase in the morbidity and mortality related to vascular disease

nique of auscultation, and carries the potential problem of mercury toxicity.

## Affordable

In 2002, the World Health Organization (WHO) established a committee to develop technical specifications for an accurate and affordable blood pressure measuring device for clinical use in low-resource countries.

The initiative was straightforward; by clearly laying down basic requirements, the world's manufacturers of blood pressure measuring devices were challenged to produce an affordable, robust and accurate semi-automated device.

It was also stipulated that devices fulfilling the specifications must then be subjected to independent validation according to the International Protocol of the European Society of Hypertension.

Having fulfilled this requirement, the device had then to undergo testing in field conditions, according to a predetermined protocol in clinical and environmental circumstances, that would reflect the ultimate circumstances of use.

The results of this series of procedures have just been published in *Hypertension* and the topic has attracted the atten-



The Omron HEM-SOLAR

tion of the press in many countries. This paper shows that one device – the Omron HEM-SOLAR – fulfilled the validation criteria of the International Protocol and also performed well in three centres in Uganda and Zambia, where it was preferred to the mercury sphygmomanometer by healthcare workers. Considering its low cost (€25), accuracy, robustness and ease of use – requiring minimal training and the provision of solar power – this

**'Without a diagnosis the cheap and effective drugs that are available to lower blood pressure are not prescribed to pregnant women with hypertension'**

device is likely to prove valuable in improving the diagnosis and management of hypertension in many countries across the world.

## Pregnancy

Maternal mortality rates in low-resource countries are alarmingly high and one of the major causes of mortality is hypertension in pregnancy, which complicates some 5 per cent of pregnancies worldwide, with the rate rising to 11 per

cent of first pregnancies. The complications of hypertension in pregnancy (pre-eclampsia and eclampsia) are responsible for the loss of 40,000 women's lives globally each year, a figure that does not reflect the additional severe maternal consequences for women who do not die, nor the accompanying foetal morbidity and mortality.

Whereas foetal mortality is of the order of 1 per cent to 2 per cent in Sweden, it may be as high as 7 per cent to 25 per cent in African countries, mainly due to hypertension in pregnancy.

A major reason for the daunting consequences of hypertension in pregnancy is the lack of an accurate and robust, inexpensive device to measure blood pressure in rural settings in low-resource countries. Without blood pressure measurement, hypertension of pregnancy cannot be diagnosed; without a diagnosis, the cheap and effective drugs that are available to lower blood pressure are not prescribed to pregnant women with hypertension.

The WHO initiative has established its first objective, namely the provision of an inexpensive, accurate device for measuring blood pressure in low-resource settings. The next objective is to test the Omron HEM-SOLAR according to its validation procedures in pregnant women in the Zambian and Ugandan centres, with the aim of providing a means for pregnant women to have regular blood pressure measurements throughout their pregnancy and ultimately, to reduce the appalling burden of maternal mortality globally.

## Clinical research

There are wider implications arising from this project that reach beyond blood pressure measurement alone. First, it was gratifying to participate with centres eager but inexperienced in clinical research and to see the attention given by the field investigators to protocol requirements.

Indeed, if this project is representative of research capability in Africa, as we believe it is, there is a vast potential for development of affordable technologies through collaborative research in low-resource countries.

A second interesting possibility arising from the project is that if these procedures can be successfully enacted for blood pressure measuring devices, might it not also be possible to do so for other diagnostic devices for clinical management, particularly in primary care? To do so would be a radical initiative in alleviating the burden of diagnosis on a global scale.

● **Prof Eoin O'Brien**, Professor of Molecular Pharmacology, Conway Institute of Biomolecular and Biomedical Research, University College Dublin, Belfield, Dublin 4.

References on request.