THE ADAPT CENTRE

&

BLOOD PRESSURE UNIT

Beaumont Hospital & RCSI

ANNUAL REPORT, PUBLICATIONS

AND

SCIENTIFIC PRESENTATIONS

VOLUME 20

2004
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Introduction

History & background
The Blood Pressure Unit was founded in collaboration with Professor Kevin O’Malley 25 years ago in the Charitable Infirmary, Jervis Street, with support provided by the Charitable Infirmary and the Royal College of Surgeons in Ireland. From the outset the Unit has concentrated on research into the pharmacology of blood pressure lowering drugs, particularly in the elderly, and on the development of blood pressure measuring techniques, especially techniques of ambulatory blood pressure measurement. The 2004 report will constitute the 20th bound volume of the publications and presentations from the Blood Pressure Unit and latterly the ADAPT Centre, giving details of nearly 500 papers published in peer-reviewed journals together with numerous editorials, letters, books, book chapters, general and educational articles and abstracts. The report also lists the scientific and educational presentations made since 1988 in many countries around the world. The full report will be available at http://www.ecf.ie/adapt_website.

The Blood Pressure Unit is the point of entry of patients into the shared-care program in which trained nurses establish a patient database and initiate the translational research model that allows patients to pass into clinical trials.

The Arterial Disease Assessment Prevention and Treatment (ADAPT) Clinic was established in collaboration with Professor David Bouchier-Hayes and Professor Desmond Fitzgerald in 1997. The rationale for this unique clinic was based on the concept that disease of the arterial organ was a fundamental denominator in all cardiovascular disease. The ADAPT Clinic was established to ensure that all patients with cardiovascular disease, regardless of the speciality to which they present, receive the most comprehensive risk factor assessment with appropriate life-style modification, and that appropriate drug treatment is directed at the arterial organ.

The ADAPT concept was further developed in 1999 with the establishment of the ADAPT Centre. This research area houses out-patient facilities and a cardiovascular laboratory equipped to perform state-of-the-art cardiovascular assessment, which includes echocardiography, electrocardiography with stress testing, Holter monitoring, applanation tonometry, pulse wave velocity analysis, 24-hour ambulatory blood pressure monitoring, beat-to-beat non-invasive blood pressure monitoring, 24-hour silent ischaemia monitoring, fundal photography and imaging, and carotid wall (intima-media thickness) imaging. Through its association with the Molecular Medicine Laboratories in the RCSI Building at Beaumont Hospital, the Department of Clinical Pharmacology, the Centre for Proteomics, SURGEN, and BIOSYS at RCSI, the ADAPT Centre can assess biochemical and genetic markers of risk, thrombosis, and endothelial damage. The ADAPT Centre works in close collaboration with the Clinical Research Centre and the support of Dr. Dermot Kenny is acknowledged with gratitude.

The goal of ADAPT is to apply common protocols of risk factor management to all patients with cardiovascular disease. This has been achieved for patients with hypertension, dyslipidaemia, surgical vascular disease, diabetes, stroke and transient cerebral ischaemic events and the elderly with hypertension, and the active participation of Dr. Patricia McCormack, Professor David Bouchier-Hayes, Dr. Joan Moroney and Dr. Christopher Thompson in furthering the ADAPT principle of management is gratefully acknowledged. This year saw continuation of the RHASP (Reduction of Heart Attack and Stroke through Prevention) Pilot Project, supported by the Department of Health and Children as part of the Cardiovascular Strategy, whereby the ADAPT concept has been extended to primary care.

Personnel changes and achievements
In 2004 Dr. Alice Stanton was appointed Director of Cardiovascular Research and Senior Lecturer in Clinical Pharmacology in the Royal College of Surgeons and Associate Director of the Clinical Research Centre at Beaumont Hospital; Professor Desmond Fitzgerald resigned as Professor of Clinical Pharmacology in RCSI to take up the position of Vice-president of Research at University College, Dublin; Professor Brian Harvey was appointed Director of the Institute of Biopharmaceutical Sciences and Professor Eoin O’Brien retired from clinical consultant duties in December 2004 after nearly 40 years of service to the Richmond Hospital, the Charitable Infirmary in Jervis Street and to Beaumont Hospital but continues in the Servier Chair of Cardiovascular Pharmacology.

David Farrell received the Certificate in Professional Development in Clinical Trials from John Moores University in Liverpool and the Institute of Clinical Research and Evelyn Clarke was conferred with a BSc in Nursing.
Introduction

Servier Chair of Cardiovascular Pharmacology

The Servier Chair of Cardiovascular Pharmacology, to which Eoin O’Brien was appointed in 2001, is a unique partnership between the Institute of Biopharmaceutical Sciences at the Royal College of Surgeons in Ireland and the Servier Group in Paris. The Chair was endowed with the purpose of facilitating research into the treatment and management of cardiovascular disease with a particular emphasis on risk factor management and the identification of techniques to measure cardiovascular target organ involvement. The Chair has facilitated translational research at Beaumont Hospital by bringing the clinical facilities in the hospital into close liaison with the laboratory facilities in RCSI to provide a unified approach to research into cardiovascular disease.

Research

ASCOT Study: The Anglo-Scandinavian Cardiovascular Outcome Trial (ASCOT) is the largest international endeavour in which the Unit has participated. ASCOT has recruited over 20,000 patients at moderate risk from cardiovascular complications of hypertension to determine which blood pressure lowering or cholesterol-lowering drug is most beneficial in preventing stroke and heart attack. Dr. Alice Stanton has supervised a team of doctors and nurses specially recruited for the ASCOT programme. The ADAPT Centre, is one of the major centres (with over 500 participating patients) in ASCOT. The Lipid Lowering arm of the study was closed prematurely in 2003 because the benefit to patients receiving statin treatment was of the order of 30% reduction in heart attack and 25% in stroke compared with those patients receiving placebo.

The Data Monitoring Committee has now recommended that the blood pressure lowering arm of ASCOT be closed prematurely because of a lower total mortality in the 10,000 patients receiving the calcium-channel blocker and ACE inhibitor combination compared to the 10,000 patients receiving the beta-blocker and thiazide combination. These results, which have major implications for the future management of cardiovascular disease, are undergoing full analysis and will be published in the New Year.

The RHASP Project: The ADAPT Centre has collaborated with the Department of Health and Children in linking the dab® database at Beaumont Hospital to six selected practices in primary care so as to transmit information on cardiovascular risk from specialist hospital clinics to primary care physicians. RHASP is bringing best management of cardiovascular disease to primary care so as to effect the 30% reduction in stroke and heart attack that has been possible in the ASCOT Study with rigorous drug treatment of hypertension and dyslipidaemia. The pilot project has now been completed and has been independently audited by Professor John Cairns from the London School of Hygiene and Tropical Medicine. This report will be launched by An Tánaiste and Minister for Health, Mary Harney in January 2005. The extension of the RHASP model to 50 general practices in Heartwatch is being considered by the Department of Health and Children as a potential means of reducing Ireland’s burden of cardiovascular disease, which is one of the highest in Europe.

Publications and communications

In 2004 the ADAPT Centre continued to contribute to hypertension research, publishing more than 20 scientific papers, and delivering research presentations at home, in the UK, Italy, Switzerland, France, Spain and Brazil.

International collaborative research

The ADAPT Centre continued to participate in a number of important international collaborative studies, which included the ASCOT, HYVET, ADVANCE, ON-TARGET and AIB Phase III studies. Participation in these studies has necessitated collaborative research with a number of institutions and universities abroad, which include Imperial College, London, St. Mary’s Hospital, London, St. Bartholomew’s Hospital, London, the Hammersmith Hospital, London, the Western Infirmary, Glasgow, the University of Louvain, the University of Ghent, Columbia University, New York, Sydney University, Australia, and the Universities of Florence and Milan, Italy.

Epidemiological research projects

The Allied Irish Bank Phase III Study, collected genetic samples from 700 AIB personnel to replenish the valuable genetic bank originally provided in the AIB Phase II Study, and the a further 300 genetic samples will be collected in the New Year. The data from the Phase II Study, which will provide
Introduction

information for the first time on the changes in 24-hour ambulatory blood pressure with age and the relationship of such change to target organ status, will be submitted for publication shortly.

The ADAPT Centre data base contains comprehensive blood pressure data on over 26,000 patients. A collaborative partnership has been established with Dr. Jan Staessen in the Catholic University of Leuven to analyse the predictive value of blood pressure parameters in 700 cardiovascular deaths in this cohort. Led by Dr. Eamon Dolan, this study will prove the superior value of ambulatory blood pressure and particularly nocturnal blood pressure in the management of hypertension. Other research projects conducted during the year included are listed under ‘On-going Research’.

Working Parties

Eoin O’Brien continued to act during the year as Chairman of the Blood Pressure Measurement Working Group of the European Society of Hypertension. Dr. Alice Stanton is Chairman of the Irish Heart Foundation Council on High Blood Pressure. Eoin O’Brien is a member of the EU Standards Committee on Blood Pressure Measurement, the British Standards Institute and the Association for the Advancement of Medical Instrumentation in the US. He is also a member of the ASCOT Steering Committee and Genetics Committee and Chairman of the ASCOT Sub-study Committee, and Professor Desmond Fitzgerald and Dr. Alice Stanton are also members of the ASCOT Genetics Committee. During the year, Eoin O’Brien was asked by WHO in Geneva to select and Chair a Committee of experts to determine how best to measure blood pressure in the Developing World. As a member of Board of the International Centre for Health and Cooperation at Fordham University, he continued to participate in international humanitarian endeavours.

DABL ® Program

The efficient outpatient management of cardiovascular disease and the translational research facility in the Blood Pressure Unit has been achieved by utilising a management system that is dependent on a specially designed computer program - dabl Cardiovascular - which has been developed over the past decade. During the year this program was further developed to include many additional functions, such as automatic generation of drug treatment and diagnoses, a flow chart, a pharmacopoeia, a scheduling system and security features. The dabl Anticoagulant program was used to transfer 2000 patients attending the Anticoagulant Clinic from a traditional clinic to a computer managed virtual clinic. The dabl Program has also been applied to a number of research projects being conducted by the ADAPT Centre. The dabl Programs are now being incorporated for cardiovascular disease management in Florence, Milan, Leuven, London, New York and many institutions and practices in Ireland. Further details of the dabl programs can be obtained on www.dabl.ie.

Websites

During the 14th Scientific Meeting of the European Society of Hypertension the dabl Educational Trust website – www.dableducational.org - was officially launched by Ambassador Pádraic MacKernan at the Embassy of Ireland in Paris. The occasion was attended by scientists from around the world, by members of international hypertension societies and representatives from manufacturers of blood pressure measurement devices. This not-for-profit website clarifies the current stage of knowledge about equipment used to measure blood pressure, and provides a valuable resource for all lay and medical consumers and for those with responsibility for purchasing blood pressure devices.

The ADAPT web site – http://www.ecf.ie/adapt_website - provides a comprehensive bibliography of publications from the Blood Pressure Unit since 1978 and it is possible to obtain PDF copies of recently published papers.

Acknowledgements

The research achievements outlined in this report have been facilitated by the Charitable Infirmary Charitable Trust, which has given valuable support to the Blood Pressure Unit and ADAPT Centre over many years. Research has also been funded by grants from RCSI, Servier Laboratories, Imperial College, London, HEA PRTLI Cycle 3, Pfizer International, Institute for International Health, University of Sydney, Boehringer Ingelheim and MacMaster College, Department of Health and Children and the European Society of Cardiology, all of which are acknowledged with gratitude. Finally, tribute is paid to the diligence and loyalty of all the staff in the Blood Pressure Unit and ADAPT Centre, characteristics, which facilitate the team approach so necessary in scientific research.
The ADAPT Centre & Blood Pressure Unit

Staff 2004

Medical

Eoin O'Brien          Patricia McCormack
Desmond Fitzgerald   Emily Ho
David Bouchier-Hayes Ailsa Fulton
Alice Stanton        Basil Al Aloul
Joan Moroney         Eamonn Dolan

Nursing - Blood Pressure Unit

Cora McTiernan       Mary Lyons
Evelyn Clarke        Helen O’Neill

Nursing - ADAPT Centre

David Farrell        Cathal Collier
Joanne Goodnough     Anne Murphy
Geraldine McCarthy   

Technical

Echocardiographer    Computer Analyst
Simon Lyons          Neil Atkins

Secretarial

Valerie Hughes       Eunice Carey
Barbara Gallagher    Orla Lambe
Kim Smyth            

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SCIENTIFIC AND EDUCATIONAL PUBLICATIONS 2004

Original papers


**Editorials**


**Letters**


**General and Educational**

3. Ho E, Stanton AV. The role of the microcirculation in hypertension. *MEDICOGRAFIA* 2003;25:??
5. O’Brien E. European Society of Hypertension guidelines on blood pressure measurement. *Irish Medical News*. 18th October 2004

**Abstracts**

5. Silveira E, Beckett N, Peters R, Banya W, Gil-Exterema B, Nachev C, Chodorouzi Z, Fletcher A, Bulpitt C. Anti-hypertensive treatment does not lead to an increase in postural hypotension in most elderly patients – Results from the HYVET Pilot Study. *J Hypertens* 2004;22 (suppl 1): 93S
7. Peters R on behalf of the HYVET investigators. Change of cognitive function within the first year of entering the Hypertension in the Very Elderly Trial (HYVET). *J Hypertens* 2004;22 (suppl 1): 54S
O’Brien E. How can 24 hour blood pressure control be achieved?

O’Brien E. How can 24 hour blood pressure control be achieved?

O’Brien E. How can 24 hour blood pressure control be achieved?

ACE inhibitors are obsolete! For the motion: E. O’Brien. Against the motion: H. McCann

Centre for International Health & Cooperation. International Diploma in Humanitarian Affairs
Course. Geneva University. Switzerland. 30th January 2004

20th Scientific Meeting of the International Society of Hypertension, Brazil. 15-19th February 2004
Al Aloud B, Fulton A, Chung E, O’Brien E, Stanton A. Acute effects of hyperoxia and hypercapnia on retinal arteriolar and venular diameters. Poster presentation.

O’Brien E. How can 24 hour blood pressure control be achieved?

Rehabilitation Congress. RDS. Dublin. 14th May 2004
O’Brien E. Computerised management of cardiovascular risk: ADAPT and RHASP.

Diversity in Unity. Irish/German Symposium Dublin. 15th May 2004
O’Brien E. When is high blood pressure hypertension?.

Mallow General Practice Symposium. Mallow. Co. Cork. 28th May 2004
O’Brien E. How can 24 hour blood pressure control be achieved?

WHO Fifth International Heart Health Conference Positioning Technology to Serve Global Heart Health Meeting. Milan. 14th June 2004

O’Brien E. Do we need diastolic pressure?
European Society of Hypertension Working Group on Blood Pressure Measurement Scientific Workshop: What’s new in Blood Pressure Measurement?
O’Brien E. Bringing ABPM directly to primary care
Dolan E. The Dublin dabl database

Diversity in Unity. Irish/German Symposium Dublin. 26th June 2004
O’Brien E. When is high blood pressure hypertension?.
O’Brien E. Let humour be thine medicine.

British Hypertension Society. Cambridge. 13 – 15th September 2004


Athlone General Practice Symposium. Athlone. Co. Galway. 16th September 2004

O’Brien E. How can 24 hour blood pressure control be achieved?

27th World Congress International Medicine, Granada. Spain. 27th September 2004

Plenary Session: Hypertension. New approaches to Therapy.

O’Brien E. Rationale for a new approach in treating hypertension.

Joint Meeting of the Irish Heart Foundation Council on High Blood Pressure & The Belgian Hypertension Society. RDS. Dublin. 15 – 16th October 2004

O’Brien E. Keynote address: Why ambulatory blood pressure measurement is now indispensable to clinical practice.


Diversity in Unity. Irish/German Symposium Dublin. 16th October 2004

O’Brien E. When is high blood pressure hypertension?

2nd All Ireland Health Promotion Conference. Creating Healthy Environments. Enniskillen. Co. Fermanagh. 20th October 2004

O’Brien E. Computerised management of an anticoagulant clinic using the dabl Abticoagulant Program.

University of Florence. Florence. Tuscany, Italy. 2nd November 2004

O’Brien E. Initiatives to manage the growing epidemic of cardiovascular disease.

Healthcare Informatics Society of Ireland. 8th Annual Conference and Scientific Symposium. Dublin. 15th November 2003


## 1. Cardiovascular Genetics

<table>
<thead>
<tr>
<th>Project</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> ASCOT Pheno-Geno Study: An ASCOT Sub-study</td>
<td>Effect of aspirin and atorvastatin on thromboxane formation in a large cohort of hypertensive patients with normal to mildly raised cholesterol.</td>
</tr>
<tr>
<td><strong>2</strong> Renin and ACE2 Gene Study</td>
<td>Determinants and consequences of increased isoprostane formation in hypertensive patients despite optimal medical management.</td>
</tr>
<tr>
<td><strong>3</strong> Genetic Variance in Oxidant Stress</td>
<td>A newly discovered polymorphism in the renin gene enhancer region is associated with elevated ambulatory BP levels in a large community population.</td>
</tr>
<tr>
<td><strong>4</strong> Allied Irish Bank Study Phase III</td>
<td>Collection of DNA from 1000 normal subjects in the Allied Irish Bank, 600 of whom have been previously phenotyped</td>
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</table>

## 2. Measures of Cardiovascular Risk and Target Organ Damage

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>10</strong> The eye as a window to the arterial system</td>
<td>Acute effects of hyperoxia, hypoxia and hypercarbia on retinal arteriolar and venular diameters.</td>
</tr>
<tr>
<td><strong>11</strong> Endothelial dysfunction in stroke patients</td>
<td>Effects of nitric oxide synthase and cyclooxygenase inhibition on retinal vascular reactivity – a novel non-invasive measure of endothelial function.</td>
</tr>
<tr>
<td><strong>12</strong> Retinal Vascular Geometry in Schizophrenia</td>
<td>Abnormalities and asymmetry of retinal vasculature in people with schizophrenia.</td>
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## 3. Epidemiology of Ambulatory Blood Pressure

<table>
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<tr>
<th>Project</th>
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<tr>
<td>16 The Allied Irish Bank Study, Phase II.</td>
<td>A longitudinal study of changes in ambulatory blood pressure parameters in a healthy population Patterns of age-related changes in ambulatory blood pressure parameters in 600 normal volunteers.</td>
</tr>
<tr>
<td>17 ASCOT ABPM Sub-study</td>
<td>24-h ambulatory blood pressure control as a predictor of outcome in treated hypertensive patients - a sub-study of ASCOT to assess the effect of Atorvastatin on ambulatory blood pressure parameters in the active and placebo limbs of the Lipid Lowering Arm of the ASCOT Study</td>
</tr>
<tr>
<td>18 dabl Data base Outcome Study</td>
<td>An outcome study to determine office and 24-hour ABPM blood pressure predictors of mortality in 700 cardiovascular deaths in 14,000 patients with hypertension followed from 1980 to 2002</td>
</tr>
<tr>
<td>19 The OvA (Office versus Ambulatory Blood Pressure Measurement) in management of hypertension</td>
<td>An on-going analysis of data from the OvA Study, the main results of which were published in <em>NEJM</em> 2003</td>
</tr>
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## 4. Effects of Management and Therapy

<table>
<thead>
<tr>
<th>Project</th>
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<tbody>
<tr>
<td>20 Efficacy of Renin Inhibition in Essential Hypertension</td>
<td>Blood pressure lowering in essential hypertension with an oral rennin inhibitor, aliskiren</td>
</tr>
<tr>
<td>21 Anglo Scandinavian Cardiac Outcomes Trial (ASCOT).</td>
<td>An on-going study of the efficacy of different blood pressure lowering agents in 20,000 moderate risk patients with hypertension; this study was ended in December 2004 because of benefit in on treatment limb; close-out will be completed in June 2005</td>
</tr>
<tr>
<td>22 Action in Diabetes and Vascular Disease, Preterax and Diamicron MR Controlled Evaluation. (ADVANCE) Main Study</td>
<td>A study of best management of cardiovascular risk in diabetic patients</td>
</tr>
<tr>
<td>23 The RADOX Study: a Sub-study of ADVANCE</td>
<td>A study of the effects of blood pressure lowering and blood glucose lowering on oxidative stress (urinary isoprostanes) among individuals with Type 2 diabetes</td>
</tr>
<tr>
<td>24 The AdRem Study: Action in Diabetes and Vascular Disease Retinal Measurements Study - a Sub-study of ADVANCE</td>
<td>A study of the effects of blood pressure lowering and glycaemic control on the retinal microvasculature</td>
</tr>
<tr>
<td>25 OnTarget Study (ONgoing Telmisartan Alone and in combination with Ramipril Global Endpoint Trial)</td>
<td>A study of the effects single and combination therapy in subjects with cardiovascular disease.</td>
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<tr>
<td>26 TRANSCEND Study (Telmisartan Randomized AssessmeNt Study in aCE iNtolerant subjects with cardiovascular Disease)</td>
<td>A study of the effects of Telmesartan in subjects in subjects with cardiovascular disease who are intolerant to ACE inhibitors.</td>
</tr>
<tr>
<td>27 The HYVET Study. Hypertension in the Very Elderly</td>
<td>Evaluation of antihypertensive medication with Indapamide in the very elderly (over 80 years)</td>
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<td>Project</td>
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<tr>
<td><strong>28</strong> The RHASP (Reduction of Heart Attack and Stroke through Prevention): A Pilot Study</td>
<td>A Department of Health sponsored pilot project to assess the feasibility of a shared care approach to the management of cardiovascular disease between general practice and a specialised centre using a common dabl cardiovascular data base. This study has ended and the independent assessment will be launched by An Tainaiste, Mary Harney in January 2005</td>
</tr>
<tr>
<td><strong>29</strong> ASCOT: Sub-study: Omron Audit in ASCOT</td>
<td>An ASCOT sub-study to assess the use of an automated device – OMRON CP-707 – in a large multicentre clinical trial</td>
</tr>
<tr>
<td><strong>30</strong> Conduit Artery Functional Endpoint Study (CAFÉ Study)</td>
<td>A sub-study of the ASCOT Study to determine the role of Applanation Tonometry in the ASCOT Study</td>
</tr>
<tr>
<td><strong>31</strong> The international ABPM database</td>
<td>A collaborative international study co-ordinated by Professor T. Pickering in Mount Sinai Hospital to establish an international database of ABPM</td>
</tr>
<tr>
<td><strong>32</strong> Computerised systems for Out-patient Management: dabl and ADAPT</td>
<td>Computerisation of cardiovascular clinics to integrate management in the ADAPT, Blood Pressure, Lipid, Elderly, Stroke and TIA and Vascular Surgical Clinics in Beaumont Hospital.</td>
</tr>
<tr>
<td><strong>33</strong> Computerised system for Management of anticoagulant Clinics: dabl Anticoagulant</td>
<td>Development and application of a computerised management system for 2000 patients attending the Anticoagulant Clinic at Beaumont Hospital. A traditional clinic has been converted into a virtual clinic</td>
</tr>
<tr>
<td><strong>34</strong> Computerised system for Ambulatory Blood Pressure Measurement in hospital and general practice: dabl ABPM</td>
<td>Development of a computer program to analyse and interpret ABPM to facilitate introduction of the technique to general practice</td>
</tr>
<tr>
<td><strong>35</strong> Computerised system for Blood Pressure Measurement in Clinical Trials: dabl Research</td>
<td>Development of a computer program to standardise blood pressure measurement in clinical trials</td>
</tr>
<tr>
<td><strong>36</strong> Development of the Sphygmocorder</td>
<td>A collaborative venture with Bang &amp; Olufsen Medicom to develop the Sphygmocorder for audio-visual evaluation of blood pressure measurement during device validation</td>
</tr>
<tr>
<td><strong>37</strong> Specification of blood pressure measuring device for the developing world</td>
<td>A WHO initiative to produce a specification for a blood pressure measuring device for the developing world and to oversee its manufacture.</td>
</tr>
</tbody>
</table>
EDITORIAL BOARD MEMBERSHIP

Journal of Human Hypertension: E. O’Brien
Blood Pressure: E. O’Brien
Blood Pressure Monitoring: E. O’Brien

COMMITTEE MEMBERSHIP


International Centre for Health and Cooperation. Fordham University. New York
E. O’Brien. Board Member

Working Group on Blood Pressure Monitoring. European Society of Hypertension
E. O’Brien. Chairman

Committee on Blood Pressure Measurement. British Hypertension Society.
E. O’Brien. Member.

HCC/10 Committee for the revision of standards for mercury and aneroid sphygmomanometers. British Standards Institute. E. O’Brien. Member

CEN/TC205 EEC Committee for Non-active medical devices. E. O’Brien

Association for the Advancement of Medical Instrumentation (AAMI), Arlington, US
E. O’Brien. Individual Liaison Member

Steering Committee. European Study of Systolic Hypertension in the Elderly (Syst-Eur)
E. O’Brien. Member

Side-project on Ambulatory Measurement. European Study of Systolic Hypertension in the Elderly (Syst-Eur). E. O’Brien. Member

Steering Committee. European Study of Ambulatory Blood Pressure Measurement. E. O’Brien


Steering Committee. THOP (Home Pressure and Treatment of Hypertension) Study. E. O’Brien.

Steering Committee. Anglo-Scandinavian Cardiac Outcomes Trial (ASCOT): E. O’Brien

Sub-study Committee. Anglo-Scandinavian Cardiac Outcomes Trial (ASCOT): E. O’Brien. Chairman