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Contents

Editorial

Welcome to the January 2002 issue of *The* Bulletin. We would like to wish all BSCR members and readers of *The* Bulletin a happy and prosperous new year.

Since the last issue of *The* Bulletin our editor, Dr Helen Maddock has taken up a senior lectureship position at the Department of Applied Human Physiology, Coventry University. We wish Helen much success and happiness in her new post.

This issue features a review article entitled *'Molecular Interactions of Purinoceptor Subtypes found on Blood Platelets'*, written by Dr Andrea Townsend-Nicholson of the Department of Biochemistry and Molecular Biology at University College London.

The new year brings a considerable change to the structure of the BSCR Committee. Dr Barbara McDermott succeeds Dr Gary Baxter as Secretary of the Society and we are pleased to include Barbara's first Column in this issue.

We can look forward to a number of exciting meetings in 2002. These are listed in the Secretary's Column and further details of the BSCR Spring and postponed Autumn meetings are provided towards the back of this issue of *The* Bulletin.

Helen Maddock and Nicola Smart

Molecular Interactions of Purinoceptor Subtypes Found on Blood Platelets

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Purines exert significant effects on platelet function. ADP is an endogenous activator of platelets and the response of platelets to ADP is mediated by at least three different purinoceptors. Although there is clear evidence of cross-talk between the $P2X_1$, $P2Y_1$ and $P2Y_{12}$ purinoceptors, the relative contributions of the $P2Y_1$ and $P2Y_{12}$ receptor subtypes to normal homeostasis are more clearly understood than the contribution of the $P2X_1$ subtype. The recent identification of a bleeding disorder caused by a defect in the $P2X_1$ receptor together with the characterisation of a new platelet isoform of the $P2X_1$ receptor activated by ADP has led to renewed interest in the influence of the $P2X_1$ subtype in platelet function.

Platelets, Purines and Purinoceptors

Platelet function is an essential feature of normal haemostasis and platelet responses also contribute during thrombosis, the pathophysiological counterpart of haemostasis. A number of agents acting to influence platelet function have been identified and ADP was the first compound shown to elicit platelet activation, leading to platelet shape change and aggregation (Born, 1962). ADP is a purine nucleotide that acts at cell surface receptors, purinoceptors, to effect specific intracellular responses. ADP causes an increase in the levels of intracellular calcium in platelets, both through calcium influx and the release of calcium from intracellular stores, and a decrease in the levels of cAMP (for reviews see Hourani and Cusack, 1991; Dubyak & El-Moatassim, 1993; Boarder & Hourani, 1998; Kunapuli & Daniel, 1998; Di Virgilio *et al.*, 2001). Defects in ADP receptors have been shown to be responsible for bleeding disorders in patients (reviewed in Cattaneo and Gachet, 1999; Triplett, 2000).

Initially, it was believed that ADP acted at a single platelet ADP receptor. It has subsequently been shown that at least three different purinoceptor subtypes are involved in platelet response to ADP (Gachet *et al.*, 1995; MacKenzie *et al.*, 1996; Daniel *et al.*, 1998; Fagura *et al.*, 1998; Jin *et al.*, 1998; Geiger *et al.*, 1998; for review, see Kunapuli, 1998). The current model of ADP-induced platelet activation involves three different purinoceptors: $P2X_1$, $P2Y_1$ and $P2Y_{12}$. $P2X_1$ is an intrinsic ion channel activated in response to purine nucleotides. $P2Y_1$ and $P2Y_{12}$ are metabotropic receptors (GPCRs) which couple through heterotrimeric G proteins to effect changes in intracellular second messengers. For recent reviews on the molecular biology of P2X and P2Y purinoceptors, see King, 1998 and von Kügelgen and Wetter, 2000.

Role of Purinoceptors in Platelet Function

The $P2Y_1$ receptor couples to the $G\alpha_q$ subunit to activate phospholipase C, increasing the concentration of intracellular calcium through its release from intracellular stores. A central role for the $P2Y_1$ receptor was proposed when knockout of the $G\alpha_q$ subunit in mice led to defective platelet activation, increased bleeding times, and absence of ADP-induced aggregation and ATP secretion (Offermanns *et al.*, 1997). The thienopyridine, clopidogrel, is an effective antiplatelet agent acting on the ADP-dependent activation pathway in human platelets (Savi *et al.*, 1996) and it had been proposed that clopidogrel acted at the $P2Y_1$ receptor. It was subsequently demonstrated that the site of action of clopidogrel is an ADP receptor coupled to adenylyl cyclase and not an ADP receptor coupled to either cation influx or mobilization of intracellular calcium stores (Geiger *et al.*, 1999). With the elimination of $P2Y_1$ as the target of clopidogrel, attention focused on the adenylyl cyclase-coupled P2Y receptor, $P2Y_{12}$.

Activation of the $P2Y_{12}$ receptor (also referred to as $P2Y_{AC}$, $P2Y_{CYC}$ and P2T) leads to a decrease in

cAMP through coupling of the receptor to the $G\alpha_i$ subunit, inhibiting adenylyl cyclase activity. In $G\alpha_q$-deficient platelets, the $G\alpha_i$ signalling pathway remains intact and the partial aggregation response of these platelets to ADP suggests that $P2Y_{12}$ is significantly involved in platelet aggregation (Ohlmann *et al.*, 2001). This suggestion was recently confirmed with the characterisation of a $G\alpha_{i2}$ knockout mouse. $G\alpha_{i2}$ is the predominant $G\alpha_i$ subtype in platelets and mice deficient for this subtype have greatly reduced ADP-dependent platelet aggregation (Jantzen *et al.*, 2001). The $G\alpha_{i2}$ knockout mouse is also defective in thrombin-dependent activation. The ability of a $P2Y_{12}$-selective antagonist to mimic this aspect of the $G\alpha_{i2}$ knockout mouse phenotype reveals that a component of thrombin-dependent activation involves activation of the $P2Y_{12}$ receptor. After considerable interest and effort, the $P2Y_{12}$ receptor has recently been cloned (Hollopeter *et al.*, 2001; Zhang *et al.*, 2001); the difficulty in isolating this receptor subtype can be explained by the low degree of sequence identity between $P2Y_{12}$ and other members of the P2Y receptor family. With the cloning of the $P2Y_{12}$ receptor has come confirmation that the $P2Y_{12}$ receptor is the molecular target of the antiplatelet drug clopidogrel (Savi *et al.*, 2001).

Coactivation of the $P2Y_1$ and $P2Y_{12}$ receptors has been shown to be essential for ADP-induced platelet aggregation (Jin and Kunapuli, 1998) and there is clearly cross-talk between these two receptor subtypes. The platelet response to ADP appears to require the concomitant activation of the $P2Y_1$ and $P2Y_{12}$ receptors, with $P2Y_1$ being primarily responsible for platelet shape change while $P2Y_{12}$ is required for later events during aggregation (see Park and Hourani, 1999; Storey *et al.*, 2000). A number of reports have shown that $P2Y_1$ contributes to an initial transient response, with $P2Y_{12}$ providing a more sustained response (Jarvis *et al.*, 2000; Ramakrishnan *et al.*, 2001; Suttitanamongkol *et al.*, 2001). It has also been shown that the $P2Y_1$ and $P2Y_{12}$ receptors are differentially down-regulated after activation of platelets by ADP (Baurand *et al.*, 2000) and the loss of specific $P2Y_1$

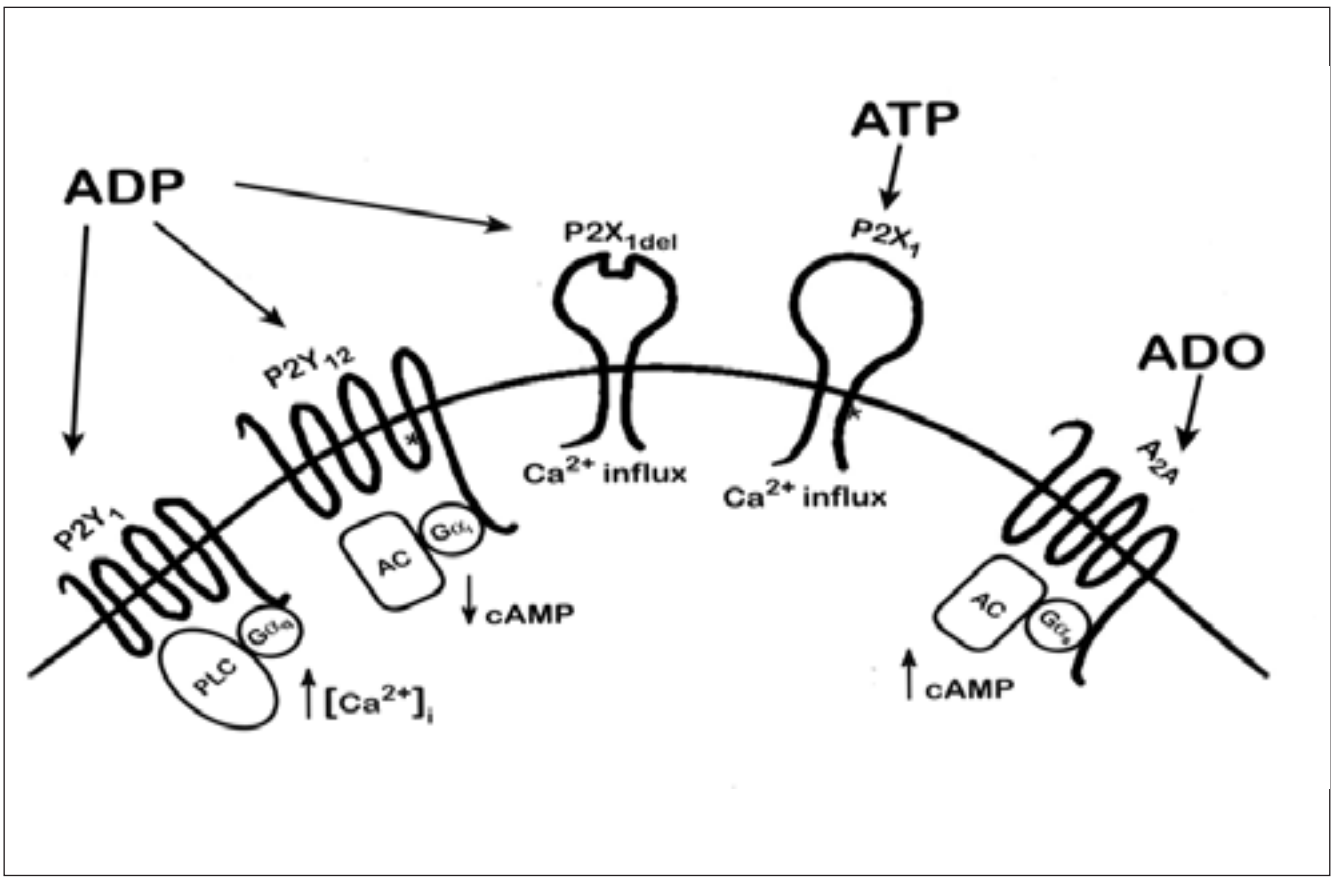

Figure 1. Schematic representation of platelet purinoceptors.
The five platelet purinoceptors are shown, together with the agonist by which each is activated and the downstream signal transduction pathway. The relative position of mutations in the human $P2X_1$ and $P2Y_{12}$ receptors that have been identified in patients with bleeding disorders is indicated with asterisks.

PLATELET PURINOCEPTOR	RECEPTOR TYPE	INTRACELLULAR RESPONSE	PURINOCEPTOR KNOCKOUT: PLATELET PHENOTYPE	HUMAN DISEASE & MOLECULAR LESION
$P2X_1$	ion channel	↑ $[Ca^{2+}]$ (influx)	ND	• bleeding disorder • in-frame deletion (Leu351/ Leu352/ Leu353) • dominant negative
$P2Y_1$	GPCR	↑ $[Ca^{2+}]$ (mobilisation)	• ↓ aggregation • ↑ bleeding times • normal cAMP levels	• none yet identified
$P2Y_{12}$	GPCR	↓ cAMP	• ↓ aggregation • ↑ bleeding times • normal Ca^{2+} mobilisation	• bleeding disorder • frameshift at amino acid 240, premature truncation • dominant negative?
A_{2A}	GPCR	↑ cAMP	• ↑ platelet aggregation	• none yet identified

TABLE 1
Properties of platelet purinoceptors

binding sites in activated platelets, with no loss of $P2Y_{12}$ sites, suggests that a component of this down-regulation involves internalisation of the $P2Y_1$ receptor.

Much effort has been directed towards an understanding of the roles and interactions between the metabotropic receptors for ADP on platelets. While the $P2X_1$ receptor has been implicated in platelet function, the role of this receptor has not been clear. ADP has been observed to evoke biphasic calcium influx in human platelets (Sage *et al.*, 1990). The initial phase corresponds to calcium influx mediated by an ADP-responsive ion channel whilst the second phase coincides with the discharge of intracellular stores (a GPCR-mediated response). The ability of a $P2X_1$ antagonist (SK&F 96365) to block the second phase implies that there is cross-talk between the platelet $P2X_1$ ion channel and the G protein-coupled P2Y receptors and it has been suggested that $P2X_1$ potentiates the response of $P2Y_1$ (Vigne *et al.*, 1999; Sage *et al.*, 2000).

The role of the $P2X_1$ receptor in ADP-induced platelet responses became even less clear when it was shown that the $P2X_1$ receptor is not itself activated by ADP (Mahaut-Smith *et al.*, 2000). Although $P2X_1$ was initially believed to respond to both ADP and ATP, the response to ADP was shown to be due to a contamination of commercial stocks of ADP with ATP. ATP competitively inhibits responses to ADP and responses to ATP are only seen in platelets if these are pre-treated with enzymes that remove endogenous nucleotides (MacKenzie *et al.*, 1996). This, together with the failure of α,β-methylene ATP (an agonist at $P2X_1$) to elicit an aggregation response (Savi *et al.*, 1997), led to suggestions that the $P2X_1$ receptor in platelets was either desensitised or internalised.

An interesting twist on the pharmacological characterisation of $P2X_1$ arose recently with the identification of an alternatively spliced isoform of the $P2X_1$ receptor, $P2X_{1del}$, expressed in platelets (Greco *et al.*, 2001). The $P2X_{1del}$ isoform is activated by ADP but ATP and α,β-methyleneATP are inactive. SK&F 96365 is able to block $P2X_{1del}$ activity. This profile corresponds closely to the platelet $P2X_1$ receptor involved in cross-talk with $P2Y_1$ and $P2Y_{12}$. The recently identified $P2X_{1del}$ is missing 17 amino acids within the extracellular domain, a region that corresponds to exon 6 of the $P2X_1$ gene sequence. The role of the $P2X_{1del}$ in platelet function remains to be elucidated, however cooperativity between this alternatively spliced isoform and the wild type $P2X_1$ receptor may occur as such a phenomenon has previously been observed between another P2X receptor subtype, $P2X_4$, and an exon6 deleted isoform of that subtype, $P2X_{4a}$ (Townsend-Nicholson *et al.*, 1999).

It should be noted that other components of the purinoceptor pathway influence platelet function. The use of any endogenous ligand as a signalling molecule necessitates a mechanism for its inactivation and purine nucleotides such as ADP are hydrolysed to the purine nucleoside adenosine. Adenosine plays an important role in platelet homeostasis, inhibiting platelet

aggregation (described in Cristalli *et al*., 1994). This is achieved through activation of another platelet purinoceptor, the A_{2A} adenosine receptor, which couples positively to adenylyl cyclase through the $G\alpha_s$ subunit (Ledent *et al*., 1997). Dilazep, an antiplatelet agent that is clinically used as an anti-thrombotic drug, inhibits platelet aggregation (Deguchi *et al.*, 1997). Dilazep inhibits the transport of adenosine into the cell, increasing the extracellular adenosine concentration and potentiating the A_{2A} receptor response. Many of the drugs that are used therapeutically to inhibit platelet aggregation affect platelet levels of cyclic AMP, leading to an increase in intracellular cAMP. This can be achieved either by potentiating a $G\alpha_s$-coupled receptor or by blocking the activity of a $G\alpha_i$-coupled receptor. The role of the A_{2A} receptor is of particular human relevance as caffeine, and other alkylxanthines, block adenosine receptor responses. Caffeine is the most commonly consumed drug in the world (in Furlong & Townsend-Nicholson, 1992) and chronic caffeine intake has been shown to alter the number and function of adenosine A_{2A} receptors in human platelets (Varani *et al*., 1999). Other modulators of the purinoceptor pathway in platelets include CD39, an ATP diphosphohydrolase. Knockout of CD39 in mice leads to platelet hypofunction, caused by desensitisation of the $P2Y_1$ receptor (Enjyoji *et al.*, 1999).

What mechanisms might be involved in platelet purinoceptor function? Platelets possess both aggregation-inhibiting (adenosine) and aggregation-potentiating ($P2Y_1$, $P2Y_{12}$ and $P2X_1$) purinoceptors. Cross-talk has previously been identified between adenosine receptors and P2Y receptors (for an example, see Megson *et al*., 1995) and heterodimerisation between adenosine and P2Y receptor subtypes has recently been reported (Yoshioka *et al*., 2001). Heterodimerisation may be a feature of platelet purinoceptor function. Although the traditional view of G protein-coupled receptors (GPCRs) considers these molecules to be monomeric, seven transmembrane domain polypeptide chains that interact with heterotrimeric G proteins to effect intracellular responses, GPCRs are increasingly coming to be seen as dynamic complexes composed of interacting proteins, where not only receptor-G protein interactions but also receptor-receptor interactions and receptor-auxiliary protein interactions are seen (for reviews, see Milligan and White, 2001; Devi, 2001). Heterodimerisation has been described between GPCRs (Jones *et al*., 1998; White *et al*., 1998; Kaupmann *et al*., 1998; Jordan and Devi, 1999) and also between a GPCR and an ion channel (Liu *et al*., 2000) and a PDZ domain responsible for protein-protein interaction with the Na^+-H^+ exchanger regulatory factor (NHERF) has been identified in the C terminus of the $P2Y_1$ receptor (Hall *et al*., 1998). Protein-protein interactions may be involved in the internalisation of the $P2Y_1$ receptor seen by Baurand *et al.* (2000). With the molecular identification and characterisation of the individual purinoceptors involved, attention is turning to the way in which these proteins interact to modulate platelet function.

Platelet Purinoceptors: Of Mice and Men

That the platelets of $G\alpha_q$ knockout mice were unable to aggregate in response to ADP implicated both the phospholipase C pathway and the $P2Y_1$ receptor in platelet function. It has subsequently been shown that knockout of the $P2Y_1$ gene in mice leads to defective platelet aggregation, increased bleeding times and increased resistance to thromboembolism (Fabré *et al*., 1999; Léon *et al*., 1999; reviewed in Fabré *et al.*, 2001). Despite the partial aggregation observed in response to high concentrations of ADP, there is no alteration in cyclic AMP levels, indicating that the adenylyl cyclase-coupled ADP receptor function is intact in $P2Y_1$ knockout mice ($P2Y_1$ -/-). $P2Y_1$ receptor function can be bypassed in $P2Y_1$ knockout mice by using serotonin (Léon *et al*., 1999); aggregation is restored when serotonin, acting through the $5\text{-}HT_{2A}$ receptor subtype to mobilise intracellular calcium, is added simultaneously with ADP to platelets from these animals.

The partial aggregation observed in $P2Y_1$ knockout mice is not affected by treatment with a $P2X_1$-selective antagonist, IP_5I, but can be ablated with the use of clopidogrel, the selective $P2Y_{12}$ antagonist (Fabré *et al*., 2001), so it is the $P2Y_{12}$ receptor that is responsible for the partial aggregation seen in $P2Y_1$ -/- mice. Knockout of the murine $P2Y_{12}$ receptor has been reported (Foster *et al*., 2001) and $P2Y_{12}$ -/- mice demonstrate a loss of ADP-mediated cAMP inhibition in platelets, although the ADP-activated calcium mobilisation response is essentially normal. $P2Y_{12}$ knockout mice have reduced sensitivity to thrombin and collagen and clopidogrel is inactive in these animals. Platelets from these mice also exhibit a highly prolonged bleeding time and are defective in ADP-induced platelet aggregation. In contrast, platelet aggregation is increased in adenosine A_{2A} receptor knockout mice (Ledent *et al*., 1997). Although a knockout $P2X_1$

mouse has been generated (Mulryan *et al.*, 2000), no data on platelet function in $P2X_1$ -/- animals have been published.

Several congenital defects of platelet ADP receptors have been described in the literature (Cattaneo *et al*., 1992; Nurden *et al.*, 1995; Cattaneo *et al*., 2000). These cases were identified as inherited bleeding disorders, with affected individuals experiencing episodes of prolonged bleeding. The ADP receptor defect described by Nurden *et al.*, has been shown to be due to a mutation in the human $P2Y_{12}$ receptor (Hollopeter *et al.*, 2000). The molecular lesion identified is a deletion of two nucleotides within the coding region at amino acid 240, leading to a frameshift of 28 amino acids at the start of the sixth transmembrane domain, before premature truncation at a stop codon. This individual has one wild type and one mutant $P2Y_{12}$ allele for the lesion described, which suggests that either the mutation exerts a dominant-negative effect or a second mutation is present within the $P2Y_{12}$ gene of this patient. Previously, the mode of inheritance of ADP receptor defects had been suspected to be autosomal recessive as the only patients identified were born of consanguineous parents (Cattaneo and Gachet, 1999).

While no human mutation of the $P2Y_1$ receptor has been reported, a bleeding disorder caused by a defect in the human $P2X_1$ receptor was recently described (Oury *et al*., 2000). This dominant negative mutation selectively impairs ADP-induced platelet aggregation and is caused by the deletion of a single amino acid located within the second transmembrane domain of the receptor. The patient is a child born of two healthy, unrelated parents and has a healthy sibling. The molecular lesion of the $P2X_1$ receptor in this patients is an in-frame deletion of three nucleotides at the cytoplasmic face of the second transmembrane domain which results in the deletion of a single leucine residue (Leu351, Leu352 or Leu353) within a stretch of four leucine residues (amino acids 351-354). The cDNA sequences obtained from reticulocytes, neutrophils and mononuclear cells of the patient do not contain the deletion, $P2X_{1delL}$, which is likely to be of clonal origin (Oury *et al*., 2001). Although these mutated $P2X_1$ receptors appear to be non-functional, they are localised normally within the plasma membrane of stably transfected cells suggesting that the mutation does not affect the assembly or insertion of the receptor in the membrane. The identification of this $P2X_1$ mutation as the cause of a bleeding disorder has clearly established that the role of the $P2X_1$ receptor in the platelet response to ADP is more significant than may previously have been realised.

Conclusion

Purines exert significant effects on platelet function by acting on specific cell-surface receptors. ADP is an endogenous activator of platelets, binding to specific cell surface purinoceptors to promote normal haemostasis, leading to aggregation and the staunching of blood flow. The response of platelets to ADP involves the inhibition of adenylyl cyclase activity together with an increase in intracellular calcium levels, achieved through both influx and mobilisation of intracellular stores, and is mediated by at least three different purinoceptors. Although there is clear evidence of interactions between the $P2X_1$, $P2Y_1$ and $P2Y_{12}$ purinoceptors, the relative contributions of the $P2Y_1$ and $P2Y_{12}$ receptor subtypes are more clearly understood than the contribution of the $P2X_1$ subtype. The recent identification of a bleeding disorder caused by a defect in the $P2X_1$ receptor together with the characterisation of a platelet isoform of the $P2X_1$ receptor activated by ADP has led to renewed interest in the role of the $P2X_1$ subtype in platelet function. An understanding of the mechanisms underlying platelet activation by ADP, and the role of the different purinoceptors in this process, is of immediate relevance to the treatment of platelet disorders caused by mutation in these receptors.

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Acknowledgements

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Review Articles for *The* Bulletin

Would you like to write a review for the BSCR Bulletin? Review articles are an opportunity to let members know about your partiular research area and also provide an overview of the current field. We are keen to hear from anyone in cardiovascular research who would be willing to write for *The* Bulletin.

If you are interested, please contact the Bulletin editors with your ideas:
Helen (h.maddock@ucl.ac.uk) or Nicola (N.Smart@ich.ucl.ac.uk)

Secretary's Column

It is with great pleasure that I am taking up the post of BSCR Secretary from January 2002 and look forward to working both with people I know already and with many I have yet to meet in cardiovascular research in the UK and further afield. It is with some trepidation, however, that I follow Dr Gary Baxter, who in this position over the past three years has displayed what must be close to the ultimate in administrative and communication skills, all carried out with a considerable polish and charm. This will be a hard act to follow, so my fellow office-bearers, both at the Rayne Institute, may not receive the same level of service from the present Secretary's Northern Ireland office, as they did from one much closer to Westminster. This might be true, at least in the short term, until I master what will be a steep learning curve. After six years service on the BSCR Committee, this may be an appropriate break for Gary, who very soon will take up a new appointment in an academic position at the Royal Veterinary College and I am sure that we all wish him every success for his future there. Further co-incident changes in Committee membership include the recruitment of Dr Gillian Gray from the University of Edinburgh, Dr Gavin Brooks from the University of Reading and Professor Ajay Shah from King's College, London, and the re-election of Dr Saadeh Suleiman from the University of Bristol, the Society continuing to maintain a good balance in regional representation.

An exciting and busy schedule of meetings for 2002 is at an advanced stage of planning and the 2003 programme is shaping up well. The next meeting is the one originally scheduled to take place at the University of Oxford in September 2001. This is a joint meeting with the 6th International Symposium on Magnetic Resonance in Cardiovascular Research, which will now take place on 21st-23rd March 2002. An announcement of the re-scheduled meeting appears in this issue of the Bulletin. If you had not previously registered, but now find that you can make these dates, the form for registration, which is free to BSCR members, is available on the Website http://www.bioch.ox.ac.uk/~mrcvr/. Just after the Easter vacation, the Spring meeting, to be held on 11th-12th April at the University of Reading, will focus on the subject of *Ion Channels and Transporters in Cardiovascular Cell Growth*. This is the first time that a BSCR meeting has been held in Reading and I would like to encourage you to attend, in support of the efforts of the organisers, Drs Gavin Brooks and Mike Shattock, to make this a meeting of particular note. Details are included on the back page of this issue of the Bulletin and registration and abstract forms are contained as inserts. Thinking ahead to the Autumn, dates for your diary are 6th-7th September, when Drs Suleiman and Caputo will host a meeting at the University of Bristol on *The Developing Heart: Biology and Protection*. So there is an impressive array of events and invited speakers lined up for the 2002 programme and beyond. In this context, the BSCR is extremely grateful to the National Heart Research Fund for agreeing to sponsor keynote speakers at the main meetings to be held over the next three years. This shows quite clearly the Fund's commitment to the support of research and education in the cardiovascular field throughout the UK.

This year's BSCR symposium at the British Cardiac Society Meeting, to be held at the Harrogate International Centre, is scheduled for the morning of 15th May 2002. It will be organised by Dr Stefan Neubauer and the subject is *Heart Failure Research from Bench to Bedside: Focus on Magnetic Resonance Techniques*. All BSCR members can attend this symposium free of charge and further details will be circulated in the April issue of the Bulletin.

So with much to look forward to, it remains for me to wish all BSCR members a very happy New Year and successful 2002.

Barbara McDermott

First Announcement

CARDIOVASCULAR DEVELOPMENT

A meeting in association with the
Working Group on Developmental Anatomy & Pathology
European Society of Cardiology

Thursday 4th July - Saturday 6th July 2002

Conference Centre, National Heart & Lung Institute
Imperial College, Faculty of Medicine
London, UK

Organiser: Paul JR Barton

Meeting outline: This meeting will address current concepts in molecular, cellular and anatomical development of the heart and vessels. Topics will include regulation of gene expression, cell cycle, cell migration, regionality and laterality, valve formation and the cardiac conduction system. The meeting will incorporate aspects of normal and abnormal human, rodent, chick and Xenopus heart development in naturally occurring and genetically modified models.

Speakers include: Robert Anderson (London), Annalisa Angelini (Padua), Nigel Brand (London), Gavin Brooks (Reading), Nigel Brown (London), Gilda Caruso (Bari), Deborah Henderson (Newcastle), Adrianna Gittenberger de Groot (Leiden), Robert Kelly (Paris), Tim Mohun (London), Antoon Moorman (Amsterdam), Andrew Newby (Bristol), Peter Scambler (London), Gaetano Thiene (Padua), Penny Thomas (London), Sandra Webb (London), Arnold Wenink (Leiden), and Siew Yen Ho (London).

Communications: Part of this meeting will be devoted to the presentation of free communications. Abstracts on any relevant topics are welcomed for poster presentation, and a number will be selected for oral presentations.

Registration: To receive the second announcement including details for registration and submission of abstracts please contact the Conference Secretary.

Local Organising Committee:

Paul JR Barton

Nigel J Brand

Penny S Thomas

Siew Yen Ho

Conference Secretary: Mrs Joanna Harwood
Cardiothoracic Surgery
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Cardiovascular Related Meetings

Cardiovascular Development - Working Group on Developmental Anatomy & Pathology, European Society of Cardiology. Meeting to be held 4th-6th July, 2002 at the Conference Centre, National Heart & Lung Institute, Imperial College, Faculty of Medicine, London, UK. Organiser: Paul JR Barton. For further information, please contact Conference Secretary, Mrs Joanna Harwood, Cardiothoracic Surgery, National Heart & Lung Institute, Imperial College, Faculty of Medicine, Dovehouse Street, London SW3 6LY UK. Tel: +44 (0) 20 7352 8121 x3039; Fax: +44 (0) 20 7376 3442; E-mail: j.harwood@ic.ac.uk

22nd Annual Meeting of the ISHR - European Section, Szeged, Hungary, July 3-6, 2002. For further details, contact Prof. Dr. Ágnes Végh, University of Szeged, Faculty of Medicine, Department of Pharmacology and Pharmacotherapy, Dóm tér 12. H-6720 Szeged, Hungary. Tel: +36-62-545-673 Fax: +36-62-544-565, E-mail: vegh@phcol.szote.u-szeged.hu. Web Site: http://www.cardiovasc.com/ishr2002/

Translational Approaches to Cardiovascular Disease, the 24th Annual Meeting, ISHR, North American Section, will be held in Madison, Wisconsin, July 24-27, 2002. The abstract deadline is February 1, 2002. Organizer: Richard L. Moss, Ph.D., Director, UW Cardiovascular Research Center, Professor and Chair, Department of Physiology, Telephone: 608-262-1939, Fax: 608-265-5072, email: rlmoss@physiology.wisc.edu

The 22nd Annual San Diego Cardiothoracic Surgery Symposium: Pathophysiology and Techniques of Cardiopulmonary Bypass: February 21 - 23, 2002 San Diego Marriott Hotel & Marina, San Diego, California Course director: Julie A. Swain MD. Information: Aligned Management Associates, Inc. South Centre City Parkway, PMB 513, Escondido, CA 92025 U.S.A., Phone - 760.839.1200, Fax - 760.839.1250 1835 cref@amainc.com

XVIII World Congress of the International Society for Heart Research, August 7-11, 2004, Brisbane, Australia. Enquiries: ISHR 2004 Congress, PO Box 164, Fortitude Valley QLD 4006, Australia. Tel +61 7 3854 1611; Fax +61 7 3854 1507; E-mail: heart2004@ozaccom.com.au; Website: www.baker.edu.au/ISHR

BRITISH HEART FOUNDATION GRANTS

Chairs and Programme Grants Committee, June 2001
Programme Grant

Prof M R Boyett et al, University of Leeds. "Molecular mapping of the sinoatrial node" 5 years £714,532

Special Project

Prof E Alton, National Heart & Lung Indt, London. "Angiogenic gene therapy for end-stage ischaemic coronary artery disease presenting with heart failure" 4 months £242,153

Project grants committee,July 2001

Dr J C Hancox & Dr H J Witchel, Bristol Heart Institute, Bristol. "Mapping low and high affinity binding of psychotropic drugs to HERG" (3 years). £180,831

Dr S Ye, Southampton General Hospital. "Variation in the matrix metalloproteinase-1 gene in relation to atherosclerosis" (2 years). £74,806

Dr S Jeffery et al, St George's Hospital Medical School, London. "Linkage and mutation analysis in two forms of primary lymphoedema" (3 years). £153,846

Dr A Graham, Royal Free & University College Medical School, London. "Mitochondrial sterol 27-hydroxylase and regulation of macrophage cholesterol efflux pathways" (2 years). £76,063

Dr K O'Shaughnessy et al, University of Cambridge. "Blood pressure optimisation in patients with polycystic kidney disease and hypertension by rotation through the main therapeutic classes of antihypertensive drugs" (2 years). £77,337

Dr R Sitsapesan, University of Bristol. "The interactions of ATP and related compounds with the cardiac ryanodine receptor" (3 years). £120,705

Professor B Williams, University of Leicester. "Cellular mechanisms of human vascular ageing" (3 years). £140,144

Dr C M H Newman et al, University of Sheffield. "Ultrasound-enhanced transfection of human and porcine saphenous vein in vitro and in vivo" (2 years). £155,363

Dr S E Francis & Prof D C Crossman, University of Sheffield. "Determination of endothelial cell replicative phenotype by polymorphism at the IL-1 locus" (3 years). £96,130

Professor D S Latchman, University College London. "Role of hsp56 in the hypertrophic effect of CT-1" (3 years). £143,025

Professor S B Marston, National Heart and Lung Institute, London. "Structural and functional polymorphisms of troponin in failing human heart" (3 years). £123,420

Professor M P Frenneaux et al, Wales Heart Research Institute, Cardiff. "Coronary heart disease and depression: role of the hypothamamic-pituitary-adrenal axis" (2 years). £95,384

Dr J L Leaney et al, University College London. "Regulation of cloned atrial G protein-gated inwardly rectifying K+ channels by protein kinase C" (3 years). £133,734

Professor N Chaturvedi et al, St Mary's Campus, London. "Ethnic differences in macrovascular and microvascular structure and function associated with diabetes" (1 year). £75,648

Professor I N M Day, Southampton University Hospital. "Individual susceptibility to coronary heart disease in women: British Women's Heart & Health Study" (3 years). £156,601

Dr S A Deuchars & Dr J Deuchars, University of Leeds. "Influences on interneurones in the intermediolateral cell column and their connectivity" (3 years). £131,297

Professor A D Struthers & Dr A D Morris, Ninewells Hospital and Medical School, Dundee. "Screening for treatable left ventricular abnormalities in diabetes mellitus" (2½ years). £182,816

Dr M R Dashwood & Miss J C S Tsui, Royal Free & University College Medical School, London. "The contribution of nitric oxide to improved patency rate of saphenous vein harvested by a novel 'no-touch' technique" (2 years). £89,582

Project grants committee, September 2001
DEFERRED APPLICATIONS AWARDED

Prof W Evans & Dr T Allen, University of Wales College of Medicine, Cardiff. "Regulation of gap junctional communication in the heart by novel peptides and by drugs" (3 years). £144,176

Dr L Ng, Leicester Royal Infirmary. "Mechanisms of activation of leucocyte NADPH oxidase in pre-eclampsia" (2 years). £66,677

Prof A Fletcher et al, London School of Hygiene and Tropical Medicine. "Investigation of risk factors measured in middle age and old age on subsequent cardiovascular morality and morbidity" (2½ years). £206,791

Dr C Knight et al, The London Chest Hospital & St Bartholomews Hospital, London. "A prospective, randomised, controlled study of a rapid protocol for the prevention of contrast induced renal dysfunction" (1 year). £22,594

Dr D Lang, University of Wales College of Medicine, Cardiff. "Improvement of endothelial function in ischaemic heart disease by high dose folic acid: an effect independent of homocysteine-lowering?" (2 years). £125,298

Professor D J Sheridan et al, St Mary's Hospital, London. "Does improvement of coronary vasodilator reserve after aortic valve replacement reflect left ventricular decompression or regression of left ventricular hypertrophy?" (1½ years). £113,295

Dr D E Newby et al, Royal Infirmary, Edinburgh. "Non-invasive assessment of endothelial function using pulse wave analysis" (3 years). £150,197

Dr B Casadei et al, John Radcliffe Hospital, Oxford. "Effects of myocardial superoxide/peroxynitrite production on the

mechanical and electrophysiological properties of single ventricular myocytes in cardiac hypertrophy" (3 years). £158,892

NEW APPLICATIONS

Dr M A Denvir & Professor K A A Fox, University of Edinburgh. "A randomised study of exercise training following hospital discharge in patients with recent decompensated chronic heart failure" (2 years). £124,964

Dr P J Kemp & Dr C Peers, University of Leeds. "Remodelling of chemoreception by chronic hypoxia" (3 years). £132,606

Professor D O Haskard & Professor D J C Pappin, Imperial College School of Medicine, London. "Characterisation of a factor responsible for selective expression of P-selectin by mouse cardiac endothelial cells" (3 years). £242,765

Dr E White & Dr S C Calaghan, University of Leeds. "The role of microtubules in b-adrenergic and stretch-activated signalling in cardiac muscle" (3 years). £130,283

Dr J J Reilly et al, University of Glasgow. "Randomised controlled trial of a nursery and home based intervention for obesity prevention and cardiovascular risk factor reduction" (2½ years). £166,980

Dr M D Whim, University College London. "Autocrine regulation of the release of neuropeptide Y by G-protein coupled receptors" (2 years). £99,039

Dr J C Mason & Professor D O Haskard, Imperial College School of Medicine, London. "The effect of statins on the modulation of complement activation on vascular endothelium" (3 years). £161,281

Professor M R Boyett, University of Leeds. "Molecular mechanism underlying the activation of the cardiac muscarinic K+ channel" (3 years). £122,025

Dr P A Handford, University of Oxford. "Molecular basis of extracellular matrix dysfunction in Marfan syndrome patients with isolated and severe cardiovascular disease" (2 years). £75,697

Dr C C Shoulders & Professor J Scott, Imperial College School of Medicine, London. "Identification of the chylomicron retention disorder/Anderson's disease gene, a potential route to the management of post-prandial hyperlipidaemia" (2 years). £166,997

Dr V Ralevic & Dr S P H Alexander, University of Nottingham. "Mechanisms of vasorelaxation mediated by P2Y purine receptors in the porcine coronary artery" (3 years). £136,845

Professor A D Struthers et al, Ninewells Hospital & Medical School, Dundee. "Improving the diagnosis of heart failure in general practice" (1½ years). £108,206

Dr E J Birks et al, Royal Brompton & Harefield NHS Trust, London. "Mechanisms of cardiac injury in chagas disease: relevance to 'idiopathic' dilated cardiomyopathy" (1 year). £67,781

Dr J M Gibbins, University of Reading. "Study of the role of the thiol isomerase ERP5 in the control of platelet function" (3 years). £128,175

Dr J W G Yarnell et al, Queen's University Belfast. "Insulin resistance syndrome: association with haemostatic risk factors and consequences for subsequent cardiovascular disease" (1 year). £40,242

Dr V B O'Donnell & Professor M J Lewis, University of Wales College of Medicine. "Regulation of lipoxygenase by nitric oxide" (3 years). £123,925

Professor A P Halestrap, University of Bristol. "Molecular mechanisms involved in the regulation of monocarboxylate (lactate) transporters in the heart" (3 years). £131,310

Professor J J V McMurray et al, Western Infirmary, Glasgow. "Relaxin: A new cardiovascular hormone in humans? Comparative potency, mechanisms of action and interactions" (2 years). £85,050

Dr R Sitsapesan, University of Bristol. "Regulation of the cardiac ryanodine receptor by calsequestrin and luminal Ca2+" (3 years). £140,324

Dr S Ali & Professor J A Kirby, University of Newcastle upon Tyne. "Role of CC chemokines in differential gene expression: identification of novel targets for anti-rejection therapy following heart transplantation" (3 years). £105,169

Dr M D Randall & Professor D A Kendall, University of Nottingham Medical School. "The vascular actions of the endogenous cannabinoid anandamide" (3 years). £108,938

Dr H Hemingway et al, Kensington & Chelsea & Westminster Health Authority, London. "The long term cost effectiveness of alternative management strategies for patients undergoing coronary angiography: economic analysis of the ACRE study" (2 years). £153,332

Professor R C Trembath, University of Leicester. "The molecular basis of familial partial lipodystrophy" (3 years). £204,867

Dr M Shahmanesh et al, Selly Oak Hospital, Birmingham. "Metabolism of VLDL, IDL and LDL apolipoprotein B in HIV-infected patients taking protease inhibitors or non-nucleoside reverse transcriptor inhibitors: a cross sectional study" (1 year). £125,703

Dr A Tinker & Dr M Bitner-Glindzicz, University College London. "The molecular basis of susceptibility in the long QT syndrome" (3 years). £150,049

Fellowships Committee Meeting, October 2001
Senior Research Fellowship

Dr B Casadei & Prof H C Watkins, John Radcliffe Hospital, Oxford. "Nitric oxide/superoxide mediated regulation of the pacemaker current I_f: implications for the control of the heart rate and myocardial excitability in pathophysiological states" £461,388

International Research Fellowship

Dr B K Brar & Prof W Vale, To Salk Institute, La Jolla, California. "The cardioprotective and hypertrophic role of Urocortin and its receptors in hearts of transgenic mice that do not express these proteins" £36,508

Intermediate Research Fellowship

Dr N King, Dr M S Suleiman & Dr J D McGivan, University of Bristol. "Amino acids and myocardial hypertrophy: expression, transport and protection". £131,732

Dr D M Flavell & Prof S E Humphries, University College London. "The role of PPARa in cardiac hypertrophy" £164,639

Dr P D Upton & Dr N W Morrell, University of Cambridge. "Characterisation of adrenomedullin expression and signalling in pulmonary vascular cells". £122,512

Junior Research Fellowships

Ms J Dandrea & Dr Symonds, University Hospital Nottingham. "Impact of maternal nutrition on maternal cortisol profiles and juvenile programming of cortisol and blood pressure". £58,407

Dr K Alfakih, Prof A S Hall, Dr M U Sivananthan & Dr A J Balmforth, Leeds General Infirmary. "The clinical significance of a common, functional, X-linked angiotensin II type 2 receptor polymorphism (+1675 GA) in patients with established cardiovascular disease". £85,661

Dr R A Bleasdale, Prof M P Frenneaux, & Dr J A Morris-Thurgood, University of Wales College of Medicine, Cardiff. "Direct diastolic ventricular interaction in advanced heart failure – the role of left ventricular and biventricular pacing as a treatment". £91,471

Dr A P Walden & Dr A W Trafford, University of Manchester. "Characterization of intracellular Ca^{2+} regulation in isolated atrial cardiac myocytes". £76,531

Miss J Griffiths & Dr T A Lovick, University of Birmingham. "Non-cardiac chest pain – a consequence of neuronal dysfunction in the periaqueductal grey matter?" £51,754

Unnamed, Dr P I Aaronson & Dr G A Knock, Kings College, London. "Involvement of the endothelium dependent hyperpolarizing factor (EDHF) response in relaxation of small arteries to propionate". £64,187

Mr R Wong, Dr P J Talmud and Prof S E Humphries, University College London. "*In vitro* and *in vivo* studies of common variants in apoAIV and their role in atherosclerosis" £78,294

Mr S L W Miller & Prof G L Smith, University of Glasgow. "The role of FKBP and calsequestrin in the modulation of SR Ca^{2+} release in a rabbit model of heart failure" £61,155

Miss S Grassom, Prof P Vallance, Dr J Leiper, University College London. "PRMT expression – endothelial cells and ADMA production" £76,059

Dr M Scoote & Professor Williams, National Heart & Lung Institute, London. "Functional characterisation of mutations in RyR2 underlying catecholaminergic polymorphic ventricular tachycardia 2. £132,908

Dr H A Khwaja & Dr Green, University of Oxford. "Haplotype – and tissue –specific control of interleukin 6 expression and the implications for atherothrombotic disease. £97,342

Dr K Mutalithas, Dr A Tinker & Prof M R Duchen, University College London. "The distribution and function of the ATP-sensitive potassium channel subunit Kir6.1 in cardiac and skeletal muscle cell lines" £143,767

Submission Deadlines for *The* Bulletin:

Volume	*Date*	*Deadline*
15(2)	*April 2002*	*March 1st*
15(3)	*July 2002*	*June 1st*
15(4)	*Oct. 2002*	*Sept. 1st*
16(1)	*Jan. 2002*	*Dec. 1st*

Travel Reports for *The* Bulletin

The Bulletin regularly publishes travel reports written by members. These are up to 3 pages in length including photographs, and can be on any conference, course or laboratory visit of interest to other members. If you are planning on travelling to a cardiovascular-related meeting and would like to write a report for the Bulletin, please contact the editors. A bursary of **£100** is available towards the cost of your visit, and this will be provided on receipt of the report. Bon voyage!

Cardiovascular Related Wellcome Trust Grants

August 2001 to November 2001

Project Grants

Professor Lalit Kalra, Department Of Medicine, School Of Medicine And Dentistry, King's College School Of Medicine And Dentistry, London. Do Ethnic Differences In Vascular Physiology Contribute To Stroke In Afro-Caribbean Subjects? 24 Months £234,068

Professor Marek Malik, Department Of Cardiological Sciences, St George's Hospital Medical School, London. P-Wave Morphology Assessment For The Prediction Of Atrial Fibrillation After Coronary Artery Bypass Grafting. 18 Months £145,598

Dr Rachael V North, Department Of Optometry And Vision Sciences, Cardiff University, Wales. Blue Cone Bipolar And Ganglion Cell Function In Ocular Hypertension: The Extent And Significance Of Neural Damage.36 Months £166,499

Dr Sussan Nourshargh, Cardiovascular Medicine Unit, Hammersmith Hospital, Imperial College School Of Medicine, London. Mechanisms Of Neutrophil Transmigration: An Investigation Using Confocal Intravital Microscopy. 36 Months £473,824

Research Career Development Fellowships In Basic Biomedical Science

Dr Ming Lei, Laboratory Of Physiology, University Of Oxford. The Ionic Basis Of Murine Sino-Atrial Node Pacemaking. 48 Months £253,543

Training Fellowships For Medical & Dental Graduates

Dr E A Ashley, John Radcliffe Hospital, University Of Oxford. The Role Of Nitric Acid Oxide In Myocardial Growth And Differentiation. 1 Month £18,000

Prize Studentships

Ms Jacqui Shields, Department Of Physiology, New Veterinary School, University Of Bristol. Mechanisms Underlying Lymphangiogenesis And Target Cell Recognition. 36 Months £79,833

Travelling Research Fellowships

Dr Bolot Kalmyrzaev, Department Of Clinical Pharmacology, Hammersmith Hospital, Imperial College School Of Medicine, London. Identification Of Genetic Loci Linked To Systemic Hypertension In The Kyrgyz. 24 Months £105,784

Dr Ali-Reza Mani, Department Of Medicine, Royal Free Hospital School Of Medicine, London. S-Nitrosothiols As Mediators Of Cardiovascular Dysfunction In Liver Disease. 24 Months £93,482

Dr Fadi J Charchar, Department Of Medicine And Therapeutics, Western Infirmary, Gardiner Institute, University Of Glasgow, Scotland. The Y Chromosome And Genetic Hypertension. 12 Months £47,598

Dr Yong Ji, Department Of Clinical Pharmacology, Centre For Cardiovascular Biology And Medicine, King's College London. Impairment Of Vascular Endothelial Function By Low-Density Lipoprotein:Effect Of Type 2 Diabetes And Gender. 24 Months £105,018

Wellcome Short-Term Travel Grants

Dr J Cameron, Care Of The Elderly, Division Of Medicine, Hammersmith Campus, Imperial College School Of Medicine, London. Risk Factor Associated With Heart Failure - The Role Of Arterial Stiffness. Expansion Of Laboratory Facilities. 2 Months £4,020

Entry Level Fellowships For Medical And Dental Graduates

Mr Sekhar Karyampudi, Wolfson Institute For Biomedical Research, University College London. Temporal Alterations Of Sepsis On The Glycolytic Pathway. 12 Months £50,404

Dr V Shrivastava, Division Of Clinical Sciences, Section Of Medicine, University Of Sheffield. Selectins And Multisystem Organ Failure Associated With Ruptured Abdominal Aortic Aneurysm. 12 Months £49,477

Research Training Fellowships In Clinical Epidemiology

Dr Richard M Martin, Department Of Social Medicine, Canynge Hall, University Of Bristol. The Association Of Infant Feeding On Growth And Coronary Heart Disease Risk In Childhood And Adulthood. 36 Months £275,481

Symposia

Dr Gavin Brooks, School Of Animal And Microbial Sciences, University Of Reading. A Contribution Towards The Cost Of A Meeting On 'Ion Channels And Transportersin Cardiovascular Cell Growth' Organised By The Brisith Society For Cardiovasculr Research To Be Held In Reading During April 2002. 1 Month £3,300

Joint Infrastructure Grant

Professor Mark S P Sansom, Laboratory Of Molecular Biophysics, Rex Richards Building, University Of Oxford. High Perfomance Computing For Simulations: From Physics To Biology. 36 Months £821,364

Clinician Scientist Fellowship

Dr Catherine L M Sudlow, Department Of Clinical Neurosciences, Western General Hospital, University Of Edinburgh. Revisiting The Lacunar Hypothesis: Are Lacunar Strokes Really Different? 56 Months £518,879

International Research Development Awards

Dr T Guzik, Department Of Cardiovascular Medicine, John Radcliffe Hospital, University Of Oxford. Molecular, Cellular And Genetic Mechanisms Of Oxidative Stress And Endothelial Dysfunction In Human Coronary Atherosclerosis. 36 Months £79,066

Joint Meeting

BSCR 2001 Autumn Meeting
and
Sixth International Symposium on
Magnetic Resonance in Cardiovascular Research

Dates: 22 & 23 March 2002
Venue: Oxford University Museum of Natural History
Organisers: Kieran Clarke & Stefan Neubauer

Invited speakers will include: Professor Sir George K Radda (London), Professor Joanne S Ingwall (Boston), Professor Theo Wallimann (Zurich), Dr Matthias Spindler (Würzburg) Professor Renée Ventura-Clapier, (Chatenay-Malabry), Prof. Aarnt Herschap (Nijmegen), Professor Hugh Watkins (Oxford), Professor Charles S. Springer (New York, USA), Dr Matthias Friedrich (Berlin), Prof. Frank Rademakers (Leuven), Professor U Sechtem (Stuttgart),), Professor Robert G. Weiss (Baltimore), Dr. Frank Wiesmann (Wurzburg), Dr Ulrich K.M. Decking (Dusseldorf), Professor Paul A. Bottomley (Baltimore), Professor Gerald M. Pohost (Birmingham), Dr Frank Kober (Marseille), Dr Meinrad Beer (Wurzburg), Dr Hildo J. Lamb(Leiden), Dr Wulf-Ingo Jung (Buehl), Professor Gustav K. von Schulthess (Zurich), Professor Robert S. Balaban (Bethedsa), Professor Jurgen Schrader (Dusseldorf), Dr Cees J. A. van Echteld (Utrecht), Dr Pamela Garlick (London), Dr Keith Channon (Oxford), Dr Paul Hockings, (GlaxoSmithKline), Dr Markus von Kienlin (Basel), Dr David N Firmin (London), Dr Thomas Voigtlaender (Mainz), Prof. Juergen Hennig (Freiburg), Professor Axel Haase (Wurzburg), Dr Christine Lorenz (Erlangen) Paolo Camici (London)

Communications: Part of this meeting will be devoted to the presentation of posters. Abstracts, on any relevant topic, are welcomed. **Abstract deadline: 15th February 2002**

Travel & Accommodation: The Oxford Information Centre has information on getting to Oxford and accommodation information http://www.visitoxford.org (e-mail: tic@oxford.gov.uk). Oxlink also has accommodation information. http://www.oxfordcity.co.uk/accom/index.html. For airport express bus information the oxford bus company website is http://www.oxfordbus.co.uk

Registration: Free to members, £50 for non-members. Registration and abstract forms will be available on the website **http://www.bioch.ox.ac.uk/~mrcvr/.** For further information contact: Yvonne Green, Department of Biochemistry, University of Oxford, South Parks Road, Oxford OX1 3QU. Tel 01865-275272, Fax: 01865 275194 email: ysg@bioch.ox.ac.uk

Bursaries: The Society will consider awarding travel grants of up to £150 to *bona fida* PhD students. Application forms are available form Dr Barbara McDermott at the address below

Applications for BSCR membership and student bursaries are available from Dr Barbara McDermott, Secretary of the BSCR. Department of Therapeutics and Pharmacology, The Queen's University of Belfast, Whitla Medical Building, 97 Lisburn Road, Belfast BT9 7BL.

BSCR Spring Meeting 2002

ION CHANNELS AND TRANSPORTERS IN CARDIOVASCULAR CELL GROWTH

Dates: 11th and 12th April, 2002
Venue: The University of Reading, Reading, Berkshire.
Organisers: Gavin Brooks (Reading) and Michael J Shattock (KCL, London)

Meeting outline: the subject of how ion channels and transporters regulate, or themselves are regulated by, cellular growth processes in the cardiovascular system is of significant interest currently both from a basic science and a commercial viewpoint. This meeting aims to bring together scientists from the areas of ion channels, signal transduction and growth control in the cardiovascular system. The subject matter of this meeting is designed to target a broad range of cardiovascular researchers who have interests in cellular, molecular and electrophysiological aspects of normal and pathological cardiovascular cell growth.

Invited Speakers include: Sir Michael Berridge (Cambridge), Jeffrey Molkentin (Cincinnati, USA), Karin Sipido (Leuven, Belgium), Metin Avkiran (London), Gary Baxter (London), Lucie Clapp (London), Max Lab (London), Ken MacLeod (London), Bernd Nilius (Leuven, Belgium), Oscar Petersen (Liverpool), Godfrey Smith (Glasgow), Michael Whitaker (Newcastle), Guy Vassort (Montpellier, France)

Communications: Part of this meeting will be devoted to the presentation of posters. Abstracts, on any relevant topic, are welcomed. **Abstract deadline: 28th February 2002.**

Travel & Accommodation: Reading is ideally situated for travel by car, rail, bus or air. Further details are available from the organisers. Accommodation will be available in Halls of Residence or local hotels.

Registration: Free to BSCR members, £50 for non-members. For further information contact: Gavin Brooks, School of Animal and Microbial Sciences, The University of Reading, PO Box 228, Whiteknights, Reading, Berkshire, RG6 6AJ. Tel: 0118-931-6363; Fax: 0118-931-6562; E-mail: g.brooks@reading.ac.uk. Deadline for registration is 15th March 2002.

Bursaries: The Society will consider awarding travel grants of up to £150 to *bona fide* PhD students. Application forms are available from Dr Barbara McDermott at the address below.

Applications for membership and student bursaries are available from Dr Barbara McDermott, Secretary of the BSCR, Department of Therapeutics and Pharmacology, The Queen's University of Belfast, Whitla Medical Building, 97 Lisburn Road, Belfast BT9 7BL. Tel: 02890-272242/33577o; Fax: 02890-438346; E-mail: b.mcdermott@qub.ac.uk