Institution: University of Hertfordshire

Unit of Assessment: Panel A (3A): Pharmacy and Pharmacology

a. Overview

The pharmacy and pharmacology unit sits within the School of Life and Medical Sciences and is part of the Health and Human Sciences Research Institute (HHSRI), one of the three research institutes of the university, which provides the wider organisational structure and support for research. The unit has two research centres: the **Centre for Research in Topical Drug Delivery and Toxicology (TDDT)** which brings together the School's expertise in topical drug delivery and toxicology; and the **Centre for Clinical Practice, Safe Medicines and Drug Misuse Research (CPSMDM)**, which focuses on patient safety, medicines management and substance misuse. In addition there is the **Pharmacology and Clinical Sciences Group** led by the Associate Dean Research (**Baydoun**), which coordinates bench-to-bedside research. Three core themes underpin the work across the unit: optimisation of drug efficacy and safety, toxicity risk mitigation, and the understanding of pathological processes in relation to clinical practice.

b. Research strategy

The strategy of pharmacy and pharmacology (the unit) aligns with the research aspirations of the university, which aims to: achieve research excellence in specific areas that demonstrate the capability to create a dynamic culture and environment; raise international profile; excel in impact, exploitation and dissemination; and develop the next generation of researchers. Throughout the 2008–13 period the university's policy has been to allocate the QR funding it receives on an annual basis back to the research areas to be used for further research development. The unit invests the QR returned to it in those elements that will best sustain and enhance its research environment: staffing and the postgraduate research culture. This is budgeted through a Research Delivery Plan agreed and monitored at school and university level.

Achievement of strategic aims for research during the assessment period

The one defining aspect of our strategic approach to research since RAE 2008 has been to bring together groups of researchers working on similar themes into centres or hubs of activity. This has been a significant change to the previous structure, under which researchers worked in smaller groups. The new concentrations have enabled capacity building; focus of research themes and creation of sustainable postgraduate supervisory teams; and enhanced collaborations within disciplines across the unit as well as nationally and internationally. The success of this strategy is reflected in the award of research grants and contracts in excess of £7m, an increase of around 50% in Category A staff returned for the REF; and a further significant increase in doctoral (PhD/MD) student numbers.

The two research centres (**TDDT** and **CPSMDM**) were established with the aim of consolidating our research strengths in the priority areas of topical drug delivery and toxicology, patient safety and medicines management and substance misuse. To integrate research in basic sciences with clinical science, the unit also pursued collaboration with clinicians in the local NHS to provide a clinical and translational focus for ongoing basic research in areas including pharmacology. This has been supported by the university with existing visiting clinical positions such as those of **Farrington** and **Gorog** (both from the Lister Hospital, Stevenage) being converted into substantive posts, in part to strengthen renal and cardiovascular research. Research grants and contracts have come from a wide stream of funders, including national and international government departments (£4.5m), the EU (£1.3m), research councils (981k), pharma industries (£678k), charities (£383k), and knowledge transfer partnership schemes (£100k) – see section d for details. These successes reflect the unit's exploitation of its extensive collaborative links (see section e) and policies implemented locally (see section c). Internal funds have also been used to seed-fund pilot projects or support early career researchers through pump-priming their research. A comprehensive staffing strategy also forms part of our plan in building our multi- and interdisciplinary research activities within a sustainable and vibrant research environment (see section c). We have continued to

maximise and take advantage of our privileged geographic location among one of the biggest European biotech clusters, building on collaborations with pharmaceutical industries (see section e).

Research groups

The **TDDT** led by **Brown,** supported by eight senior and Early Career Researchers, six Research Fellows and 14 PhD students, focuses on developing and/or refining formulations to enhance drug delivery whilst reducing toxicity, and has made a significant contribution to new medicines. It has successfully facilitated translation from basic science to market through a number of *in vitro/ex vivo* models which, combined with mathematical models derived using the novel tests and standard Franz cell testing, have resulted in a unique array of methods to help select drug candidates and help design/optimise topical and transdermal medicines. Complementing this research, the centre is evaluating the risk of topical exposure to nanoparticles and its toxicological implications using CutaFlex™. This system, patented in 2010, is being characterised and validated with funding from the Health Protection Agency. Other research themes being developed include: (i) pulmonary formulations with a lower risk of systemic toxicity especially for paediatrics; (ii) development of buccal/sublingual formulation approaches to increase patient compliance and reduce the risk of misuse in the elderly (joint project with **CPSMDM**); (iii) evaluation of the potency and toxicity of street cannabis and other illicitly used psychoactive substances (joint project with **CPSMDM**); (iv) evaluation and reduction of the toxicity of nanoparticles when exposed topically to skin, airway and eye; and (iv) development of formulations to increase safety around use of antipsychotic drugs.

The **CPSMDM** headed by **Schifano** includes five Early Career Researchers and twelve PhD students. The centre's research into drugs misuse and safety aims to improve patient safety and reduce medication errors in clinical practice; reduce morbidity and mortality in the general population, using evidence-based interventions; and inform policy formulations. Researchers collaborate extensively with other UK institutions, the NHS and European partners (section e). They also lead on several national research programmes, e.g. the National Programme on Substance Abuse Deaths (np-SAD) (in collaboration with the International Centre for Drug Policy, St George's University of London) as well as on international programmes of research such as the multi-centre (twelve EU countries) Psychonaut and ReDNet research programmes. The centre's General Medical Council (GMC)-funded study (in collaboration with the Universities of Nottingham, Reading and the London School of Pharmacy) to investigate the prevalence and causes of prescribing errors in general practice has resulted in the GMC recommending communication, teamwork and electronic solutions to improve medication safety. The Royal College of General Practitioners' curriculum, recently submitted for GMC approval, has been updated to include changes to learning outcomes based on findings of this GMC study.

Within the **Pharmacology and Clinical Science Group** staff supervise thirteen PhDs and four Masters by Research students. The research spans a broad compass, ranging from *in vivo* models through to molecular pharmacology, and computational biology through to clinical application. The research conducted is focused on utilising integrated physiological and pharmacological approaches with biochemical and molecular techniques to study disease states, underlying mechanisms of disease and drug actions, with a view to identifying novel mechanisms, therapeutic targets and agents. This research is led by **Baydoun**, **Farrington** and **Gorog** (cardio-renal), **Irvani** (neurodegenerative pharmacology) and **Kukol** (biocomputation and molecular biophysics).

Future strategic aims and goals for research

The unit's plans for the period to 2020 are as follows:

- **TDDT** will be strengthened by expanding the current research portfolio of the toxicology team to molecular and cellular toxicology, environmental toxicology and veterinary toxicology. In addition, the centre will seek to maintain its high level of funding through continuation of existing projects and successful applications for new government research projects on the protection of civilians and emergency responders against toxic materials.
- Within **CPSMDM** the focus on medication/patient safety and drug misuse will be further enhanced by developing interventions (with relevant partners) based on epidemiological,

pharmacological, neurobiological and toxicological approaches to reduce the adverse consequences of (mis)using traditional and novel psychoactive substances, as well as applying modern technologies from other disciplines to assist in their development and delivery. The Centre will also build on its expertise and lead in Patient Safety (**Dhillon**) in the East of England Academic Health Science Network (EAHSN); enhance research and knowledge exchange in the areas of patient safety, public and mental health in response to one of the national priority areas in the NHS and the NIHR;

- The **Pharmacology and Clinical Science Group** will continue to work with closer collaboration between industrial partners and the National Health Service within the framework of the EAHSN to develop effective translational research in other priority areas of the network such as cardiovascular diseases and diabetes; strengthen research in pharmacology, particularly in the area of stem cell research by fostering stronger links with the UK Stem Cell Bank, with which Baydoun already collaborates.
- The development of two new research centres, one in the area of pharmaceutical chemistry, to support the chemistry research needs across the unit; and the other on the study of the clinical management of chronic disease states, building on the existing collaboration with the Centre for Lifespan and Chronic Illness Research (CLiCIR), which is also within the Health and Human Sciences Research Institute. This latter centre will strengthen the integration of clinical research at the university. Since 2011 a total of six joint NHS/University of Hertfordshire appointments have been created, with the intention of aligning university and local NHS R&D strategies. Further visiting and honorary NHS appointments to the university will be made.

c. People, including:

i. Staffing strategy and staff development

Our recruitment and retention policy reflects an emphasis on the identification, recruitment and retention of talent. At the senior level, it embraces strategic appointments to key positions (e.g. **Baydoun**, **Brown, Chilcott**, **Dhillon**, **Farrington**, **Gorog**, **Schifano** and **Zloh**) and drills down to maintaining a sustainable base of other established researchers (**Corazza**, **Corkery**, **Iravani**, **McAuley**, **Murnane**, **Traynor** and **Nicklin**) and early career researchers (**Ghaleb**, **Hutter**, **Keating**, **MacKenzie** and **Nikolic**).

Recent key appointments have been made to strengthen research in our priority areas. For example, **Zloh** (from UCL) as Head of Pharmaceutical Chemistry, is an appointment that will assist the unit to fulfil its ambition to create a research Centre in Pharmaceutical Chemistry; and Chilcott as Head of Toxicology, who although not included in this submission because of his previous priorities working within the Defence Science Technology Laboratory, brings a wealth of expertise in toxicology with immediate impact on the unit's funding streams (£3.9m from BARDA (Biomedical Advanced Research and Development Authority) amongst others – see section d(i)). Other post-RAE 2008 appointments include **Traynor**, **Murnane**, **Nicklin** and **McAuley** to strengthen research on topical drug delivery in a range of areas, including transdermal and pulmonary drug delivery and *in silico* and mathematical modelling. Likewise, the appointments of **Iravani** in neuropharmacology and **Corkery** in drug misuse have strengthened our research in these areas. We have also recruited several early career researchers with rising research profiles and potential to strengthen our priority areas. Examples are the appointment and integration of **MacKenzie** to the cardiovascular research group, **Keating** in neuropharmacology, **Ghaleb** in patient safety and **Hutter** in topical drug delivery. As well as new appointments, it has been vital to nurture, sustain and retain current team members, including talented scientists such as **Corazza** who, since joining the unit in 2009, has worked closely with Schifano, leading the ReDNet project and developing SMAIL for wider exploitation.

The university was one of the first to receive the European Council HR Excellence in Research Award, following the April 2010 launch of the Concordat to Support the Career Development of Researchers. The award was re-approved after its two-year review. All research staff, including postdoctoral researchers, are encouraged to access staff development programmes provided centrally by our HR Development group, as well as Generic Training for Researchers (GTR)

programmes. This central provision includes CPD courses in career management, leadership and management, personal effectiveness, specialist research skills and techniques, doctoral student supervision, and public engagement. The university participated in the 2010, 2011 and 2013 Careers in Research Online Survey (CROS). The 2013 results show that in 12 out of 18 categories University of Hertfordshire responses are above or more positive than the national average. The survey provides valuable feedback to the unit on its staff development strategy.

We place great importance on staff development and on providing high-quality facilities. At research institute, school and department levels, support is provided via established mentoring and training schemes, through which new staff can integrate with their specialist areas and benefit from the opportunity to develop into independent researchers. This entails active collaborations with lead researchers and an emphasis on team building. All research-active staff are provided with dedicated time for research, which is factored into their annual overall workload. Newly appointed staff are entitled to relief from teaching for up to six months to facilitate the establishment of a research trajectory. Early career researchers are mentored and given study leave of up to six months to help establish such a platform. They also have access to financial support to allow conference attendance and access to other relevant training opportunities. They have full access to assistance from staff within the unit/university with a proven track record of success in writing grant applications, research articles, and patent applications. All staff are encouraged to participate in our extensive outreach programmes, which have both Research Council and Royal Society support. A major opportunity for early career researchers is available through pump-priming schemes to facilitate research projects. These opportunities revolve around small grant funds which are allocated through the Research Institute on a competitive basis to support fellowships and studentships. Career progression and development, together with performance targets, are monitored at regular appraisals. Personal development plans are supported through internal staff development budgets. Career development is also enhanced through a fee-waiver policy, allowing staff to study for higher degrees by research without incurring costs. Once enrolled, individuals are integrated into one of the specialist research areas.

The unit fully supports the university's equality and diversity principles across all relevant protected characteristics. All new staff to the university, including researchers, receive mandatory equality and diversity training as part of their induction to ensure they deliver considerate and inclusive services. In developing its approach to staffing and staff recruitment, the unit is supported by the university's Equality Office and Disability Services, which advise on legal issues surrounding equality and disability, and on best practices. The university promotes 'family friendly' policies such as flexible working, has an on-site children's nursery, and offers support for staff with caring responsibilities. The university is also a member of the Athena Swan Charter and is a Stonewall Diversity Champion.

ii. Research students

The unit has continued its capacity-building strategy for postgraduate researchers, creating a community of over 50 students on research degree programmes, including an established MD/PhD programme for students/medics working in the NHS. Students originate from a diverse range of backgrounds, including the UK, EU and further overseas. Some research students are recruited from our pool of Masters students in Pharmacology, from the MPharm degree, or from the MSc in Evidence-Based Medicine. A matched-funding scheme is available to all staff, by which the school matches external funding to support a research programme and/or a student.

Research training is coordinated by the Doctoral College, which oversees quality assurance and training for all key milestones of the research degree process. Each student receives an individually assessed Training Needs Analysis and access to the comprehensive programme of Generic Training for Researchers, which is informed by RCUK guidelines and designed to provide the knowledge and skills to help students progress successfully through research degrees and research careers. These services underpin students' research work by providing knowledge and skills that will help them to proceed smoothly through their programmes of study and into postgraduate careers. The analysis includes an understanding of the process of attainment of a research degree, personal development and employability. All programmes are designed to meet

the Research Councils' Joint Skills Statement.

An experienced team of at least two supervisors with successful supervisory records is appointed for each research student. Good supervision is implemented through: (i) quality assurance of the research expertise and experience in the supervisory team; (ii) time allowances for supervisors: (iii) supervisor training in agreement with the university's code of good supervision practice; and (iv) monitoring of students' progress at several levels, including a three-monthly progression report from each student and an annual monitoring conducted at school level by research tutors. Students are engaged through Doctoral College and Research Institute fora, where issues and needs are identified and addressed.

Students receive discipline-specific training tailored to their needs, and participate in fortnightly multi-disciplinary seminars and monthly discipline-specific meetings within a collegial research culture that brings students, staff and other researchers into regular contact. Students actively participate by presenting their research at national/international meetings supported by external travel grants or internal travel bursaries. This is in line with our policy of ensuring that each student attends at least one scientific conference, but normally several, during the course of their studies in order to present their findings and network.

The effectiveness of these combined arrangements is evidenced by the fact that the university achieves consistently good results in the Postgraduate Research Experience Survey (PRES), with above average scores. This trend has continued in 2013, with supervision and research skills being particularly highly rated.

d. Income, infrastructure and facilities

Income

Since 2008 the unit has obtained over £7m in awards, including funding from:

Government departments/agencies: In 2012 we received a £3.9m award for a two-year research project to seek an understanding of, and develop new methods for mitigating, the effects of exposure to toxic chemicals. In addition, in November 2012 the Department of Health (DoH) awarded the TDDT £105,000 for applied research to assist the DoH and the Home Office transition towards new approaches to managing chemical incidents. The Health Protection Agency also recently awarded **Brown** and Chilcott £377,000 to develop a new model for measuring the transdermal absorption of nanoparticles, chemicals and therapeutics. Additionally, two grants to the value of over £120,000 were awarded to **Schifano** by the Italian Anti-Drug Police to (i) investigate the range of drugs available on their web user profile, and (ii) assess the prevalence of use of performance- and image-enhancing drugs (PIED), and organise a prevention campaign addressing the misuse of these compounds.

European Commission: Funding in excess of €1.5m has been awarded for multi-centre research programmes on drug misuse and safety including a recent award coordinated by the CPSMDM of €0.5m under the Drug Prevention and Information Program.

Research councils: A total of £500,000 has been awarded from ESPRC, BBSRC and MRC. Over £1m has been awarded from the NIHR. This includes awards from the Research for Patient Benefit (RfPB) Programme, for a pilot RCT of drug treatment for depression in patients undergoing haemodialysis and to conduct research on Facilitation of Self-Management in a Haemodialysis Unit; and from the NIHR Health Services Research Programme for a national study of practice patterns in UK renal units in the use of dialysis and conservative kidney management to treat people aged 75 years and over with chronic kidney failure Stage 5.

Charities: Funding has been obtained from the British Renal Society for piloting a novel intervention for improving phosphate control in non-adherent haemodialysis patients, and from an industry partnership (Baxter/KRUK/RA/BRS) for broadening options for long-term dialysis in the elderly (BOLDE). These are in addition to an award of £98,754 from the Association for

International Cancer Research (AICR) to design inhibitors of S100P, a protein implicated in pancreatic cancer progression.
Industry: Industry funding is in excess of £800,000. Details of funders are given in section (e). In addition, TDDT has received a KTP award (ca. £100,000) to apply the centre's knowledge to *in vitro/ex vivo* testing of drug and excipient toxicity to the commercial world.

Research structure and facilities

Operational infrastructure

Support for income generation is provided centrally by the university's Research Grants Team (RGT), with the Enterprise and Business Development Team providing support for industrial collaboration through commercial seminars and partnership brokering. The RGT offers assistance to staff and supports all aspects of pre-award funding activities and advice on ethical issues. The university is a full member of the RCUK Research Integrity Office and has approval processes for studies involving human participants and potentially problematic ethical issues relating to research. In relation to NHS Research Sponsorship, the university is a 'recognised sponsor'. The Knowledge Transfer team works with researchers to develop industry links through knowledge transfer. It offers assistance to unit staff with preparing business proposals and funding applications, and manages Knowledge Transfer Partnership (KTP) applications from enquiry stage to project launch. This work is underpinned by the Intellectual Property and Contract Support team, who manage the university's intellectual property portfolio, overseeing the drafting of all related legal agreements.

To respond to recent data management requirements of major research funding bodies, Information Hertfordshire, which provides the university's information services, information technology and learning resources, collaborated with the university's three research institutes in two successful JISC grants in 2012 (totalling £295,000). A postdoctoral appointment to HHSRI was thus funded to develop PI competencies in data management planning, looking after data, and longer-term data sharing. In addition, the university strengthened its data policy and extended its Research Archive to support this initiative. The university also has a Research Information System, which allows researchers effectively to manage, publish, and disseminate their portfolio of research outputs.

Research facilities

Our research culture is promoted internally through open-access multi-disciplinary seminar programmes with external speakers, special interest group meetings and annual research events. Research within disciplines is conducted in well-equipped laboratories and supported by teams consisting of a programme director, principal investigators, senior and junior researchers, visiting professors, and various groups of technical and administrative staff. Our research benefits from an in-house Biological Services Unit and two Learning Resource Centres with outstanding facilities, including dedicated postgraduate study rooms and extensive electronic and physical journal collections.

Since 2008 we have:

- Commissioned a state-of-the-art cell culture laboratory (with facilities for stem cell research, nano-pharmaceutics and the toxicological and dermatological evaluation of drugs).
- Installed a Class B sterile suite and a radio isotope laboratory.
- Established new research laboratories for pharmaceutical chemistry and pharmaceutics.
- Developed a new solid dosage form manufacture and characterisation laboratory.
- Purchased and commissioned a 400 and a 600 MHz NMR facility equipped with auto sample changers and high resolution probes for both instruments. Additionally, the 600 MHz instrument has a solid state probe and a stopflow cell probe.
- In collaboration with the Science and Technology Research Institute, installed a high-performance computer cluster that currently consists of 976 CPU cores and two 48 cores SMP machines. An additional cluster for molecular dynamics to support **Kukol's** work was also purchased.
- Established a vibrational spectroscopic facility with Raman microscopy and IR spectroscopy with

various advanced sampling techniques.

- Refurbished other laboratories with state-of-the-art skin permeation and characterisation instrumentations including the CutaFlexTM skin diffusion cell systems, skin biophysical instrumentation suite, various imaging systems including a Laser Doppler imager, an infrared imager and a Skin Tissue Viability Imager ('TiVi') as well as a Skin Reflectance Spectroscope (SRS) and a visoscan intra-dermal video camera.
- Improved other facilities include establishing well-equipped molecular and *in vitro* pharmacology laboratories, and a confocal imaging system.
- Provided for clinicians, through the NIHR East of England Research Design Service, excellent support for statistical and experimental design and access to clinical trials support.

A major £53m programme of construction for a new science building for the School of Life and Medical Sciences (available for use summer 2015) will significantly enhance research capacity, ensuring the unit is equipped for the challenges beyond REF 2014.

e. Collaboration or contribution to the discipline or research base

Industry. An extensive network of collaborations has been established between the academics in **TDDT** and the pharmaceutical industry for the utilisation of the centre's performance-testing models and formulation expertise to optimise the opportunity of product success in the clinic, e.g. Bracco Diagnostics (US) for the clinical development of a cream for eczema; Chanelle Medical (Ireland) for *in vitro* and *ex vivo* equivalence testing of a generic nail lacquer; Futura Medical (UK) on the optimisation of a topical gel for pain treatment which has been licenced to big pharma; Peplin (now Leo Australia) on the development to market of Picato for the treatment of actinic keratoses; Medicis and Graceway (US) on the development to market in various packaging forms of Zyclara for the treatment of genital warts, actinic keratoses and molluscum contagiosum; MSD (UK), NycoMed (US and Germany) and Takeda (Japan) on the development and optimisation of various topical products for the treatment of inflammatory skin disease; MedPharm Ltd for the development and optimisation of MedSpray and MedTherm, its platform drug delivery technologies. The work of **Baydoun** and **Farrington** on Vascular Calcification was also carried out as a collaborative programme of research with Genzyme (now Sanofi).

Academic and other institutions. TDDT collaborates with the Ocular Research Group, University of Ulster in drug delivery to the eye (EPSRC CASE award); the Institute of Pharmaceutical Science, King's College London and the School of Pharmacy, University of London in ungual drug delivery (BBSRC grant in nail characterisation) and in lung drug delivery (CASE DTS award); School of Pharmacy, University of Reading in eczema treatments (MRC Case award); Mechanical Engineering, De Montfort University on inhaler performance; Chemistry, University of Bristol on single particle dynamic characterisation of inhalation aerosols; Engineering Design Centre, University of Cambridge on inhaler design; and the University of East Anglia on the physical characterization of polymeric films for topical drug delivery and in the development of liquid crystalline gels for dermatological applications. **CPSMDM** collaborates with St George's University in the analysis of UK substance-related fatalities; **Baydoun** collaborates with the UK Stem Cell Bank (South Mimms) and with the Research Centre for Cardiovascular Regenerative Medicine, Fuwai Hospital, Chinese Academy of Medical Sciences & Peking Union Medical College, Beijing. **Baydoun** and **Kukol** are developing links with Dr Mike Curtis (Kings College London), whose research on cardiac pharmacology complements the group's focus on phospholemman and the Na^+/K^+ ATPase pump. **Kukol's** computational work improving the calculation of lipid bilayer properties has led to collaboration with Dr Strodel (Institute of Complex Systems, Research Centre Jülich, Germany). **Iravani** collaborates with Jenner and, more recently, with Francis and Ballard at King's College London and with colleagues at the McGowen Institute, University of Pittsburgh on Parkinson's disease. **Gorog** collaborates with Prof. Jun Yamamoto, Kobe Gakuin University, Japan, collaborating on assessing racial differences in thrombotic status between Caucasian and Japanese patients and their response to antithrombotic medications; and with Dr Pierluigi Tricoci and Dr David Morrow, Duke University USA on sub study of TRA2P and TRACER trials evaluating the PAR-1 inhibitor vorapaxar. **Corazza** collaborates with University of Chieti-Pescara (Italy); University of Eötvös

Loránd University (Hungary); and University La Sapienza (Italy) on research into novel psychoactive substances.

Government agencies/departments. TDDT has collaborative links with many government agencies and departments, including the Health Protection Agency, the Department of Health, the Home Office, the Department of Communities and Local Government, the US Department of Defense and US Department of Homeland Security. These links are particularly strong in the areas of dermal toxicology, skin decontamination and development of medical countermeasures against chemical warfare agents, and they extend to other organisations including the University of Military Medicine in the Czech Republic; the Army Biomedical Research Institute, France; the Swedish Defence Research Agency; and US Army Research Institute for Chemical Defence. **Schifano** advises the Italian Government Anti-Drug Policies Department, while **Corkery** collaborates with both the UK/European Early Warning Systems on Novel Psychoactive Substances and the Scottish Crime & Drug Enforcement Agency.

Health services and organisations. CPSMDM collaborates with the National Institute for Pharmaceutical Education and Research/NIPER India on medication safety issues. **Corazza** is advisor to the **Global Public Health Intelligence Network/GPHIN,** a Canadian public health early warning system. **Dhillon** collaborates with LPC pharmaceuticals in evaluating medicines-related problems in Asian patients, and with the Manor pharmacy group for the evaluation of pharmacists' role in diabetes care. **Baydoun's** and **Farrington's** cardio-renal research involves collaboration with key researchers in renal research units (in London: Davenport – Royal Free; Brown – Hammersmith; Southampton – Roderick; Birmingham – Day). **Gorog's** health service collaborations are also extensive and include several at the Royal Brompton & Harefield NHS Trust.

Membership of advisory groups. Schifano and **Corkery** are both active members of the Advisory Council on the Misuse of Drugs (ACMD) and its sub-group on novel substances and the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA); **Dhillon** is member of: General Pharmaceutical Council; DH Medical Education England (Modernising Pharmacy Careers Programme Board); and board member of the Eastern Academic Health Science Network (EAHSN), and lead of its Patient Safety Clinical Study Group. **Farrington** plays a national role in relation to kidney disease and renal care, and sits on the British Renal Council. **Corazza** acts as an advisor on novel psychoactive substances for national and international policy makers, including the EMCDDA and a number of bodies in Canada. **Gorog** is a member of the EAHSN Cardiology Study Group.

Fellowships and awards. Baydoun: elected Fellow of the British Pharmacological Society. **Farrington**: Fellow of the British Renal Society. **Schifano**: Fellow of the Royal College of Psychiatrists. **Schifano** also received the Bronze Award for Clinical Excellence from the NHS Consultants' scheme. The ReDNet project received the European Health Award (2013).

Invited keynote lectures. Baydoun: International Heart Fora (Beijing 2008 and 2009); **Farrington**: World Congress Nephrology (2009); Royal College of Physicians, London (2012); the College of Physicians, Edinburgh (2012); UK Renal Association (2012).

Membership of editorial boards. Farrington: member of the editorial boards of *Blood Purification* and *BMC Nephrology*. **Schifano**: Section Editor for *International Psychiatry* and on a number of journal editorial boards including *Current Drug Abuse Reviews* and the *Journal of Maintenance in the Addictions*. **Corrazza**: Guest Editor of *Human Psychopharmacology* for a special issue on novel psychoactive substances (2013).

Organisation of conferences/scholarly activities. Baydoun: member of the international steering committee of the International Heart Forum (2005–10). **Schifano** and **Corazza** co-organised the 1st (Budapest, March 2012), and the 2nd (Swansea, September 2013) International Conferences on Novel Psychoactive Substances.