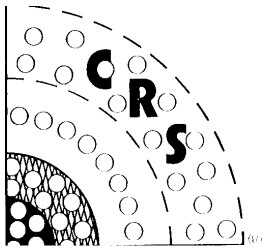
UKCRS Newsletter



United Kingdom Controlled Release Society — August 1996
Editor: Tony D'Emanuele — No. 2

Welcome to the second UK Controlled Release Society Newsletter, included in this edition are details of the next UKCRS meeting to be held in January 1997 together with the results from the UKCRS questionnaires. Up to date UKCRS information can be found on our pages on the Internet.

Contents

A Message from the President of the Controlled Release Society

The Controlled Release Society is an interdisciplinary and international society with a membership from both academia and industry. The scientific interests of the membership cover a wide array of disciplines. It is imperative to utilize this huge intellectual potential for the further advance of our society and for the welfare of mankind. The establishment of local chapters helped the realization of the ambitious goals of our Society. Local chapters can address the particular needs in geographical areas around the world and increase the participation of scientists in our Society. At the present time, local chapters are established in UK, Argentina, Greece, Germany, India, Israel, Italy, Korea, Spain-Portugal; additional local chapters are being established in Australia, China, France, New Zealand, Taiwan, and Turkey.

Since its formation in 1994, the United Kingdom's local chapter was in the forefront of the Society's activities. You gave an example to others how to organize scientific activities on a local level and how to encourage young scientists to participate. I was honoured to take part in the 2nd Symposium on Controlled Drug Delivery of the United Kingdom's local chapter of the CRS in January 1996. It was an excellent meeting covering the most important aspects of the science and technology of chemical and biological delivery systems. In addition to oral presentations, I was very impressed with the poster session. The topics covered a wide range of research aspects and were in the majority presented by young investigators indicating that the future of our discipline in the United Kingdom is in good hands. The scientific content of the meeting supported my belief that the future of research is in an interdisciplinary approach to the formulation of hypotheses and problem solving. Your conference helped to create a scientific environment which will foster research leading to improved understanding of basic scientific principles on the interface of chemistry, biology, pharmaceutics, and medicine.

Your activities will certainly help in the advancement of our Society. The main tasks ahead of us are: To further increase the high scientific standard of the Society, to foster interdisciplinary collaboration, to increase the internationalisation of the Society, to finish the strategic planning process, and, what I consider the most important task with a decisive impact on the future of the Society, is the creation of an atmosphere which will encourage and increase the participation of graduate students and young scientists in both the scientific and day to day activities of the Society.

My sincere thanks to the UKCRS Committee and to all members of the United Kingdom's local chapter for your excellent work. Good luck in your future endeavours.

Jindrich Kopecek, President of CRS

The UKCRS Committee

During coming months, the UKCRS Committee will be expanded and restructured. It's a great credit to all involved that the initial foundations for the 'UK Local Chapter' are now firmly laid and indeed the parent society are using the UK efforts as a model for establishment of Local Chapters worldwide!!

As a result of our recent surveys in academia and industry, we would like to ensure continued development of the UKCRS and have recently co-opted a number of new committee members (see front page for list of names). During the next six months, some of the executive positions will swop around to give colleagues a break - we all have very busy schedules - and ensure a lively and influential local voice for our interdisciplinary work in the broad disciplines of Controlled Release. Election of committee members will take place in January 1997. Last year, there were no new nominations. If you would like to volunteer/nominate someone, please contact us at UKCRS.

Report on the 2nd Annual UKCRS Symposium - London

The second UK Controlled Release Society symposium, superbly organised by Dr. Duncan Craig, was held in January at the School of Pharmacy at the University of London. Over 150 participants attended from France, Germany, Holland, the United Kingdom, and the United States. Professor Sandy Florence, as Dean, welcomed the attendees to the School of Pharmacy and introduced Professor Ruth Duncan, the current chairperson of the UKCRS. She explained that the society had been set up in 1994 as a branch of the Controlled Release Society. Its aim was to further the internationalisation of the parent society and to act as a focus for the study and development of controlled release technologies within the UK. Professor Duncan said these objectives were now being realised with day symposia and joint meetings with other pharmaceutical science groups. The UKCRS Committee were particularly pleased that the current President of the CRS, Professor Jindrich Kopecek of the University of Utah attended the meeting. He give a short speech on the activities of the parent Controlled Release Society and endorsed the role of local national groups such as UKCRS in encouraging scientific research and communication in this area. Professor Kopecek formally opened the science meeting which was organised into a number of sessions of invited keynote speakers, a few short contributed presentations and a large poster session.

The use of immunoliposomes to target cells in the body as a potential way of treating disease was outlined by Professor Daan Crommelin (University of Utrecht, the Netherlands). He explained that there were a number of barriers to targeting disease sites in the body. These barriers included the endothelial lining of the vasculature, the activity of macrophages and poor perfusion of the target tissue. Turning to the function of immunoliposomes, Professor Crommelin explained that they were liposomes with surface antibodies or antibody fragments. They had potential in diseases where the targets were known to be in the blood circulation or endothelial wall. Some of the areas in which immunoliposomes might be used were autoimmune diseases, certain cancers (where the cells were circulating in the bloodstream), clot dissolution, cardiovascular disease, and in liver diseases localised in hepatocytes. The concept of using macrophages in a technique called "target cell dragging" was

The speakers and hosts of the London Meeting. From left to right: Prof. Daan Crommelin, Prof. Helmut Ringsdorf, Dr. Gillian Francis, Prof. Jindrich Kopecek, Prof. Lisbeth Illum, Prof. Ruth Duncan, Dr. Clive Roberts, Prof. Tony Moffat, and Dr. Duncan Craig.

discussed. The target cell itself was not recognised by the immune system but, on interaction with the immunoliposome, it became recognisable by macrophages and was consequently removed from the circulation or tissue. Target cells could thus be selectively "picked out" from the circulation. This technique had been tested in the laboratory against the malarial parasite in rats. Immunoliposomes also had potential in thrombolysis after acute myocardial infarction. Liposomes with tPA inside had been developed which "homed in" on plasminogen in the thrombus. Professor Crommelin suggested that this technique might provide a way round some of the undesirable side effects of conventional tPA therapy which resulted from its effects on plasminogen in the blood.

Dr. Gillian Francis (PolyMASC and Royal Free Hospital, London) described methods to provide better attachment of polyethylene glycol (PEG) to therapeutic agents. There was considerable interest in using polymer-drug conjugates as a means of improving biological distribution and cellular uptake of drugs such as cytotoxic agents. There was a need to develop effective methods of attaching polymers such as PEG without compromising biological activity, toxicity or stability of the conjugate. Dr. Francis described a novel "pegylation" technique which had been used with various cytokines. These had demonstrated that improvements in both circulation half-life and bioavailability could be obtained. In particular, studies with GMCSF and erythropoeitin had shown that attachment of PEG rendered these agents "invisible" to the immune system. Furthermore, studies with liposomes had shown a decrease in hepatosplenic uptake and increased tumour localisation after pegylation of the liposome surface.

Professor Lisbeth Illum (Danbiosyst and University of Nottingham) discussed the difficulties associated with the delivery of peptides and proteins. These were challenging molecules for transmucosal delivery because they were large, water soluble and unstable. They did not easily cross biological membranes and were normally given by the parenteral route because they were difficult to administer by other routes. As an alternative, the nasal route of delivery was an option. Professor Illum argued that there were several advantages to this route, including high permeability compared with the gastrointestinal tract, a large surface area for absorption, high vascularity and a low first pass effect. In addition, the nasal route offered patient compliance and both pulsatile or sustained release preparations could be administered by this route. There were, however, a number of disadvantages to this route. The permeability of the membrane was poor, drugs needed to be able to penetrate the mucus layer in the nasal passage, degradation of the drug might occur and absorption was dependent on the location of the dosage form within the nose. Mucociliary clearance in the nose was also a problem, hence absorption might be enhanced by limiting this clearance. Starch or albumin microspheres had been used as delivery vehicles for this route, but the material of choice was chitosan.

Professor Karol Sikora (Hammersmith Hospital Medical School) said that the main stumbling block in gene therapy was the delivery of DNA to target cells. Delivery of genes could take place via physical methods or be virally mediated. Physical methods included microinjection, liposomal transfer, receptor mediated delivery and tissue injection. Viral methods included the use of a retrovirus, adenovirus or Herpes simplex virus. At present, nearly 80 per cent of gene therapy protocols used the retrovirus technique. Discussing the potential disease models that could benefit from gene therapy, Professor Sikora suggested that they would have to be life-threatening. Current targets for gene therapy were: immunodeficiencies, cystic fibrosis, haemoglobinopathies (e.g. thalassaemia), metabolic disorders, arthritis, HIV infection, central nervous system disease, muscle disorders (e.g. muscular dystrophy), cardiovascular disease (e.g. restenosis) and cancers. It was on cancer that most gene therapy had been focused to date. Professor Sikora described one of the potential approaches to gene therapy in cancer or for tissue specific drug release. The technique was termed "selective drug activation". It involved switching on certain transcriptional messages in a specific tissue or tumour. For example, if production of an enzyme involved in the activation of a prodrug could be switched on in a specific tissue or cancer, then this would produce selectivity *in vivo*. This type of technology was

likely to be improved as the human genome sequence was mapped and genes expressed in normal tissues and tumour tissues could be identified.

Professor Helmut Ringsdorf (University of Mainz, Germany) discussed some of his work on supramolecular organisation and biorecognition. The focus of the research was to establish model systems which imitated the natural processes whereby molecules assembled into larger structures. It was the behaviour of these structures, and not the individual constituent molecules, which determined many biological processes, such as biorecognition. Viral docking had been studied using a monolayer lipid system which on interacting with a viral coat protein underwent a red to blue colour change. This had implications for the development of biosensors and other diagnostic tools, as well as demonstrating the degree of sophistication with which model systems to study these complex biomolecular interactions could be built.

There were also three excellent short contributed papers from young scientists within the UK. Dr. Jayne Lawrence (King's College, University of London) reviewed her recent work on the formulation of microemulsion-based gels. Dr. Clive Roberts (University of Nottingham) described how the atomic force microscope can be employed to study biomolecular structure, polymer surface degradation and the release of proteins of biodegradable systems. Dr. Andrew Lloyd (University of Brighton) described the novel use of biomimetic polymers based on phospholipid derivatives to improve the ocular compatibility of intraocular lenses.

Prof. Ruth Duncan (left) and Prof. Jindrich Kopecek (right) with the poster prize winners, Ms. B. Thomas, Dr. A. Hillery and Ms. A. Fernandes.

There was a lively poster session over the lunchtime break with over 20 contributed posters from many of the major controlled drug delivery groups in the UK. Professors Crommelin and Kopecek were kind enough to adjudicate the posters and commented on the high quality through the session. Ana Fernandes (School of Pharmacy), Beverley Thomas (University of Bath) and Anya Hillery (University of Brighton) were awarded prizes as best posters. They will each receive £500 travel expenses towards attendance at the next CRS meeting in Stockholm in June 1997 and the parent society have agreed to waive their registration fees.

Overall, the meeting was a great success and much credit goes to Duncan Craig for his tireless efforts in organising the meeting. The UKCRS Committee would like to thank our industrial sponsors Cortecs Ltd, Ethical Holdings plc, Jago Pharma AG., Pfizer Central Research and Polymer Laboratories for their kind and generous support. We would also like to thank our UKCRS members for supporting this meeting so actively and look forward to seeing them at the next meeting in Manchester in 1997.

(Adapted in part from a report in the Pharmaceutical Journal)

Report on the CRS Meeting in Kyoto

Several UK colleagues recently had the opportunity to travel to the Annual CRS Meeting in Kyoto, Japan. For those members who found it too expensive or too far, the Abstract Booklet will be with you soon!! The meeting was once again an excellent forum for exchange with more than 1000 participants from many nations, and of course gave us a chance to see the breadth of the excellent research ongoing in Japan. The Japanese Drug Delivery Society (of which there are some 2,000 members) held a Satellite Meeting on the Sunday beforehand which was very well attended.

Kyoto Conference Centre is a magnificent venue, and Kyoto, with its many temples, is well worth a visit. The UKCRS would like to congratulate our Japanese friends for their excellent organisation and hospitality.

Next year its the European turn to host the meeting (Stockholm). Somewhat closer to home, hopefully we can all make an effort to support our 'local' CRS Symposium.

Ruth Duncan

3rd Annual UKCRS Symposium - Manchester January 1997

The 3rd UKCRS Meeting on "Controlled Drug Delivery - Current Perspectives and Future Horizons", will be held on Monday 6th January 1997 at the University of Manchester. The meeting will be organised by Dr. Tony. D'Emanuele. The programme for this meeting reflects many of the important current issues in the field of controlled release. The preliminary programme includes the following invited speakers:

- Prof. David Clarke (University of Manchester)
- Prof. Martyn Davies (University of Nottingham)
- Dr. Tony D'Emanuele (University of Manchester)
- Prof. Nicholas Peppas (Purdue University)
- Dr. Tony Phillips (Glaxo Wellcome)

There will also be an invited poster session and three awards of £500 each will be made to the best posters. This will enable the winners to travel to the Stockholm CRS meeting. The final programme plus latest news on the meeting will be circulated shortly and will also be available on the UKCRS Web page.

Joint Meeting between the UKCRS and the RPSGB - 1997

The 134th British Pharmaceutical Conference will be held at Scarborough in September 1997 and the UKCRS will collaborate with the Royal Pharmaceutical Society of Great Britain to organise a Satellite Symposium (programmed as a parallel session in the main meeting) to consider the topic "Innovative Drug Delivery Systems: Design to Market".

The programme is currently being put together (Organising Committee: Duncan Craig (UKCRS), Jayne Lawrence and Gary Martin (Pharmaceutical Sciences Group)). Suggestions to be forwarded to them!

The UKCRS is delighted to collaborate with the RPSGB via this joint meeting and hope that our membership will support the event.

Gene Therapy from a Pharmaceutical Viewpoint

The future of gene therapy depends on the manufacture of pharmaceutical products for widespread distribution. Whether viral or semisynthetic systems are preferred this will involve the design of effective gene expression systems, the understanding of their biodistribution, metabolism and fate *in vivo*, and the development of effective methods for their manufacture and quality assurance. An understanding and assessment of the risks versus benefits of such systems will also be a crucial element in development and licensing of products for human use. Though scientific knowledge and techniques in gene therapy are advancing rapidly, and several *in vivo* clinical trials are in progress, more attention needs to be focused on the pharmaceutical and manufacturing issues, which will ultimately influence the design of products for bulk manufacture. These were the issues discussed in the UK Association of Pharmaceutical Scientists (UKAPS) symposium 'Gene Therapy from a Pharmaceutical Viewpoint' organised at the University of Bath in April by Colin Pouton and his colleagues.

The meeting was opened by Eric Tomlinson (GeneMedicine Inc.) who gave a plenary lecture outlining the portfolio of GeneMedicine and the progress he and his colleagues have made in 'Controllable gene therapy using semisynthetic systems'. Both lipids and peptides can be used in the design of non-viral delivery gene systems. GeneMedicine are developing proprietary systems for delivery to the airways by inhalation, and also to the liver and other organs from the blood circulation. Control of gene expression is possible using tissue-specific promoters and gene-switch technologies. Wolfgang Zauner (IMP, Vienna) described the efforts of the Vienna group to use viral fusogenic peptides to promote escape of gene delivery systems from the endosome following endocytosis of condensed DNA particles. Structure-activity studies have been conducted using analogues of the N-terminus of the influenza virus hemagglutinin HA-2 protein and the VP-1 of rhinovirus 2 (HRV 2). The fusogenic peptides which have a net negative charge can be taken into the cell with the condensed DNA particles by adsorption onto particles with excess cationic charge. The advantages and disadvantages of the use of attenuated adenoviral and retroviral particles was discussed by Lawrence Young (University of Birmingham). There are a multiplicity of factors which will affect the future of such strategies. Viruses are usually more efficient delivery systems, and in the case of retroviruses can lead to heterologous recombination in dividing cells, but there are safety issues to consider and the production of high titres of viruses is difficult in some circumstances. Future developments in the selective expression of genes from viral particles was explained by Richard Vile (UMDS, London) who used his work on targeted gene therapy for malignant melanoma as an illustration of the potential. His group are investigating anti-cancer strategies using a melanoma-specific promoter (the tyrosinase promoter). The possibility of using viruses with a restricted ability to replicate was discussed as a

potential way of overcoming the problems caused by low viral titres. Expression within the hematopoietic system can be controlled using locus control regions and this is the basis of technology licensed by Therexsys which was described by Vincent Cunliffe (Therexsys, Keele). It is clear that selective expression will be a major factor in the future development of gene therapy. It remains to be seen how these expression control systems will perform *in vivo* in humans. In a session concerning the pharmaceutics, biopharmaceutics and pharmacokinetics of gene therapy, Martin Garnett (University of Nottingham) opened by describing the physical chemistry underlying the interactions between polycations and DNA. Characterisation of such complexes is a considerable challenge which is being met by the use of several techniques in parallel, including circular dichroism, photon correlation spectroscopy, microcalorimetry, and scanning probe microscopies. The interactions between DNA and polylysine or polyamidoamines were investigated by Garnett and colleagues using several of these techniques. Characterisation of complexes and assessment of their stability will be important in relation to understanding their performance *in vivo*. Biopharmaceutical issues in delivery of plasmid DNA were reviewed by Colin Pouton (University of Bath) who paid particular attention to cell culture models and the difference in performance between DNA complexed with polypeptides and cationic lipids. Polypeptide systems have a future in the design of virus-like particles which include analogues of viral proteins, but DNA-polylysine complexes are ineffective in the absence of an endosomolytic agent. Lipid systems on the other hand are able to transfect cells by mechanisms which are not fully understood. The stability of non-viral gene delivery systems in the blood circulation has been investigated by Len Seymour (University of Birmingham) and colleagues. Linear DNA was end-labelled with ^{32}P-dCTP, condensed with polylysine and injected i.v. into mice. The DNA had a very short half-life in the bloodstream which was not explained by excretion. The most likely explanation for the rapid clearance was thought to be capillary entrapment, but more data is required to confirm this hypothesis.

In a session on manufacturing issues David Thatcher (Therexsys) explained the key steps involved in large-scale purification of plasmid DNA for non-viral gene therapy. The basic principles are the same as those used for small-scale isolation but handling large masses of DNA in concentrated solutions is problematic due to the solution viscosity. Thus the harvesting and chromatographic procedures need to be optimised. Centrifugation is not practical on the scale required and is often replaced by coarse filtration. Contaminants need to be removed by a combination of selective precipitation, anion exchange chromatography and gel filtration. Simon Tucker (University of Glasgow) explained the use of packaging cell lines for production of viral systems. Safety issues and low titres were the main concerns. Recombination within packaging cell lines is being overcome by designing cell lines so that their is limited homology between the DNA involved in desired product and that required for packaging. Feline leukaemia virus packaging cassettes have potential in this respect. The safety and regulatory issues intrinsic to gene therapy were discussed in the penultimate session. Compliant manufacturing of non-viral systems was described by Tom Seddon (ICRF, Clare Hall), who has been responsible for setting up the ICRF unit and manufacturing several clinical trials batches of plasmid DNA in the UK. Dr. Seddon reported that a good dialogue existed between himself and the Medicines Control Agency, which had led to the development of acceptable standards for manufacture, making it possible for academic organisations funded by charities to go forward with clinical trials. Similar issues have been faced by John Marshall and colleagues (Magenta Services) in their work on manufacture of viral vectors. It was essential to set up safety tests based on the various phases of the manufacturing process, i.e. setting up of preliminary, master and working cell banks, culture of production cells etc. The probability of generation of replication competent viruses was discussed in detail. Concluding this session Lincoln Tsang (Medicines Control Agency) discussed the stages involved in progressing a gene therapy through to clinical trials.

The meeting was concluded by two speakers with clinical viewpoints, firstly Eric Alton (National Heart & Lung Institute) described progress in gene therapy for cystic fibrosis. There are several trials

in progress using both adenoviral vectors and liposomal-DNA complexes. Proof of concept that the CFTR gene can be expressed in vivo was obtained by intra-nasal administration and we now await the results of human trials involving delivery to the airways. It is often assumed that adenoviral systems would be more efficient but at present the proportion of positive responses seems to be comparable for both systems. Gene therapy for cancer was discussed by Karol Sikora (Royal Postgraduate Medical School, Hammersmith). There are several potential approaches to the gene therapy of cancer but many suffer from the problem that all cells would need to be transfected to achieved the desired result. It is sensible to focus on strategies which do not require delivery to all cells. The enzyme-prodrug approach is one way forward which is being investigated at Hammersmith. A selective promoter is in use to ensure that expression of the enzyme is localised.

About 80 scientists participated in the two-day symposium. It is intended that a second meeting in the series will be held in 1998. Suggestions will be welcome (e-mail c.w.pouton@bath.ac.uk).

Colin Pouton

Results of Market Research Surveys

Over its initial two years the UKCRS has tried, through market research, to establish what is wanted from a local chapter of the CRS and give the membership the opportunity to determine its direction/ activities. This has been mainly through the form of questionnaires targeted at various groups. The first questionnaire was sent out to the membership with the first Newsletter last July. In addition, the opinions of the Academic and Industrial communities were canvassed through Duncan Craig and Julie Binns, the respective academic and industrial liaison officers, who targeted their questionnaires through specific link people at various establishments. Finally an additional chance to feedback to the Committee was provided in January at the 2nd Annual meeting in January. In total we obtained a 30% response rate and in excess of 150 replies. The main points from the surveys show that

- the CRS community is interested in attending both meetings and workshops
- a forum is wanted where experts can be heard as well as having an opportunity to meet with colleagues and present/view original work
- support and training is needed for young scientists
- technology reviews/updates on controlled release and greater conference information would be a welcome asset to the Newsletter
- a very diverse range of areas of interest and disciplines are represented
- liaison with other societies is encouraged
- at present membership and feedback have predominantly been obtained form the pharmaceutical sector

In response to some of this feedback, the Committee is endeavouring to link with other Societies and possible joint meetings are under discussion. We hope to continue with the format of poster sessions at the annual meeting and will continue to offer travel prizes to CRS meetings for young scientists. We are actively trying to establish links within other areas pertinent to controlled release, particularly the food, agricultural, veterinary and cosmetics industries both from an industrial and academic viewpoint.

Please continue to communicate your ideas and needs to the Committee members in order that the UKCRS can evolve to fulfil the needs of its members.

Committee Members in the News!

"The Secret of Our Success" - Several members of the UKCRS Committee were recipients of national awards and career promotions in the last months and I would like to take this opportunity to congratulate them all!! Academic and industrial members of the UKCRS are all juggling so many activities these days: not only research but also administration, and for many of us also teaching. Therefore it is rewarding to see that it is still possible to attain "excellence" in our chosen fields and I have asked my colleagues to tell us something of their research interests - very diverse as you will see - and give some tips to the budding UKCRS prize winners of the next generation!

Ruth Duncan, Chairperson UKCRS

Royal Pharmaceutical Society of Great Britain Science Award 1995

The prize is awarded to 'young' (i.e. under 35 at the time of submission) pharmaceutical scientists on the basis of the work carried out to date and the direction in which the research seems to be going. In addition to a cheque, the award involves giving a plenary presentation at the Pharmaceutical Conference the following year which, previous winners have cheerfully told me, is a highly stress-laden experience, largely on the basis of the standard which one has to live up to with respect to previous winners. This coming conference will be unusual in that instead of the normal contributed paper sessions, the meeting will involve invited speakers on the topics of malaria, tuberculosis and asthma. Given that my subject area is pharmaceutical materials science, I think it unlikely that I will face accusations of preaching to the converted. I look forward to the challenge of trying to convince an audience of medics and clinicians that they should be dusting off their A level physics textbooks in order to develop more effective therapies.

Duncan Craig, School of Pharmacy, University of London

Personal Chair in Biomedical Surface Chemistry

Martyn Davies has been promoted to a personal Chair at the Department of Pharmaceutical Sciences in recognition of his recent research in biomedical surface chemistry

Martyn Davies, Department of Pharmaceutical Sciences, University of Nottingham

Lilly Prize 1995

The Lilly Prize is awarded each year to a young lecturer employed in a UK school of pharmacy for pharmaceutical excellence. Since arriving in Manchester in 1990 I have developed research projects in pulsed and responsive drug delivery, biodegradable polymeric systems, and the delivery of DNA into cells. The Lilly Prize involved me presenting a research seminar at the UK Lilly Research Centre and at the Eli Lilly Corporate Headquarters in Indianapolis. The award also included funding to enable me to present some of my work at the AAPS meeting in Miami. It is to the credit of companies such as Eli Lilly for making this type of award available to young academics. It can be disheartening at times in the current academic climate, and awards such as the Lilly Prize help to encourage young academics in the early stages of their career.

Tony D'Emanuele, Department of Pharmacy, University of Manchester

Pfizer Prize 1995

Six awards are presented each year by Pfizer Central Research for research in the fields of Chemistry, Biology, Pharmaceutical Science and Animal Health Research. Winners are selected by a panel of Pfizer scientists and independent advisors, which means no applications, no waiting for the results,

and a wonderful surprise one morning when an unexpected congratulatory letter arrives in the post. I have a rather broad range of research interests (not usually a good idea if you aim to win prizes). My early work concerned the formulation of self-emulsifying oils for administration of drugs to the gastrointestinal tract, and I retain an interest in the bioavailability of hydrophobic drugs. Since arriving at Bath in 1982, my research has been stimulated by advances in molecular cell biology. Current work is aimed at targeting and delivery of peptides and gene expression vectors. Specific projects include design and characterisation of plasmid DNA delivery systems; receptor-mediated targeting of drugs to melanoma using melanocortin analogues; characterisation of melanocortin receptors and design of selective agonists and antagonists of melanocortin activity, synthesis, characterisation and biodistribution of macromolecular prodrugs for drug targeting. The therapeutic targets of the gene delivery programme are malignant melanoma and chronic inflammatory diseases of the lung. My advice to thrusting young scientists is work on what interests you, work hard and don't worry about the prizes. If you are happy and working effectively the rewards will come.

Colin Pouton, School of Pharmacy and Pharmacology, University of Bath

UKCRS on the WWW

The UKCRS can take pride in being the first pharmaceutical organisation to develop a web site. The pages have recently been updated and include all the latest UKCRS news together with the latest information on the 3rd UKCRS meeting in Manchester. All UKCRS newsletters are also available via the Web pages. The URL (address) of the UKCRS page is:

http://www.mcc.ac.uk/pharmweb/ukcrs.html

Controlled Release Discussion Group on the Internet

A discussion forum has been developed on the Internet for scientists interested in the area of controlled release. The forum was established to encourage the discussion and free exchange of information between scientists around the world. The group is being moderated by Dr. Ross Kennedy from the University of Sydney in Australia. At the time of writing this article there were approximately 100 people registered from around the world. If you have an interest in controlled release and would like to join the forum you can get full information from the following web page:

http://www.mcc.ac.uk/pharmweb/forum.html

Annual CRS Symposia Dates

June 15th - 19th, 1997, Stockholm, Sweden, *24th International Symposium on Controlled Release of Bioactive Materials*. This is the main International meeting of the CRS in 1997.

Other Meetings

1st-6th September, 1996, Jerusalem, Israel, *56th World Congress of Pharmacy and Pharmaceutical Sciences*.

10th-13th September, 1996, Glasgow, UK, *133rd British Pharmaceutical Science Conference.*

15th-17th September, 1996, Edinburgh, UK, *3rd European Congress of Pharmaceutical Sciences*.

27th-31st October, 1996, Seattle, USA, *AAPS Annual Meeting and Exposition*.

6th January, 1997, Manchester, UK, *3rd UKCRS Symposium on Controlled Drug Delivery: Current Perspectives and Future Trends*.

15-18th September, 1997, Scarborough, UK, *Innovative Drug Delivery Systems: Design to Market*. A satellite symposium organised by the RPSGB and the UKCRS as part of the 134th British Pharmaceutical Conference.

Information on these and other conferences relevant to the field of controlled release may be found on the PharmWeb pages on the Internet at the following URL:

http://www.mcc.ac.uk/pharmweb/conferences.html

Joining the CRS

If you would like to join the Controlled Release Society please fill in the application form enclosed with this newsletter. Alternatively, you can contact the CRS at the address below.

Contacting the CRS

CRS Administrative Headquarters
1020 Milwaukee Avenue, Suite 235
Deerfield, IL 600015 USA
Tel: +1 708 808 7071
FAX: +1 708 808 7073

CRS European Office
c/o School of Pharmacy
30, quai E.-Ansermet
CH-1211 Geneva 4, Switzerland
Tel: +41 22 702 6339
FAX: +41 22 702 6339

Contacting the UKCRS

For any enquiries regarding the UKCRS please contact;
Prof. Martyn Davies
Department of Pharmaceutical Sciences
The University of Nottingham
Nottingham NG7 2RD
Tel: 0115 9515031
FAX: 0115 9515110
E-mail: Martyn.Davies@Nottingham.ac.uk