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Foreword

9th International Conference on In Vivo Methods Monitoring Molecules in Neuroscience, June 16–19, 2001, University College Dublin, Ireland

Attending the State reception of the 9th International Conference on In Vivo Methods, *Monitoring Molecules in Neuroscience* in Dublin Castle were from the left: Dr. John Lowry, Department of Chemistry, NUI Maynooth; Dr. Billy O'Connor, Department of Human Anatomy and Physiology, University College Dublin (UCD) and chairman of the local organizing committee; Professor Arvid Carlsson, Department of Pharmacology, University of Gothenborg, Sweden, and Nobel Prize Winner in Physiology and Medicine 2000; Professor Robert O'Neill, Department of Chemistry, UCD and Dr. John O'Connor, Department of Human Anatomy and Physiology, UCD.

The 9th International Conference on In Vivo Methods, *Monitoring Molecules in Neuroscience* was held in University College Dublin, Ireland, 16–19th June 2001. This meeting is one of a series that began in Nottingham, UK in 1982 and follows on from previous successful conferences in Britain (1989), Holland (1991), France (1994), Spain (1996) and the USA (1999). Some 55 papers were read and 300 delegates from over 20 countries presented 150 posters over 3 days. Invited speakers at the conference have submitted the nine papers in this special issue of the Journal of Neuroscience Methods.

University College Dublin and The National University of Ireland, Maynooth, jointly organized the meeting. The topics addressed at this inter-disciplinary conference included advances in the ability to monitor various aspects of brain function especially chemical neurotransmission in the brain of living organisms, including man. There were special sessions devoted to on-going technical and methodological advances including the development of biosensor technology and analytical techniques with the ability to detect molecules in the brain with great sensitivity.

This topic of recent advances in the ability to monitor chemical and electrical aspects of brain function in the experimental and clinical neurosciences was well addressed in the opening plenary session. Mark Wightman (University of North Carolina, Chapel Hill, USA) presented a summary on his work with carbon-fiber microelectrodes and fast-scan voltammetry, now extended to the awake, freely-moving model. Urban Ungerstedt (Karolinska Institute, Stockholm, Sweden) summarized the recent status of intracerebral microdialysis in humans following stroke and traumatic brain injury, whereas Tony Grace discussed electrophysiological approaches to analyzing systems interactions on a synaptic and network level. In fact, most of the presentations at the meeting were focused on various aspects of microdialysis sampling or electrochemical sensing devices. In other approaches to neurochemical monitoring, Vickie Chapman (School of Biomedical Science, Nottingham, UK) described how fMRI in small animals is a novel approach in neuropharmacology while Martyn Boutelle (Kings College, London, UK) described recent advances in on-line electrochemical detection systems for clinical and pre-clinical neurochemical analysis.

The second plenary session addressed the issue of synaptic and non-synaptic transmission and was initiated by Manuel Mas (University of La Laguna, Tenerife, Spain) who described changes in nitric oxide levels in the corpus cavernosa during penile erection. The case for volume transmission for noradrenaline in the locus coerulus was put forward by Jonathan Stamford (Royal Hospital, London UK) whereas M. Benoit-Marand (University of Bordeaux, France) described the kinetics and geometry of autoregulation of striatal dopamine release. Nicolas Hussy (CNRS, Mon-

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tpellier, France) gave a very interesting talk on evidence for taurine and glycine receptors as mediators of glia-to-neuron transmission in the hypothalamus.

The third plenary session addressed issues relating to neurotransmission and behaviour. Matthijs Feenstra (Netherlands Institute for Brian Research, Amsterdam, The Netherlands) described how prefrontal dopamine and noradrenaline release may be related to the relevance of a task performed during classical conditioning and operant behaviour. In a similar vein, Gaetano Di Chiara (University of Calgiari, Sardinia, Italy) provided strong evidence for a role for dopamine release in the prefrontal cortex and the core and shell of the accumbens in meditating the psychomotor aspects of addiction. Holger Stark (Leibnitz institute for Neurobiology, Magdeburg, Germany) also described how an increase in prefrontal dopamine release in gerbils might underlie the acquisition of avoidance strategy in the shuttle box. John P. Bruno (Ohio State University, USA) demonstrated how the use of multiple dialysis probes can reveal a distributed neural system underlying attentional processing in the rat, whereas Robert Strecker (Harvard Medical School, USA) described how neuromodulators such as adenosine play a key role in the sleep-wake cycle.

Six parallel symposia addressed microdialysis sampling issues, in-vivo voltammetry and developments in biosensor technology. Ken Perry (Eli Lilly, Indianapolis, USA) initiated the microdialysis session with a description of procedural issues in HPLC analysis. Yvette Michotte (Vrjie University of Brussels, Belgium) gave a description of quantitative microdialysis in PK–PD studies while Kelly Drew (Institute of Arctic Biology, Fairbanks, USA) described the nature of striatal glutamate levels and tissue trauma in the hibernating arctic ground squirrel. Elizabeth A. Pehek (Case Western University, USA) provided strong evidence for a heteroreceptor regulation of the rat mesocortical system by cortical serotonin 5-HT_{2A} receptors, whereas Phillip Thomas (University College Dublin, Ireland) described how intracerebral microdialysis in man is applied to study the temporal neocortex and hippocampus during epilepsy neurosurgery.

David Sulzer (Columbia University, USA) initiated the session on recent progress in voltammetry and biosensor technologies by describing how dopamine release can be monitored in the cellular microenvironment in vivo and in vitro, whereas John Lowry (National University of Ireland, Maynooth) demonstrated recent developments in biosensor technology for in-vivo monitoring of brain energy metabolism. Andrew Ewing (Pennsylvania State University, USA) described the electrochemical and separations-based sensing of neurotransmitter dynamics and storage at cells and varicosities in culture, whereas voltammetric detection of rat brain glucose and lactate was discussed by Raymond Cespuglio (Claude Bernard University, Lyon, France).

The session on monoamines, acetylcholine and second messengers was initiated by Umberto Spampinato (University of Bordeaux, France) who described the role of the serotonergic (5-HT) system in the control of nigrostriatal and mesolimbic DA neurons. This was followed by a talk by Jan Kehr (Karolinska Institute, Stockholm, Sweden) on hippocampal cholinergic–5-HT interactions and the modulatory role of the neuropeptide galanin and their possible implications in Alzheimer's disease and depression. Atsushi Yamatodani (Osaka University, Japan) provided evidence for a neuronal pool of extracellular histamine in the hypothalamus, whereas using dual probe microdialysis in six-hydroxydopamine treated rats, Michele Morari (University of Ferrara, Italy) investigated the possible mechanisms by which striatal dopamine and glutamate regulate striatonigral glutamate release. John O'Connor (University College Dublin, Ireland) presented data on the relationship between LTP and intracellular MAP kinases in CA_1 hippocampal neurons and showed that pro-inflammatory cytokines have marked effects on synaptic transmission.

The session on amino acids and neuropeptides attracted much interest. Ben Westerink (University Centre for Pharmacy, Groningen, The Netherlands) discussed the controversial issue of the neuronal origin of extracellular amino acid levels. In her talk provocatively entitled *The theology of amino acid microdialysis: the mystery of origin and meaning* Kristen Keeffe (University of Utah, USA) explained the key role of reuptake mechanisms in maintaining extracellular amino acid levels, whereas factors influencing amino acid transporters was discussed by Peter Kalivas (Medical University of South Carolina, USA). By combining microdialysis and immunocytochemistry, Charles Meshul (Oregon Health Sciences University, USA) described how loss of dopamine affects striatal glutamatergic function.

In the session on novel and combined approaches Trevor Sharp (University of Oxford, UK) described how integrated studies employing electrophysiology, microdialysis and in situ hybridization may give a better perspective on neuronal function. Michael G. Kaplitt (Cornell University, USA) described how microdialysis and deep brain stimulation can be combined in human Parkinson's disease patients. Raul Gaitainidov (Duke University, USA) showed how the combination of in vivo microdialysis and voltammetry can reveal alterations in dopamine transmission in mice with genetic deletions of both the dopamine and norepinephrine transporters. The use of intracerebral microdialysis in drug-induced and kindling models of epilepsy was presented by Rob Berman (University of California, Davis, USA) whereas Larry Parsons (Scripps Research

Institute, USA) argued the 'pros and cons' of the capillary electrophoresis–mass spectroscopy approach compared with the HPLC–mass spectroscopy approach, while giving an overview of recent trends in peptide separation and detection.

In light of the fact that many pharmaceutical companies active in the CNS therapeutic area utilize microdialysis as a research tool to obtain neurochemical correlates to various behavioural tests or pharmacological treatments, a special session was devoted to drug action and development. The benefits of microdialysis in the process of drug discovery were discussed by Hans Rollema of Pfizer, Groton, USA (depression, schizophrenia) and Peter Hertel of Lundbeck, Copenhagen, Denmark (schizophrenia, relevance to behavioural models). Francesco Crespi (Glaxo Wellcome, Verona, Italy) described concomitant in-vivo voltammetric and electrophysiological studies in cortical and subcortical brain regions, whereas Sophie Sarre (Vrjie University of Brussels, Belgium) described the nerve circuitry of the basal ganglia as studied with microdialysis.

On the second evening of the conference a state reception was held in Dublin Castle and this was followed on the final evening by a banquet to honor the award of the Nobel Prize in Physiology and Medicine (2000) to Professor Arvid Carlsson (University of Gothenborg, Sweden). Professor Carlsson was invited to cut a special commemorative cake baked in the shape of a dopamine molecule (the discovery of which earned him the Nobel Prize) and he also gave a keynote address on the research personalities he encountered on the road to the Nobel Prize. To commemorate his achievement Dr Billy O'Connor presented Professor Carlsson with a specially engraved Irish millennium silver plate on behalf of the local and international organizing committees.

As has been the tradition for these meetings, the organizers have, under the auspices of the host University (UCD), published a book in the Series: '*Monitoring Molecules in Neuroscience*' (ISBN number 1-902277-47-3). This book contains the 205 short papers submitted by the oral and poster presenters.

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