

Expert Opinion

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International Society for Aerosols in Medicine, 17th Congress, 10 – 14 May 2009, Monterey, California, USA

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The 17th biennial congress of the International Society for Aerosols in Medicine (ISAM) was held in Monterey, California, between 10 and 14 May 2009. The congress was attended by ~ 300 delegates from 18 countries. Podium presentations were focused on advances in pulmonary drug delivery, but clearance of materials from the lungs by a variety of processes and the potential harmful effects of inhaled particles were also covered. There were > 100 proffered posters, and a commercial exhibition in which 20 companies displayed their products. There were excellent networking opportunities, and the inauguration of more formal networking groups will allow dialogue to continue. Abstracts of podium and poster presentations were provided in the *Journal of Aerosol Medicine and Pulmonary Drug Delivery*, and it is likely that some of the podium presentations will appear as full papers in that journal in due course. The next conference in this series takes place in Rotterdam, The Netherlands, in June 2011.

Keywords: aerosol therapy, aerosolised vaccines, inhaled gases, lung clearance, nanoparticles, pulmonary drug delivery.

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1. Introduction

The 17th biennial congress of the International Society for Aerosols in Medicine (ISAM) took place at the Monterey Conference Center, Monterey, California, from 10 to 14 May 2009. ISAM was founded in 1970 as a mainly Eastern European society, but it has evolved over the past two decades to become a highly respected and truly international organisation. The objectives of ISAM are “to stimulate and further the interdisciplinary cooperation and exchange of information in all aspects of aerosol research in medicine including health effects of inhaled aerosols and pulmonary drug delivery” [1]. A total of ~ 300 delegates attended the Monterey congress; delegates from the US were the most numerous, but 17 other countries were represented as well. The congress followed a fairly densely packed single-session format of oral presentations. There were also > 100 posters available for viewing throughout the meeting, and a commercial exhibition involving 20 companies. Congress sponsorship was provided by ~ 30 organisations.

The official journal of ISAM is the *Journal of Aerosol Medicine and Pulmonary Drug Delivery*, which has been enthusiastically edited by Gerald Smaldone (University of Stony Brook, New York) for > 20 years. Abstracts of podium presentations and posters were published in the June 2009 issue of that journal [2], and it is likely that some of the podium presentations will also appear as full papers in future issues.

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2. Meeting highlights

2.1 Training workshops

There was a preliminary day of workshops, covering several key areas of pulmonary drug delivery, and intended primarily for those relatively new to the field. The workshop topics were i) the basics of aerosol technology, providing information about inhaler devices and their evaluation; ii) aerosol instrumentation, including provision of hands-on experience with instruments such as cascade impactors; and iii) the essentials of inhalation toxicology, aimed at helping companies plan toxicology studies for new inhaled drug products.

2.2 Aerosol therapy in the intensive care unit

The full meeting began with a plenary lecture by Michael Matthay (University of California, San Francisco) on 'Acute lung injury: pathogenesis and treatment'. The exciting future possibility of treating conditions such as acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) using nebulised mesenchymal stem cells was discussed. Other speakers in this session discussed ways of optimising drug delivery to both intubated and non-intubated patients in the intensive care unit. Aerosol delivery depends on the aerosol particle size and morphology, as well as on the patient's breathing pattern. When aerosol is delivered by means of an endotracheal tube, several other factors also have to be considered, including the location of the nebuliser or other inhaler in the ventilator circuit, humidity and the need to avoid passing the aerosol through narrow tubes containing sharp bends [3]. It was questioned whether the amount of aerosol that can be delivered to patients in the intensive care unit is generally adequate.

2.3 Lung clearance

In a session titled 'What is clear about clearance?' speakers discussed the removal of deposited materials from the lungs by mucociliary, cough and macrophage clearance mechanisms [4,5]. One obvious conclusion from this session is that there are many unanswered questions, even at the fundamental level of whether it can be assumed that deposited radiolabelled colloid particles used to monitor mucociliary and cough clearances always move with mucus. The relevance of abnormal ciliary function to the efficacy and safety of inhaled drugs is still poorly understood. Cough is ineffective in clearing mucus from the more peripheral regions of the lungs, and it is not known how patients with primary ciliary dyskinesia (PCD) clear mucus from the smaller airways. Looking ahead, there is interest in the possibility of using mucociliary clearance as a biomarker in diseases such as cystic fibrosis (CF).

In a related session on CF, a distinction was made between the terms 'mucus', 'phlegm' and 'sputum' used to describe lung secretions [6]. Pulmonary mucus is good because its presence is an essential requirement for maintaining a healthy lung. However, phlegm is bad because it is associated with inflammation, and sputum is expectorated phlegm. While past research has shown that lung secretions in CF patients

are not more viscous than those in patients with other lung diseases, they are particularly tenacious, and hence are difficult to clear by cough.

2.4 Carrier gases

Although it has been known for many years that the deposition of inhaled particles depends on the characteristics of the gas in which it is delivered, the use of carrier gases other than air as a means of improving targeting of inhaled drugs to different lung regions is only starting to be explored. The addition of helium to the inhaled gas reduces gas density and hence the Reynolds number (making turbulence less likely), and also reduces the work of breathing. Delivery of inhaled drugs in helium/oxygen mixtures (sometimes known as 'heliox') is now seen as a potential third parameter for controlling aerosol targeting, in addition to the established parameters of aerosol particle characteristics and the mode of inhalation. An international interdisciplinary biomedical research programme is currently in progress, aimed at quantifying the deposition and efficacy of drugs delivered in helium/oxygen mixtures.

2.5 Hazards and benefits of aerosolised nanotechnologies

Nanotechnology is a hot topic at the present time, and its potential application to pulmonary drug delivery is no exception. Nanoparticles are already used in medicine, for instance, in gold and platinum colloids used as health supplements, and are being developed as formulations for delivery by nebuliser, where they can overcome some of the limitations associated with trying to nebulise micronised suspensions. The possibility of using electrohydrodynamic methods (electrospraying) to make approximately monodisperse particles as small as a few nanometres in diameter was discussed [7]. However, it was pointed out that nanoparticle technologies pose some significant challenges: the smaller the particles are, the harder it may be to make them, and because the drug dose is related to particle volume, huge numbers of nanoparticles would be needed to deliver the required dose [8].

2.6 Aerosolised vaccines

Aerosolised vaccines are another area of major interest. It was suggested > 25 years ago that delivery of measles vaccine in the developing world should be carried out by inhalation, mainly to avoid the use of needles and the problems of safe needle disposal, but also because inhalation may produce an enhanced immune response compared with that achieved by systemic delivery [9]. One type of specially designed vibrating-mesh nebuliser will shortly be used in a program to deliver measles vaccine to millions of children. However, it was also suggested that measles vaccine formulated as a powder could have further advantages, because it would avoid i) the potential contamination of liquids; ii) the problem of having to destroy a significant fraction of liquid vaccine once it has been reconstituted for more than a few hours; and iii) the need to power nebulisers in remote areas [10].

2.7 Networking groups

An important development at this congress was the inauguration of six networking groups, intended to encourage smaller group discussions within the ISAM membership. Members had been consulted before the congress about the groups, covering the areas of i) imaging, deposition and mucus clearance; ii) new and emerging therapeutic targets; iii) nanoparticles; iv) physiology, lung structure, function and modelling; v) new delivery technologies; and vi) regulatory and standardisation issues. Groups were asked to elect chairmen and deputy chairs, to propose a session for the next ISAM congress, to consider further stand-alone 'Focus Symposia', and to develop guidelines and consensus statements where appropriate. It was recognised that these networking groups would not work in isolation, and that collaboration across groups would sometimes be required. It was also suggested that networking groups should be at the forefront of organising training workshops at future ISAM congresses.

2.8 Awards

ISAM sponsors several awards that are usually presented at the biennial congresses. Most significant of these were the Thomas T Mercer Award for excellence in pharmaceutical aerosols and inhalable materials, given to Dieter Köhler (Schmallenberg, Germany), and the Career Achievement Award, given to Myrna Dolovich (McMaster University, Ontario, Canada). Both were richly deserved for major contributions to the field over several decades. The congress also saw the presentation of student and young investigator awards, and an award for the best poster.

2.9 Other sessions

Other sessions covered the topics of aerosol therapy for treatment of asthma, chronic obstructive pulmonary disease (COPD), CF, infectious diseases, lung cancer and pain, as well

as regulatory issues, and the effects of ambient air pollution on susceptible populations. There was also an evening device and technology showcase, providing advice on the appropriate selection of an inhaler device for different patient groups. The conference dinner was a buffet held in the memorable setting of Monterey Bay Aquarium in Cannery Row.

3. Expert opinion

This was a very useful and scientifically diverse conference, held at a location that was fascinating in terms of history, scenery and local flora and fauna. Its success was a tribute to the efforts of the organising committee that included Jim Blanchard, David Cipolla, Ralph Niven and Terry Sweeney, supported by a strong scientific committee. The conference maintained the reputation of ISAM congresses as one of the leading conference series in the area of pulmonary and nasal drug delivery, with a diverse range of interests that also encompasses the potential harmful effects of inhaled substances. As with any conference where like-minded people are gathered, there were great opportunities for networking, and it may be that the discussions that took place outside the auditorium were just as important as the formal presentations inside.

The congress in Monterey followed other recent successful congresses in Baltimore, US (2003), Perth, Western Australia (2005), and Tours, France (2007). The next ISAM congress, in Rotterdam, The Netherlands, 18 – 22 June 2011, will be eagerly awaited. This date should be noted in the diary of anyone with an interest in particle deposition, particle clearance and pulmonary or nasal drug delivery.

Declaration of interest

S Newman received the TT Mercer award from ISAM in 2007.

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