

## South West Conference on Personal Decontamination and Internal Dosimetry

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## Meeting report

### **South West Conference on Personal Decontamination and Internal Dosimetry** Dartington Hall, Devon, 1 October 2009

The South West conference on Personal Decontamination and Internal Dosimetry was held in the medieval mansion hotel and conference centre, Dartington Hall, Devon. Over 100 delegates and speakers attended, many of them arriving the night before and enjoying an excellent three-course meal in the White Hart Restaurant. The meal was preceded by registration and suitable refreshment, and followed by detailed networking in the bar!

After an opening address by the chair, Bernard James, Sandra Mackie from the HSE gave the morning's first talk on Decontamination and Dosimetry, concentrating on the issues of regulation and advice and highlighting what we can expect from the regulators once they become involved in an incident and what they will expect from us. The key points of how to deal with an incident were covered and three separate areas were identified as being important in responding to an incident: Actual, Potential and Psychological consequences. Emphasis was placed particularly on the psychological impact and it was highlighted that these 'soft' issues can often be overlooked. There is very little 'hard' evidence to prove that a person has suffered. Sandra's concluding comment was to know as much detail about what you are working with, its half-life, routes of uptake and the bio-kinetic models available to calculate the dose. The more information made available at the time of the incident, the more effective the response and the lower the personal impact experienced.

Cliff Ellis from Aurora gave the second talk of the morning concerning the practical issues relating to personal decontamination. The key concepts of the talk were limiting individual doses, preventing the transfer of contamination to others and the prevention of spread of contamination both outside and throughout the workplace. An example was given where incorrect management of an incident ended in further contamination of others and of the workplace. We are asked to consider the adequacy of decontamination facilities and also of the training and procedures we use to deal with any such incidents. One important point to come from this talk concerned when to stop decontamination. Medical staff are invaluable when an incident occurs and especially if the route of entry involves

a wound, but it is not always clear when enough is enough. In his second example, Cliff highlighted the fact that Health Physics staff accompanied the injured party to the hospital and were able to give on-site information to aid in the most appropriate method to deal with the contamination. Monitoring was performed during the washing process and this meant that the staff knew when their actions had been sufficient and minimised any unnecessary discomfort to the patient.

Andy Pinhey from the Royal Navy gave an interesting summary of the difficulties presented for decontamination when on-board a submarine. As such, the decontamination facility is set up when necessary and has a simple design which allows for rapid assembly, and is disposable. A specific area is designated in the heads/showers of the boat with specific staff given particular roles to ensure a fast and effective response. This is crucial as the boat needs to retain normal function as much as possible, and so when the order of emergency stations is given, only key staff trained to deal with incidents become involved. Spill packs and large polythene bags, large enough for individuals to undress within, are used to deal with the initial contamination and are specifically designed to be disposable and to give maximum containment of any contamination. The submarine provides a very different environment to the one many of us are used to and provides challenges in dealing with incidents simply due to the confined space in which it is necessary to work. Contamination events are rare in submarines and this justifies why it is not necessary to have a permanent decontamination facility.

Gareth Roberts from Nuvia gave an interesting talk on wound management and dosimetry, covering wound monitoring techniques and the management of potentially contaminated wounds. Gareth discussed the use of specialist monitoring systems using hyperpure germanium and sodium iodide which enable the detection of alpha-emitting actinides and low energy gammas. He also discussed how the issues relating to wound management affect the patient and the importance of accurate monitoring techniques and equipment to aid in the effective decision-making process to help reduce the stress suffered by the patient.

Demetrio Gregoratto gave an in-depth talk yielding some interesting results on the modeling of particle clearance from the alveolar-interstitial

region of the lungs. Since 1994 when the Particle Transport and Human Respiratory Models (ICRP) were devised, there has been more investigative work which has produced results prompting a new model to be devised for the alveolar-interstitial region. Demetrio made comparisons between the old and new models, and current thinking is that plutonium spends considerably longer in the alveolar-interstitial region of the lungs than previously thought, giving a possible increase of 50–100% increase in lung doses for long-lived insoluble alpha-emitters.

Nick Lewis (Trident Medical Services) then introduced and presented a short DVD on how skin decontamination is carried out at AWE. The emphasis was on using everyday skin cleaning products as much as possible, and the interaction between medical and health physics personnel.

The morning session rounded-off with an interesting debate on contaminated wounds and when they should be treated with surgical excision—there currently are no exact guidelines. The main focus was on the patient and involving them in the decision-making process, concluding that surgical excision is sometimes more of a psychological treatment than a physical necessity.

A team effort produced a very interesting and amusing presentation from Dr Cliff Morgan, Royal Brompton Hospital, Dr David Holt, Institute of Naval Medicine and Dr Nick Lewis, Trident Medical Services/AWE, on whole lung lavage. The trio of medics discussed the history of whole lung lavage, leading to the current procedure performed today. From treatment results, it has been found that the response to treatment is variable, with some patients requiring only one treatment while others may require multiple treatments before improvement. An average number of treatments is between 4 and 6 before a period of remission is seen. Each treatment requires the patient to be administered a general anaesthetic, but there is little neural stimulation during the procedure and so only a small amount of anaesthetic agent needs to be administered, which is of obvious benefit to the patient, especially if multiple treatments are required.

Sharron Wormald, Babcock Marine, presented a talk on 'Cobalt-60—Internal Dosimetry' on behalf of Jenny Vickers, who is busy at home looking after her new daughter. Following three events in 2006 at Babcock where seven individuals received a very small intake followed by a faster than expected rate of elimination, a review of this radionuclide in the workplace was prompted. Sharron covered two examples that both involved an acute inhalation of cobalt-60. One involved intrusive work on a naval pressurised water reactor (PWR) primary circuit component and the other involved a radioactive item from a naval PWR plant

becoming unbagged. Whole body monitoring is available at Babcock and produced lung results which Jenny used to compare the current ICRP model (M) with the data produced. In both case studies, it was found that there was a poor fit to the data using the ICRP Absorption Type M. Jenny's work concludes that caution is needed when using ICRP defaults and a new ICRP 'F' class for cobalt is also required. Following Jenny's review a number of changes have been made to Devonport's arrangements, including introduction of urine monitoring for cobalt-60 and increasing the number of lung or body scans following a positive result. It is clear that at least three readings are required to clarify the elimination rate and thus the intake and associated dose.

Terry Woodcock, Magnox South, gave a detailed talk on 'Establishing Bioassay Programmes and Managing Internal Doses when Dealing with Actinides'. Terry covered optimising analysis and dealing with isotopes that are difficult to detect, action levels for bioassay results, sample screening and reporting/counselling, and advantages of an integrated system for exposure, to name but a few. Terry emphasised the importance of being able to make logical assumptions based on the presence of other radionuclides by concentrating on the most abundant, easy to detect nuclides. Currently, there is no bioassay which can detect actinides with doses as low as 1 mSv and there is a legal requirement to measure and record internal doses above 1 mSv. Part of the solution to this, suggested from Terry's work, is to take more frequent samples for higher risk groups, PAS results and DACH tracking. The calculations used are based on DAC's and DACH's. For the non-mathematicians, here is an easy conversion to remember!

$$\text{DACH's} \times 10 = \text{Dose in } \mu\text{Sv.}$$

Tim Wright, CBRNE Unit of the Home Office, gave our final talk of the day on tackling some of the radiological terrorism problems of today. There are several challenges facing the team at present with interesting possibilities for research. Some of the screening technologies so far allow for the detection of threats on the body or in vehicles, to discreetly identify threats in crowded places with minimal disturbance to other members of the public and to increase the number of materials and hazards that can be remotely identified. The future for the team involves expanding the current range of detectable materials and hazards whilst making the screening process less intrusive to people, and trying to integrate some of these technologies to give greater confidence margins. Conventional medical imaging equipment could potentially be adapted to aid in triage following an incident as

well as the use of Monte Carlo modelling to help determine calibration factors for intakes.

The afternoon session concluded with a lively debate on the methods and reasons for whole lung lavage and when it should be indicated following an incident. Once again, there are no hard or fast rules and the decision is very much at the discretion of the medical team involved.

The conference came to a close with thanks expressed to everyone involved in making the day a success—and the planning begins for next year!

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