Australian Nuclear Medicine Traceability Program (ANMTP)

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1. **What is the Australian Nuclear Medicine Traceability Program (ANMTP) and why is it important?**

   The Activity Standards Laboratory (ASL) has been working with the nuclear medicine peak body, the Australian and New Zealand Society of Nuclear Medicine (ANZSNM), to determine ongoing requirements for radionuclide metrology services within the Australian nuclear medicine community. ANMTP can provide nuclear medicine practices with technical and legal traceability to the Australian standard for important nuclear medicine based radionuclides to assist with regulatory compliance. One of the main objectives of the program is to improve the health outcomes of Australians receiving nuclear medicine treatments through the more precise administration of nuclear medicine.

2. **Who is responsible for the administration of reliable, accurate radiopharmaceutical doses to patients?**

   The responsibility for administration of reliable, accurate radiopharmaceutical doses lies with the individual nuclear medicine practice. ANMTP offers a means to establish direct traceability to the Australian standard for the activity of radionuclides which forms part of standard quality control procedures that should be developed and adhered to by nuclear medicine practices.

3. **Who should participate in ANMTP?**

   The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) recommends annual accuracy testing of dose calibrators with Certified Reference Materials as part of standard quality control procedures. It is a requirement that the calibration of dose calibrators is traceable to a national standard, which is held by ANSTO in Australia. ANMTP participants will be supplied with two Australian Certified Reference Materials (ACRMs) every year and will have access to a metrological assessment of their dose calibrator performance. By offering this service as a coordinated national program, ANSTO is able to minimise the overall cost to participants.
4. **How much will ANMTP cost?**
   By participating in ANMTP, nuclear medicine practices will have access to radionuclide metrology services at a reduced rate. By running ANMTP as a coordinated national program, ANSTO is able to reduce the production costs of ACRMs. The fees for participation in the 2014 program are:

   - Single ACRM ($^{99m}$Tc or $^{131}$I): $1,617*
   - Two ACRMS ($^{99m}$Tc and $^{131}$I): $2,439*
   - Additional Dose Calibrator: $583

*Per dose calibrator.

5. **What is offered in ANMTP 2014?**
   - Two Australian Certified Reference Materials (ACRMs):
     - 600 MBq* Technetium-99m
     - 600 MBq* Iodine-131
   - A visit to your facility by a trained and competency assessed ANSTO Radionuclide Metrologist
   - A certificate of traceability to the Australian standard for radioactivity

*At reference time

6. **When is ANMTP happening?**
   The 2014 ANMTP will take place between August and December and will operate on a state-by-state basis. A provisional schedule will be posted on our website in the coming months and we will confirm the exact date and time each participant’s appointment before the program commences.

7. **Who will perform the measurements?**
   An ASL scientist will attend your practice and perform a series of measurements on your dose calibrator using ACRMs.
8. What is the measurement protocol?
Measurements for this exercise will be performed using ACRMs provided by ASL. Measurements will be recorded in an online form and submitted to the ASL for analysis and reporting. Participants will receive a measurement report of the findings once the analysis of their dose calibrator data has been completed. The measurements will be carried out in the following manner:
10 measurements will be performed in the dose calibrator, removing and replacing the source between each measurement.
10 measurements will be performed in the dose calibrator, without removing the source between measurements.
Measurements will be repeated for each ACRM (a total of 40 measurements for two ACRMs).

9. How long will the measurements take?
The ASL scientist will require uninterrupted access to your dose calibrator for 20-30 minutes to perform the measurements. The entire appointment should take no more than 45 minutes. If you have more than one dose calibrator you will require a longer appointment.

10. How often should the measurements be repeated?
ANMTP will be run annually with rotating ACRMs for the most commonly used medical radionuclides. Additional or specialised ACRMs can be supplied separately upon request for an additional cost.

11. What is required of participants?
You will need to provide access to your facility and your dose calibrator for the duration of your appointment. A staff member with experience in using the dose calibrator to measure patient doses will need to be on hand to assist the ASL scientist and provide any necessary information on the typical usage and maintenance of your instrument. If you require a comprehensive analysis on the performance of your dose calibrator you will need to provide stability and linearity measurement data. You will be able to submit this data through an online portal on the ASL website, you will receive instructions on how to do this following registration. Stability data for the preceding 12 months and at least one linearity data set is required to enable
comprehensive analysis. If you would like a comprehensive analysis of your dose calibrator performance, please contact the Activity Standards Laboratory.

12. **What are stability measurements?**

Stability measurements are repeated measurements performed using a long-lived source (eg. Cs-137) to check counting precision of a dose calibrator. A stability measurement should be performed each working day as recommended by the ARPANSA Safety Guide to Radiation Protection in Nuclear Medicine, and the variation in daily measurements over a 12-month period provides an estimate of the stability of the dose calibrator response over time. For more information on stability measurements please refer to the ARPANSA Safety Guide to Radiation Protection in Nuclear Medicine or contact the Activity Standards Laboratory.

13. **What are linearity measurements?**

Linearity measurements are performed using a short-lived source (eg. Tc-99m) with an activity at least as high as the maximum activity measured at the practice. Measurements are repeated at regular intervals as the source decays to determine any non-linearity of the dose calibrator response over the full range of activity used at the practice. Linearity measurements should be performed at least annually. For more information on linearity measurements please refer to the ARPANSA Safety Guide to Radiation Protection in Nuclear Medicine or contact the Activity Standards Laboratory.

14. **Which standards can ASL provide?**

Two ACRMS will be distributed annually. Technetium-99m and Iodine-131 will be supplied in 2014. Technetium-99m will be offered each subsequent year and a second radionuclide will be offered on a rotating basis. ANSTO is working in conjunction with ANZSNM to devise a schedule of other ACRMs in the following years. ACRMs for radionuclides not offered as part of ANMTP can be provided upon request at any time for an additional cost.
15. Who fixes any problems that you identify?
ANMTP provides a means to establish measurement traceability to the national standard for the activity of radionuclides. The responsibility for correct maintenance and operation of a dose calibrator lies with the individual nuclear medicine practice. Servicing of a dose calibrator to address faults or large discrepancies detected during ANMTP measurements or analysis remains the responsibility of the nuclear medicine practice. Guidelines on dose calibrator maintenance can be found in the ARPANSA Safety Guide to Radiation Protection in Nuclear Medicine and ASL can offer advice to ANMTP participants.

16. What happens to the information gathered by ANSTO?
Information gathered by ANSTO will be used to carry out assessments on participant dose calibrators and provide participants with accurate reports and certification. Measurement data will also be used to compile a nationwide assessment of dose calibrator performance in Australia, however data will be used anonymously and results will not be attributed directly to individual nuclear medicine facilities. For more information please refer to the ANSTO Privacy Policy.

17. How is ANMTP different to calibration programs offered by others?
ANSTO maintains the primary and secondary standard for the activity of radionuclides in Australia, and is therefore able to provide direct traceability to the Australian national standard.

18. How does ANMTP fit in with previous dose calibrator surveys?
The Technical Standards Committee of ANZSNM has carried out regular dose calibrator surveys using calibration sources supplied by ANSTO since the 1990s. The last survey was carried in 2009-2010. Recently, ANSTO has been working in consultation ANZSNM to develop ANMTP as an ongoing annual program which will provide traceability to nuclear medicine practices all over Australia.
19. Will ANMTP be available in New Zealand?
ANMTP will be offered to Australian nuclear medicine practices initially. Following the successful rollout in 2014, ANSTO anticipates offering an equivalent service to practices in New Zealand in future. Currently, ACRMs can be ordered at any time by New Zealand practices by contacting ASL.

20. What is ANSTO’s role in radionuclide metrology?
ANSTO maintains the Australian national standard for the activity of radionuclides by Authorisation of the Chief Metrologist of the National Measurement Institute (NMI) under the National Measurement Act 1960 as amended. ANSTO is a member of the Consultative Committee for Ionising Radiation (CCRI): Section II Measurement of Radionuclides which sets the international standards for the activity of radionuclides within the Metre Convention. ANSTO is also a member of the Technical Committee for Ionising Radiation (TCRI) of the Asia Pacific Metrology Program (APMP) and the International Committee for Radionuclide Metrology (ICRM). As the national authority on radioactivity standards, ANSTO is authorised to provide legally binding certificates demonstrating traceability to the national standard for the Becquerel to our users.

21. What is the Activity Standards Lab (ASL)?
The technical function for measuring radionuclides is housed at ANSTO within ASL. Radionuclide metrology scientists in ASL employ unique, highly specialised radiation detection techniques to carry out precise measurements of radioactivity without reference to a calibration. ASL has the facilities and capabilities to perform accurate primary standardisations of various radionuclides. The primary standards are transferred to the ASL Secondary Standard Ionisation Chamber in the form of radionuclide specific calibration factors. These calibrations make up the Australian secondary standards of activity of radionuclides and are used to produce Australian Certified Reference Materials (ACRMs).
22. What is an Australian Certified Reference Material (ACRM)?
   An ACRM is a reference material that has been certified under regulation 48 of the National Measurement Regulations 1999 (as amended). An ACRM can be used by nuclear medicine practices to achieve traceability to the Australian national standard for radioactivity for a specific radionuclide and measurement geometry.

23. Has ANSTO developed new standards for this program?
   Radioactivity standards have been maintained at ANSTO for over 50 years. ASL underwent a complete refurbishment in 2012, and a major capital investment in 2013 will fund a capability upgrade enabling ASL to increase its portfolio of primary standards and keep up with the evolving metrology requirements of the Australian Nuclear Medicine community.

If you have any further questions please submit them to ASL.