Chapter IX: Bioassay Guidelines

Policy

It is the policy of the University of Chicago to conduct bioassays to measure internal exposure to personnel by direct (in vivo) measurement or by analysis and evaluation of radioactive material excreted or removed from the human body (in-vitro).

Purpose

The purpose of the Bioassay Policy is to establish guidelines to ensure internal monitoring is conducted in a timely manner, ensure internal exposures exceeding limits are investigated in a timely manner and corrective actions are taken to avoid further exposures.

Authority and Responsibilities

Office of Radiation Safety is responsible for:

1 Ensuring the monitoring equipment is maintained.
2 Conducting bioassays on personnel requiring internal monitoring.
3 Conducting quality control on equipment to ensure proper operation.
4 Maintaining record of internal monitoring.
5 Investigating exposures exceeding the investigational limits.

Principal Investigator and Research Staff are responsible for:

1 Scheduling appointment with the Office of Radiation Safety for routine bioassay.
2 Notify the Office of Radiation Safety if an accidental uptake of radioactive material may have occurred and schedule a bioassay.
3 Work being conducted with volatile radioactive material is conducting in an operating fume hood with a minimum flow rate of 100 linear feet per minute at the sash height.

Bioassay Requirements

Iodine Thyroid Bioassay Requirements

- All users who work with a vial containing more than 1 mCi of I-125 or 5 mCi of I-131 must have a thyroid bioassay no sooner than 12 hours after each iodination and no later than one week after each iodination.
- All users performing iodination are required to schedule an appointment for a thyroid bioassay before any package containing more than 1 mCi of I-125 or 5 mCi of I-131 will be released by Radiation Safety. Do not schedule a thyroid bioassay for sooner than 12 hours after performing the iodination. If the user is not able to schedule (not sure the date to be used), the user must call the day of use to schedule the bioassay.
- A copy of the Package Receipt & Disposal Record for each iodine package or more than 1 mCi of I-125 and 5 mCi of I-131 must be submitted to the Office of Radiation Safety every week, beginning with the date the material is received by the user. Either fax or deliver a copy to the Office of Radiation Safety to ensure receipt. The Package Receipt & Disposal Record must list the date the material was used, amount removed from the vial, percent of activity placed into waste,

and the user initials. This requirement remains in effect for the length of time the iodine stock vial(s) remains in the laboratory. Vials that will no longer be used by the laboratory must be transferred to Radiation Safety. Once the stock vial(s) is transferred, the laboratory will no longer be required to submit copies of the usage log.

- Users who fail to submit a copy of the usage form within the one week time period will be notified.
- Users not reporting for a scheduled thyroid bioassay appointment will be called to reschedule. If the second appointment is not kept, the worker will be called to reschedule and the principal investigator will be notified. After the third failure to report for a scheduled thyroid bioassay, the principal investigator's license will be suspended from ordering I-125 or I-131.
- In repeated noncompliance situations, the University Radiation Safety Committee has authorized the Office of Radiation Safety to suspend principal investigators from ordering radioactive material.

Investigation Limits for Iodine

- The Radiation Safety Officer (RSO) and/or RSO designee shall be notified whenever the thyroid burden at the time of measurement exceeds 1.0 μCi of I-131 or 0.12 μCi of I-125. The RSO/RSO designee shall perform an investigation into the cause of the exposure and the potential for further exposure, and develop corrective actions to prevent recurrence.
- The RSO/RSO designee shall be notified immediately whenever the thyroid burden at the time of measurement exceeds 5.0 μCi of I-131 or 0.5 μCi of I-125. The RSO/RSO designee must perform an investigation, as described above, and must perform weekly bioassays on the individual until the individual's thyroid burden is less than 1.0 μCi of I-131 or 0.12 μCi of I-125.

Note: Investigation limits are adopted from U.S. Nuclear Regulatory Guide 8.20, "Applications of Bioassay for I-125 and I-131".

Tritium Bioassay Requirements

- Individuals working with more than 100 mCi of H-3 in any unsealed form are required, as a condition of the University's licenses to provide the Office of Radiation Safety with a urine specimen within 4 working days after each use.
- All users working with more than 100 mCi of H-3 are required to schedule an appointment for a bioassay (urine specimen) before the package with 100 mCi of H-3 will be released by the Office of Radiation Safety. If the user is not able to schedule (not sure the date to be used), the user must call the day of use to schedule the bioassay.

Investigational Limits for Tritium

- The Radiation Safety Officer (RSO) and/or RSO designee shall be notified whenever the urinary excretion concentrations exceed 5 μCi/L but are less than 50 μCi/L. The RSO/RSO Designee shall perform an investigation into the cause of the exposure and the potential for further exposure, and develop corrective actions

to prevent recurrence. The RSO/RSO designee will repeat the urine sample bioassay within a week of the previous sample.

- The RSO and/or designee shall be notified immediately whenever the urinary excretion concentrations exceed 50 µCi/L. The RSO/RSO designee must perform an investigation, as described above, and must perform weekly bioassays on the individual until the individual's urine samples show concentrations less than 5 µCi/L.

Note: The University of Chicago referenced the guidance outlined in NRC Regulatory Guide 8.32 "Criteria for Establishing a Tritium Bioassay Program".