Thyroid Screening for Radioiodine Exposure in Nuclear Medicine

Purpose

This document describes the requirements and procedure for Thyroid Screening to ensure sites that handle I-123, I-125 and I-131 have an effective thyroid screening program in accordance with the terms of the Provincial Health Services Authority Canadian Nuclear Safety Commission (CNSC) operating licence.

Site Applicability

This procedure is applicable to all Nuclear Medicine (NM) departments within Lower Mainland Medical Imaging (LMMI) across Fraser Health (FH), Providence Health Care (PHC), Provincial Health Services Authority (PHSA) and Vancouver Coastal Health (VCH).

Practice Level

Profession:	Responsibilities:
Site Radiation Safety Officer	• Ensure staff follow the thyroid screening procedure • Review thyroid screening results and report to RRSO if applicable • Ensure annual performance testing and calibration is performed
Nuclear Medicine Technologists Students, physicians, nurses, Biomed staff handling radioiodines	• Follow the thyroid screening procedure when handling volatile radioiodine (I-123, I-125, 1-131)

Need to Know

The CNSC regulates the use of radioactive material in Canada. A thyroid screening program is required if radioiodine is used. CNSC Reg Doc 2.7.2 states: "The purpose of a thyroid screening program is to monitor workers for intakes of radioiodines. Timely information produced by the program should be used to assess any intake of radioiodines, provide assurance that the radiation protection program is working, and demonstrate compliance with regulatory dose limits" (CNSC Reg Doc 2.7.2).

Regional RSOs have the overall responsibility to define the rules for thyroid screening in compliance with CNSC licence and all applicable regulations.

Equipment and Supplies

- Thyroid Uptake Probe
- Nuclear Medicine Information System (NMIS)

Procedure

This procedure applies to all NM staff and other personnel (e.g: students, physicians, nurses, Biomed) who are exposed to or use, in a 24-hour period, a total quantity of I-123, I-125 or I-131 that exceeds the amounts listed in Table 1

It is the Site RSO's responsibility is to:

- Ensure staff follow this procedure.
- Review the thyroid screening results and inform to the RRSO if the results exceed the investigational level and/or reporting level.
- Ensure the annual performance testing and calibration is performed, following the instructions provided by Health Canada, to determine the efficiency of the thyroid uptake probe and appropriate count time for thyroid screening. The efficiency must be updated in NMIS annually.
- All records and procedures must be available for inspection upon request of the CNSC.

Thyroid screening must be performed following exposure to radioiodine during routine handling, a spill or personnel contamination involving volatile radioiodine liquids, powders or gases as outlined in Table 1

Table 1: **Criteria for Screening** (Total activity handled per day)

Location of Use	Activity of I-125 or I-131 (MBq)	Activity of I-123 (MBq)
Open room	2	200
Fume hood	200	20 000
Glove Box	20 000	2 000 000
Accidental spills	> 2	> 200
Personnel external radioiodine contamination detected	Any amount	Any amount

Sourced from CNSC Licence Condition 2046-17

1. Thyroid screening must be performed within the appropriate period:
   - **I-131 & I-125:** between 24 hours and 5 days of handling/exposure.
   - **I-123:** between 8 hours and 48 hours of handling/exposure.
2. If thyroid screening is required due to a spill, personnel contamination or other exposure event:
   a) Use the Appendix A: Thyroid Screening Record and include it in your Incident Report
   b) Perform thyroid screening as outlined below and record in NMIS.
3. If thyroid screening is required due to normal handling or related to a patient exam
   a) Follow site/department protocol for setting reminders
   b) Use the *Thyroid Screening Log* found on your health authority drive.

Workers who are exposed to or handle a total quantity of open sources of volatile radioiodine in a 24 hr period that exceeds the quantity in Table 1 must perform Thyroid screening.

   c) Perform thyroid screening as outlined below and record in NMIS.

Steps for Thyroid Screening

1. Confirm there are no radioactive sources present.
2. Perform daily quality control (QC) on the Thyroid probe.
3. Select the correct isotope window region of interest (ROI).

4. Perform a count of your thigh. There should be at least 400 total thigh counts.
5. Record counts
   a. Use the Thyroid screening log for routine screening events
   b. Use the Thyroid Screening Record for spill, personnel contamination or other accidental exposures
6. Perform a count of your thyroid.
7. Record counts

Note: If your thigh or thyroid counts are higher than usual:
- verify the possibility of contamination or nearby source of radiation and repeat the measurements
- take a room background for the same counting time as the thigh/thyroid counts; communicate results to site RSO

8. Document results in NMIS. See Documentation
9. Inform the Site Radiation Safety Officer (S-RSO) immediately if your results exceed the investigation limit in Table 2.

Table 2: **Investigating and Reporting Levels for Iodine Exposure**

Isotope	Investigation Level	Reporting Level to R-RSO and CNSC
I-125	≥ 1 kBq and < 10 kBq	≥ 10 kBq
I-131	≥ 1 kBq and < 10 kBq	≥ 10 kBq
I-123	≥ 10 kBq and < 100 kBq	≥ 100 kBq

10. Submit completed *Thyroid Screening Log* and/or the Thyroid Screening Record to the S-RSO.

    The S-RSO will:

    - Review thyroid screening results as soon as possible after thyroid screening has been completed.
    - Sign electronically the report in NMIS
    - Inform the Regional RSO and conduct an incident investigation if thyroid screening was a result of a spill or personnel contamination, or the result is within or above the investigation level. A Thyroid Screening Record will be included with the Spill/Contamination investigation report.

    The R-RSO will:

    - inform CNSC as applicable and follow CNSC regulation requirements.

Documentation

Thyroid screening results must be entered into NMIS for each patient exam the thyroid screening pertains.

1. Record results in NMIS. Refer to the Thyroid Screening Recording the Results in NMIS for detailed instructions.
2. Confirm the correct efficiency for the isotope you are screening

Ensure other staff and students involved in the procedure have performed thyroid screening.

Note: When entering Student thyroid screening results, choose BCIT for the Technologist name and enter the student's FULL Name and Supervising Technologist initials in the Comment Section.

Audits

Site Level:

- Thyroid screening results will be recorded in NMIS.
- The S-RSO will review all thyroid screening results after thyroid screening has been performed.

Regional:

- Annual internal audits will be performed to review the effectiveness of the thyroid screening program.

Related Documents

Guidelines/Procedures/Forms

- LMMI Nuclear Medicine Radiation Safety Manual
- LMMI Diagnostic and Therapeutic Licence
- Thyroid Screening Recording the Results in NMIS
- Thyroid screening Log

References

Canadian Nuclear Safety Commission, Reg Doc 2.7.2 Appendix E: Radionuclide-Specific Recommendations Related to Bioassay Measurements and Internal Dosimetry – Radioiodines, retrieved from: https://www.nuclearsafety.gc.ca/eng/pdfs/regulatory-documents/regdoc2-7-2-vol-I/regdoc-2-7-2-dosimetry-vol-1.pdf

ec^2: NMIS Software instructions

Human Monitoring Lab Thyroid Performance Test Instructions

Appendices

- Appendix A: Thyroid Screening Record

APPENDIX A: Thyroid Screening Record

For Non-Routine Radioiodine Exposures (Spills or Contamination) Requiring an Incident Investigation

Section 1: Radioiodine Exposure Information:

Exposure Date: _____ Exposure Time: _____

Isotope Involved: _____ Amount Handled: _____ MBq

Section 2: Thyroid Screening Requirements:

Thyroid screening must be performed following the exposure to radioiodine in the form of volatile liquids, powders or gases as outlined in the table below.

- ☐ I-131 & I-125: between 24 hours and five days
- ☐ I-123: between eight hours and 48 hours

Due date/time

Location of Use	Activity of I-125 or I-131 (MBq)	Activity of I-123 (MBq)
Open room	2	200
Fume hood	200	20 000
Glove Box	20 000	2 000 000
Accidental spills	> 2	> 200
Personnel contamination (skin or clothing)	Any amount	Any amount

I-123 Investigation Level = 10 kBq, Reporting Level = 100 kBq I-131/I-125 Investigation Level = 1 kBq, Reporting Level = 10 kBq

Section 3: Thyroid Screening Record:

Instrument used: _____ □ Quality Control

Name	Date (dd/mm/yy)	Time (hhmm)	Total Thigh Counts	Total Thyroid Counts	Count Time (min)	Entered in NMIS	Thyroid Activity (kBq)

Supervisor to review: Screening completed in correct time frame? □ Yes □ No (investigation required)
Thyroid Activity under Trigger Level? □ Yes □ No (investigation required)

Reviewed by SRSO: _____ Date: _____

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Revision History:	**Version**	**Date**	**Description/ Key Changes**	**Revised By** (Name and Position)
	1.0	07-May-2021	Initial Release	Joanne Soltesz, NM Interim RSS Rhonda Hollerbaum, NM RPL Roxana Ralea, NM R-RSO
	2.0	28-JUN-2023	Align with SHOP Format Change of title from Thyroid Screening Include practice table Include thyroid screening record as appendix A Replaced CNSC RD-58 regulations with CNSC Reg Doc 2.7.2	Roxana Ralea, NM R-RSO