

## Target Organs for Lymphatic and Hematopoietic Cancers Comments/Suggestions by K. F. Eckerman

### Introduction

The lymphatic system consists of bone marrow, spleen, tonsils, nodes, and thymus. The only nodes explicitly addressed in dosimetric models are those associated with the respiratory system in the head (ET) and thorax (TH). The number of nodes in the body has been indicated to be between 600 – 700; 8-37 in the arm pits, at least 50-60 in the lung, and 200-500 in the mesentery (ICRP 1975). The same mass has been estimated for the extrathoracic lymph nodes [LN(ET)] and thoracic lymph nodes (LN(TH)) in adults; the value being 12 and 15 g in the female and male, respectively (ICRP 1994). If the 60 nodes in the lung have a mass of 15 g then the mass of the 600 nodes of the body would be 150 g. ICRP publications do not indicate a mass for the body's lymph nodes.

### General Comment

The following statement appears frequently in the proposed technical information bulletin.

*Due to the insoluble nature of many of the radionuclides ...the dose to the extrathoracic lymph nodes [LN(ET)] is typically higher than the dose to HNMO.*

While the statement is true, the thoracic lymph nodes [LN(TH)] are generally more highly irradiated than the extrathoracic nodes at least in ICRP's calculations. This is typically the case for in most radionuclides of U, Th, Pu, Am, and Cm. Apparently IMBA differs from the standard calculations on this matter? (**Note to Reader: The IMBA model does not differ from the standard ICRP model in this regard. The difference noted by Dr. Eckerman was due to an interpretation error by NIOSH**) Furthermore the LN(TH) are present in the thoracic not LN(ET) as apparently assumed here.

### Specific Comments:

#### Table 1: ICD 200 – 200.18

Below are my suggested changes by ICD for the internal – all externals accepted.

- a. 200.00 LN(TH)
- b. 200.01 LN(ET)
- c. 200.02 LN(TH)
- d. 200.04 LN(TH)
- e. 200.05 Colon
- f. 200.06 Colon
- g. 200.08 LN(TH)
- h. 200.10 LN(TH)
- i. 200.11 LN(ET)
- j. 200.12 LN(TH)
- k. 200.14 LN(TH)
- l. 200.15 Colon
- m. 200.16 Colon

- n. 200.18 LN(TH)

**Table 2: ICD 200.2-200.28**

Change all the internal target organs to LN(TH). Note the last sentence of the discussion following the table suggest that a large fraction of the lymph mass is in the thorax and yet the extrathoracic lymph was cited in the table. From the introduction the thoracic lymph as probably only about 1/10 of the total lymph node mass.

**Table 3: ICRP 200.8 – 200.08**

Below are my suggested changes by ICD for the internal – all externals accepted.

- a. 200.8 LN(TH)
- b. 200.80 LN(TH)
- c. 200.81 LN(ET)
- d. 200.82 LN(TH)
- e. 200.84 LN(TH)
- f. 200.85 Colon
- g. 200.86 Colon
- h. 200.88 LN(TH)

Here again the discussion following the table associated LN(ET) with the thorax! Also the statement that the HNMO is the “claimant-favorable choice” is not clear since it rules out a metabolic organ. For insoluble materials the target of 200.85 and 200.86 is suggested above to be the colon rather than HNMO. Maybe these should be HNMO or Colon to be claimant favorable.

**Table 4: ICD 201-201.98**

Below are my suggested changes by ICD for the internal – all externals accepted.

- a. 201 LN(TH)
- b. 201.0 LN(TH)
- c. 201.00 LN(TH)
- d. 201.01 LN(ET)
- e. 201.02 LN(TH)
- f. 201.04 LN(TH)
- g. 201.05 Colon
- h. 201.06 Colon
- i. 201.08 LN(TH)
- j. 201.1 LN(TH)
- k. 201.10 LN(TH)
- l. 201.11 LN(ET)
- m. 201.12 LN(TH)
- n. 201.14 LN(TH)
- o. 201.15 Colon
- p. 201.16 Colon
- q. 201.18 LN(TH)
- r. 201.2 LN(TH)
- s. 201.20 LN(TH)
- t. 201.21 LN(ET)

u.	201.22 LN(TH)
v.	201.24 LN(TH)
w.	201.25 (Colon)
x.	201.26 (Colon)
y.	201.28 LN(Th)
z.	201.4 LN(TH)
aa.	201.40 LN(TH)
bb.	201.41 LN(ET)
cc.	201.42 LN(TH)
dd.	201.44 LN(TH)
ee.	201.45 Colon
ff.	201.46 Colon
gg.	201.48 LN(TH)
hh.	201.5 LN(TH)
ii.	201.50 LN(TH)
jj.	201.51 LN(ET)
kk.	201.52 LN(TH)
ll.	201.54 LN(TH)
mm.	201.55 Colon
nn.	201.56 Colon
oo.	201.58 LN(TH)
pp.	201.6 LN(TH)
qq.	201.60 LN(TH)
rr.	201.61 LN(ET)
ss.	201.62 LN(TH)
tt.	201.64 LN(TH)
uu.	201.65 Colon
vv.	201.66 Colon
ww.	210.68 LN(TH)
xx.	201.70 LN(TH)
yy.	201.71 LN(ET)
zz.	201.72 LN(TH)
aaa.	201.74 LN(TH)
bbb.	201.75 Colon
ccc.	201.76 Colon
ddd.	201.78 LN(TH)
eee.	201.9 LN(TH)
fff.	201.90 LN(TH)
ggg.	201.91 LN(ET)
hhh.	201.92 LN(TH)
iii.	201.94 LN(TH)
jjj.	201.95 Colon
kkk.	201.96 Colon
lll.	201.98 LN(TH)

**Table 5: ICD 202-202.08**

Change all internal target organs to LN(TH). Externals look OK.

**Table 6: ICD 202.1 – 202.18**

Use skin for the internal targets since it is explicit in the calculations.

**Table 7: ICD 202.2 – 202.28**

Same treatment as in Table 6 is suggested.

**Table 8: ICD 202.3- 202.38**

Since these cancers are found in connective tissue, which is a component of all solid organs, why not use the highest dose to a solid organ as the estimate for internal exposure. I would exclude bone surface from this list.

**Table 9: ICD 202.4 – 202.48**

OK

**Table 10: ICD 202.5-202.58**

Same comment at for Table 6 and 7.

**Table 11: ICD 202.6-202.68**

- a. 202.6 LN(TH)
- b. 202.60 LN(TH)
- c. 202.61 LN(ET)
- d. 202.62 LN(TH)
- e. 202.64 LN(TH)
- f. 202.65 Colon
- g. 202.66 Colon
- h. 202.68 LN(TH)

**Table 11: ICD 202.8 – 202.98**

Change all internal targets to LN(TH).

**Table 13: ICD 203-203.01**

OK

**Table 14: ICD 203.1 -208.91**

OK

## References

ICRP 1975. Report of the Task Group on Reference Man. ICRP Publication 23, Pergamon Press, Oxford UK.

ICRP 1994. Human respiratory tract model for radiological protection. ICRP Publication 66, Ann. ICRP 24(1-3).