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Effect of tumor size on PET visual reporting

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IHP : 2 reference backgrounds

Depending on residual tumor size

- tumor > 2cm $\rightarrow$ mediastinal blood pool
- tumor $\leq$ 2cm $\rightarrow$ nearby background (usually < MBP)

partial volume effect induces an underestimation of the activity of lesions < 2cm

$\rightarrow$ Adds 2 sources of error :

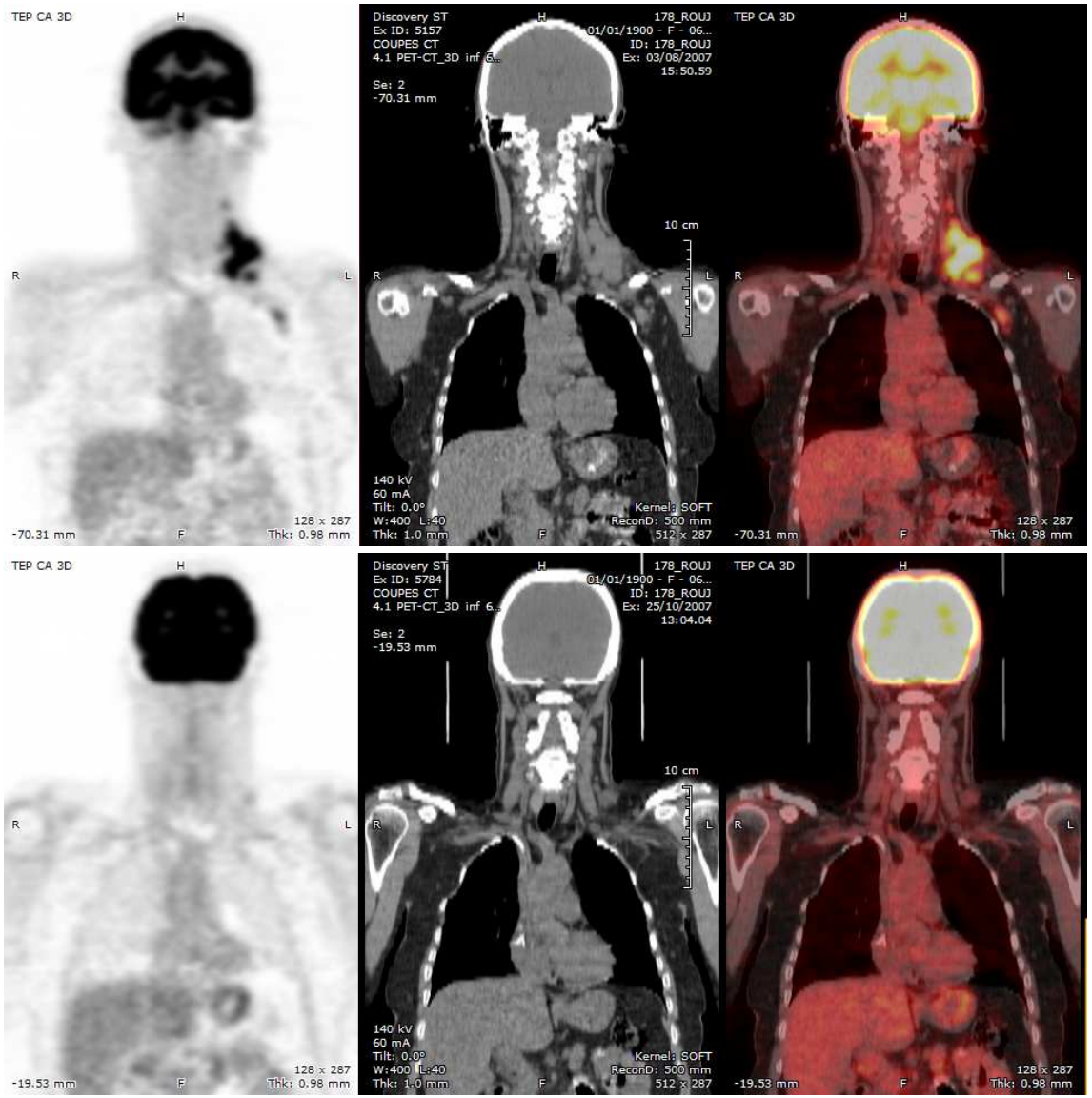
1. size measurement of small tumors
2. intensity assessment of different referentials

LNH07-3B

- GELA trial, risk-adapted strategy (2007)
- PET after 2 & 4 cycles (CHOP-R or ACVBP-R)
- Opinions of 2 experts, **IHP criteria (+ or -)**

- 170 exams, 49 discordant cases
- **17% due to differences in size assessment** leading to comparison of the same residual uptake to different backgrounds

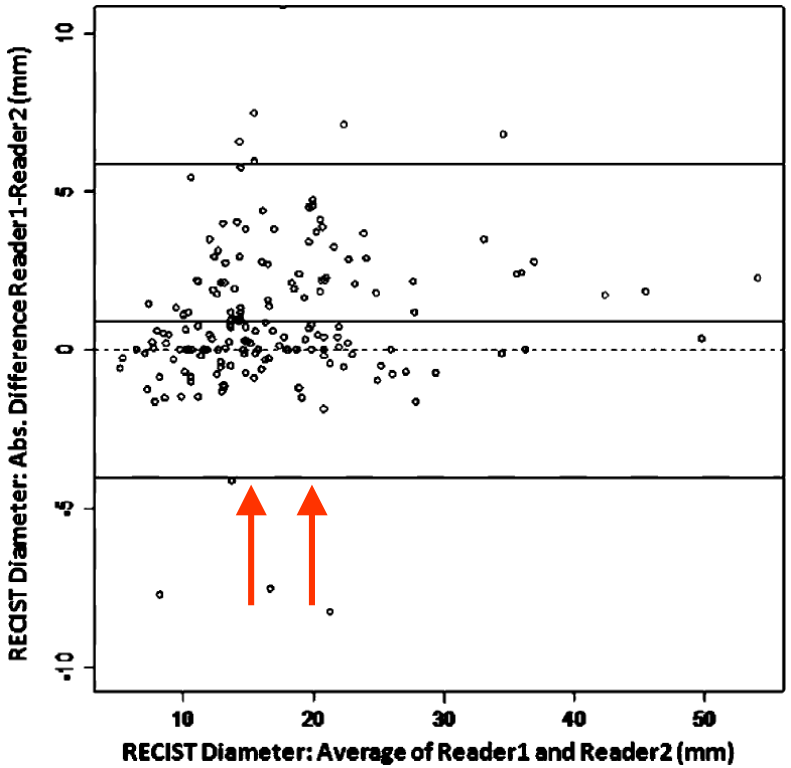
Example of discordant case



SUV_{Tum} =1.3
SUV_{NbB} =0.8
SUV_{MBP} =1.6

Reproducibility of size measurement

- **30% misclassification of the response with RECIST criteria**
  (Erasmus, *J Clin Oncol* 2003)



- **Lowest reproducibility lymph nodes between 15-20mm**
  (Fabel, *Eur Radiol* 2008)

Background intensity

- Mediastinal blood pool

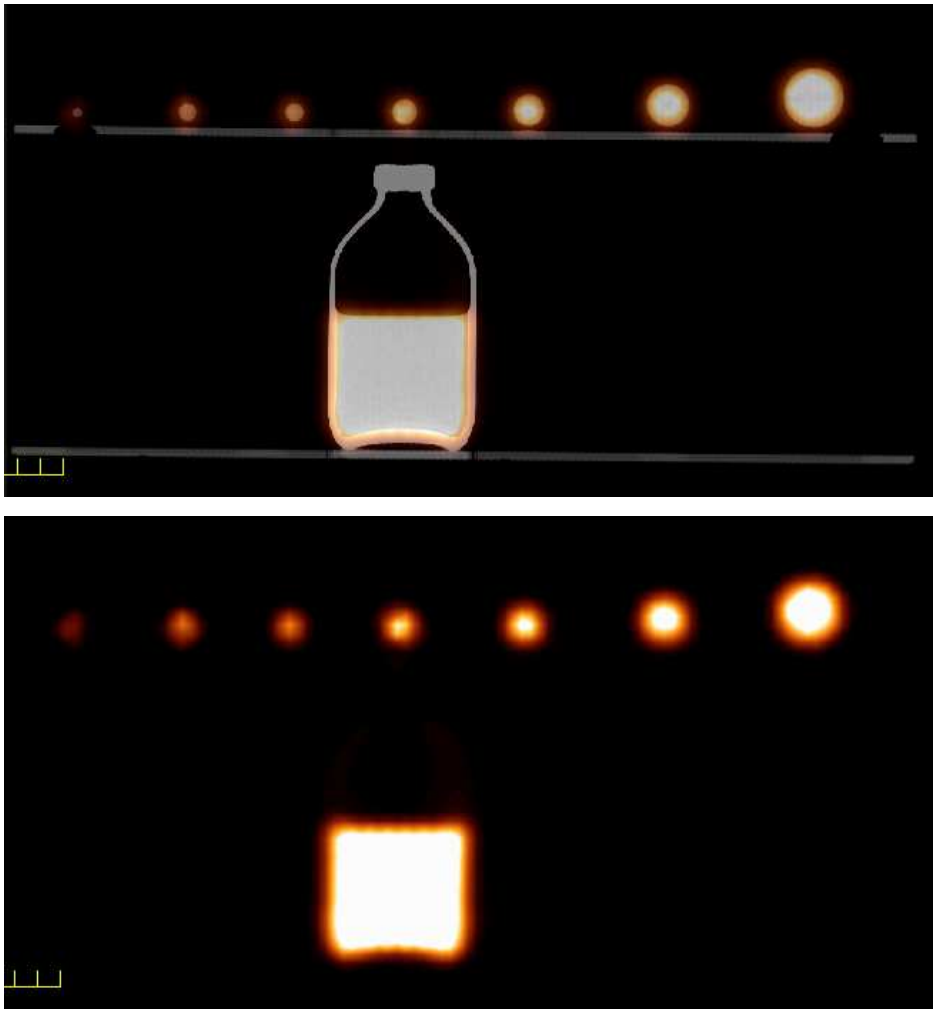
  $SUV_{max} = 1.8 \pm 0.5$

- Nearby bkg (excluding MBP)

  $SUV_{max} = 0.8 \pm 0.6$

$\rightarrow$Change of the reference background to compensate partial volume effect induces a correction factor which can be > 100%

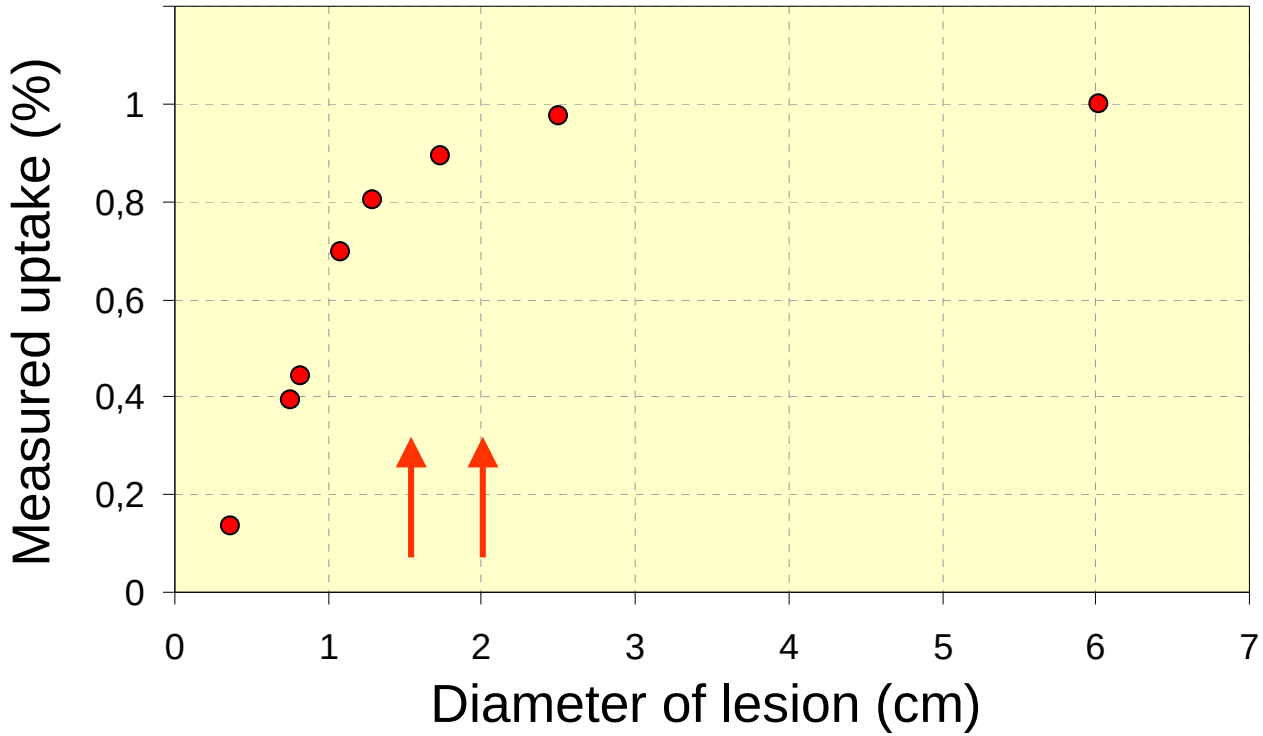
Partial volume effect



7 containers filled with
the same radioactivity

Lin C. *Mémoire de M2 "Signaux et Images en Médecine"*, Créteil 2006

Partial volume effect



Correction factor of about 5-15% between 15-20mm !

Conclusion

- Errors in size measurement
- Overcorrection of partial volume effect

- *Exclusion of size criterion in the 5PS*