

# Kvantitativ SPECT - Dosimetri

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May 22, 2018

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# Introduksjon

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# Hvem er jeg?

- Stipendiat ved Oslo Universitetssykehus (p ca tredje ret)
- Fysiker (egentlig siv. ing. fra NTNU)
- Prosjektet jeg jobber i bruker SPECT/CT-bilder av den kvantitative formen

Kvantitering (verb) - mle, telle. Tilordne til en *kvantitet*

- Infinitiv (hint: sett foran)

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- Kvantitere

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- Presens (hint: hva vi gjør nå)
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- Presens (hint: hva vi gjør nå)
- Preteritum futurum  
perfektum, Kondisjonalis II  
(hint: hva vi ikke vil si)
- Kvantitere
- Kvantiterer

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- Presens (hint: hva vi gjør nå)
- Preteritum futurum  
perfektum, Kondisjonalis II  
(hint: hva vi ikke vil si)
- Kvantitere
- Kvantiterer
- Ville/skulle ha kvantitert

Avbildning der bildene har enhet MBq/ml eller lignende

PET er kvantitativt - SPECT er det ikke!



**Terapiplanlegning** Dosering av radionuklideterapi

**Myocard-perfusjonsavbildning**  $^{99m}\text{Tc}$  for mle  
blodgjennomstrømning i ml/g-min eller SUV-SPECT

**Lungescan** Pre-operativ funksjon bde ventilasjon og perfusjon

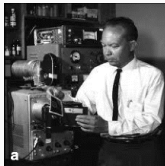
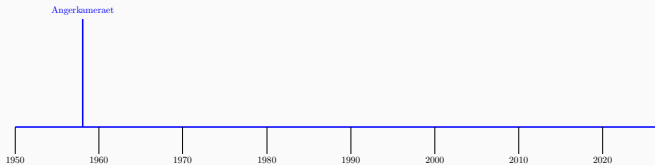
**$^{131}\text{I}$**  Opptak post-terapi for monitorere effekt

**Biodistribusjon** Utprøving av nye radiofarmaka

# SPECT-kameraet

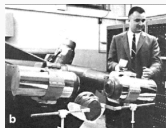
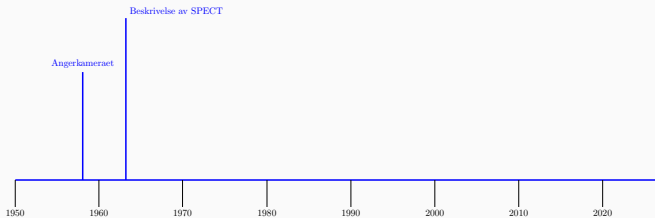
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# Et lite tilbakeblikk

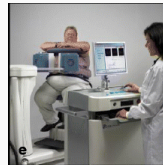
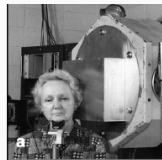
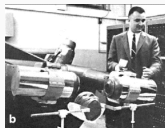
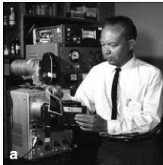
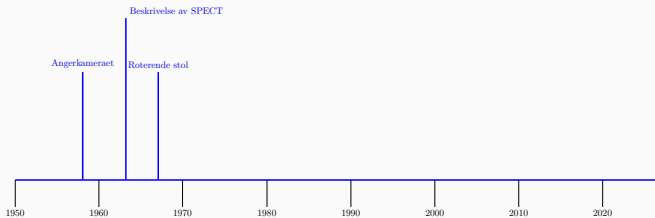




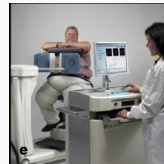
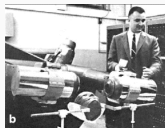
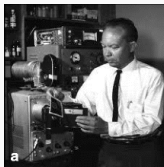
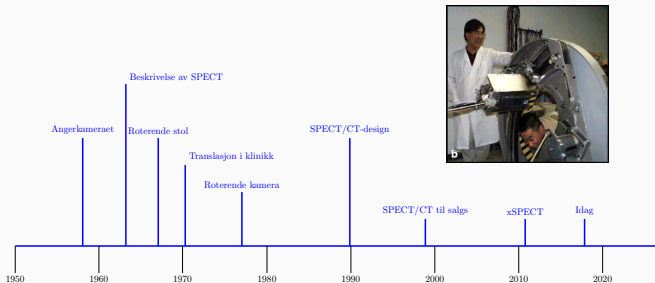
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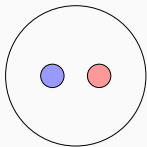


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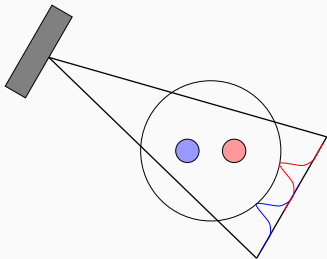


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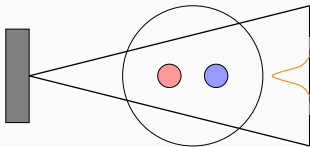




- To radiaktive kilder

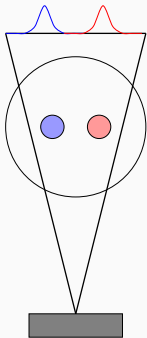


- To radiaktive kilder
- SPECT-kameraet tar bilde av en projeksjon

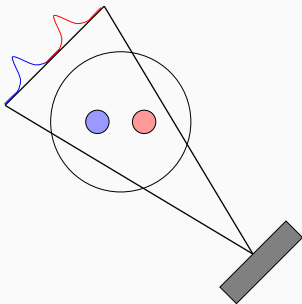


- To radiaktive kilder
- SPECT-kameraet tar bilde av en projeksjon
- Roterer og tar et nytt bilde

# SPECT-kameraet

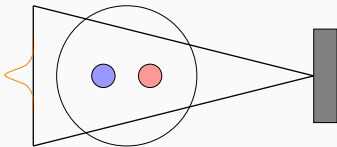


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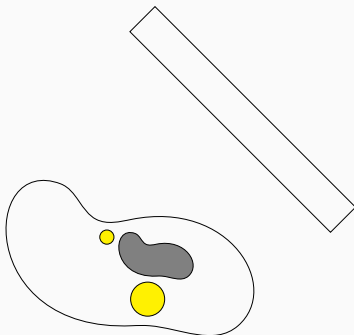


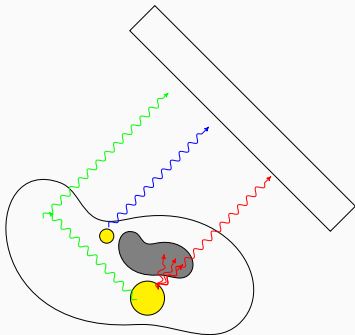
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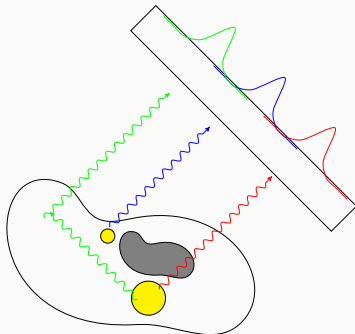




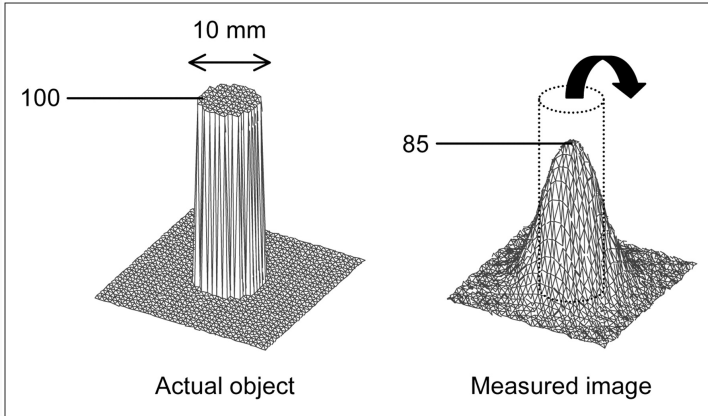
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# Partiell volumeffekt



## PET kvantitativ, men ikke SPECT?

- Spredt strling (var) et strre problem (i 5 % i tidlig PET, n 35 - 50 i % for bde 3D PET og SPECT)
- PET ble "gjemt bort" i 20 r som forskningsobjekt - kinetikk med arteriell aktivitetskonsentrasjon som input
- Attenueringskorreksjon (var) mer rett frem i PET

## **Fantomstudier - hvor er SPECT n?**

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Dette er et veldig vanskelig sprsml!

*99mTc, 111In, 131I "To summarize: activity can be accurately measured (+/- 10 %) at least in uniformly attenuating parts of the body,..., as small as 40 ml"*

- Quantitative SPECT in radiation dosimetry (1989)

*"...the results should be improved image quality and, perhaps, quantitative **accuracies of about 10 %**"*

- Quantitative SPECT Imaging (1995)

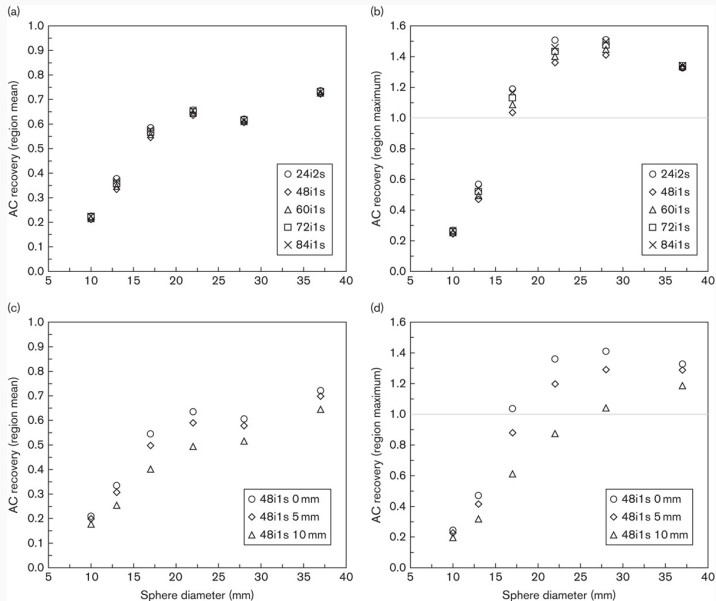
*"quantification based on a calibration procedure similar to the one used in PET seems to be feasible **within 10 % error limits and even below** if a fine-tuning of all acquisition and reconstruction parameters is performed."*

- Quantitative capabilities of four state of the art SPECT/CT-systems (2012)

Det kommer an på en hel rekke ting:

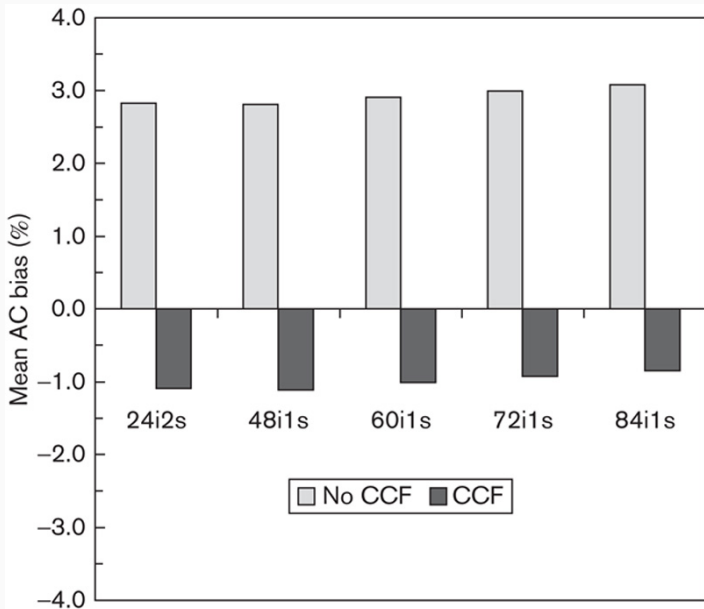
- Nukliden
- Organet man vil måle i (størrelse, form og plassering)
- Bildeprotokoll
- Kalibreringsmetoden
- Segmentering
- ...

# $^{99m}\text{Tc}$ - m/ xSPECT





## $^{99m}\text{Tc}$ - m/ xSPECT





Hva kan du forvente?

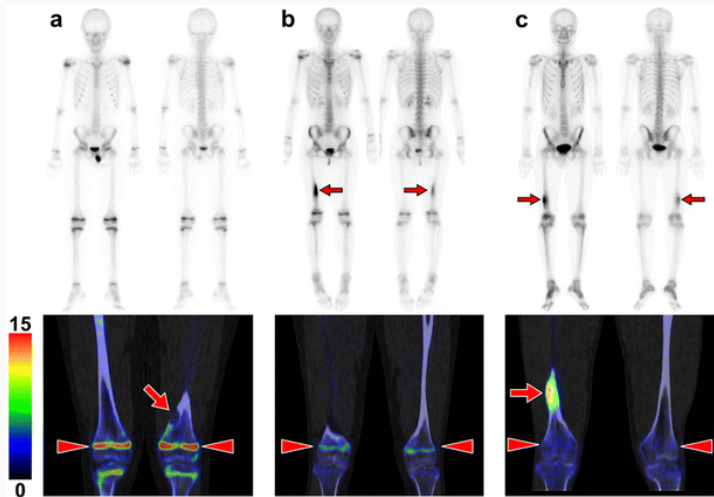
**Tommelfingerregel** Omkring 10 %

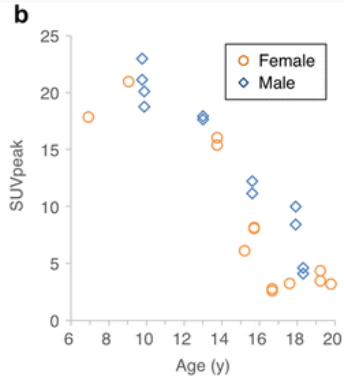
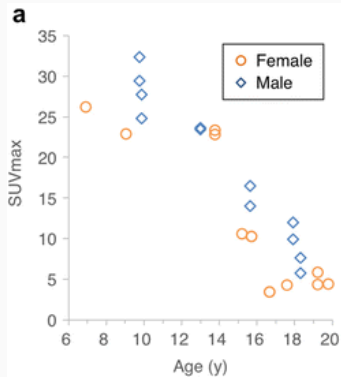
**Om du vet hva du *gjør*** Under omkring 5 %

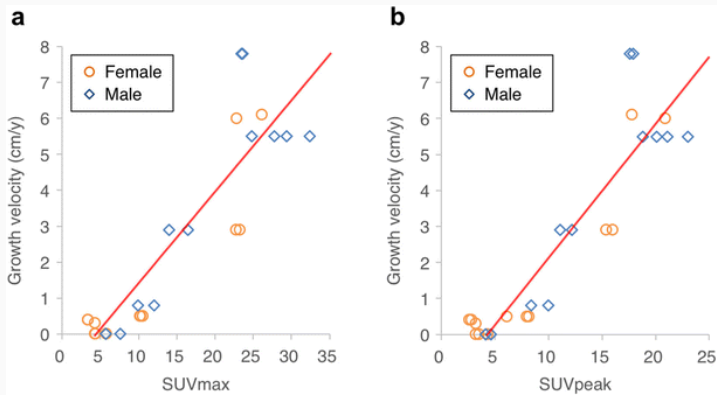
**Om du ikke vet hva du *gjør*** Mer enn 50 %

# SUV-SPECT

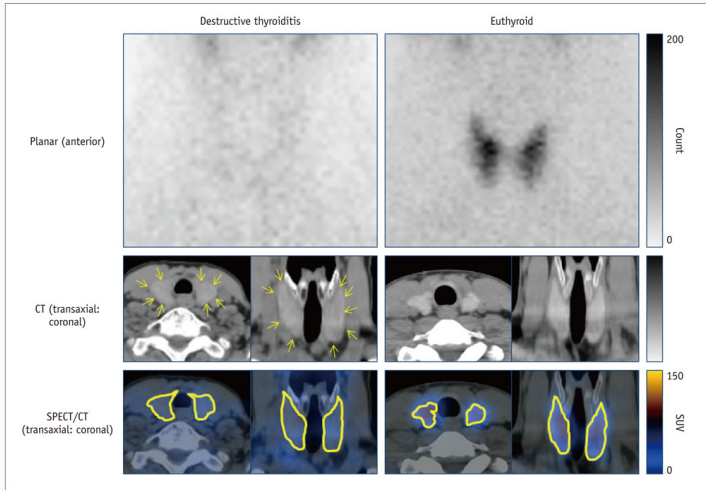
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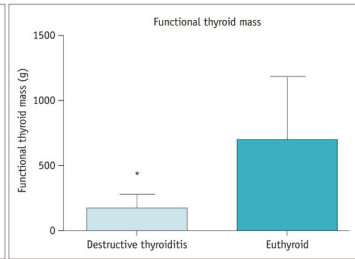
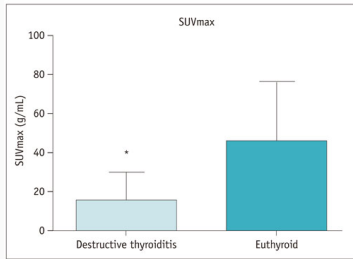
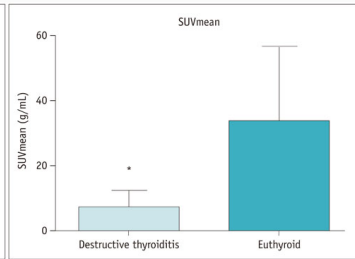
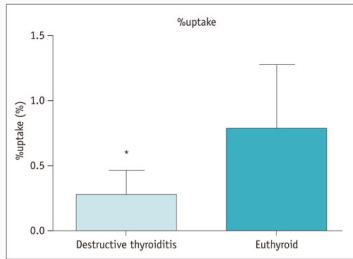


# Thyroidea





# Thyrodea



**xSPECT**

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# Dosimetri

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## Eget arbeid

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*Gir bildene en ekstra nytteverdi - selv om man ikke bruker dem hver gang er de fine ha.*

*Life without you would be like a broken pencil... pointless!*

- Edmund Blackadder