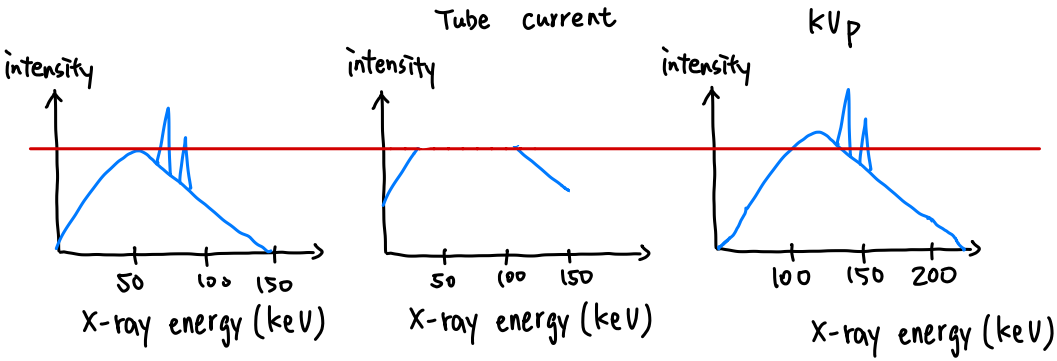
1.



2.

$N_i = 4 \times 10^6$ @ 15keV, 40keV.

(a)

15keV : 4×10^6

40keV : 4×10^6

absorbed : 15keV > 40keV

(b)

$I_{out} = I_n e^{(-\mu d)}$

15keV : $I_t = I_{in} \exp(-3 \times 0.5)$, $I_b = I_{in} \exp(-4 \times 1.5) \Rightarrow \frac{I_t - I_b}{I_b} = \frac{e^{-1.5} - e^{-6}}{e^{-6}} = 89.0171$

40keV : $I_t = I_{in} \exp(-0.2 \times 0.5)$, $I_b = I_{in} \exp(-0.4 \times 1.5) \Rightarrow \frac{I_t - I_b}{I_b} = \frac{e^{-0.1} - e^{-0.6}}{e^{-0.6}} = 0.6487$

15 keV has better performance.

(c)

由(b)知40keV缺乏對比，因此 agent 應用於 40keV 較有效.

(d)

在 40keV 時該 contrast agent 具 K-edge absorption.

3.

definition

dose : Radiation passes through the body which is absorbed.

for example

Bone : 1.4 mSv (about 6 months natural BKG radiation)

Chest : 0.001 mSV

dental : 0.005 mSV

https://www.radiologyinfo.org/en/info/safety-xray

exposure: the ability of x-ray photons to ionize air and can't be used for protons.

SI unit: Columb/kg

https://radiopaedia.org/articles/exposure

4.

A.k.A spectral CT. use two seperate x-ray photon energy spectra. allowing the interrogation of materials that have different attenuation properties at different energies.

5.

CT is about 0.7 mm ⇒ kV_p : 60 kV. Intensity 141 mAs.

mammography is about 1 mm