KTA 1

Folien zur Vorlesung vom 27.11.2013

Energieverlust von Elektronen

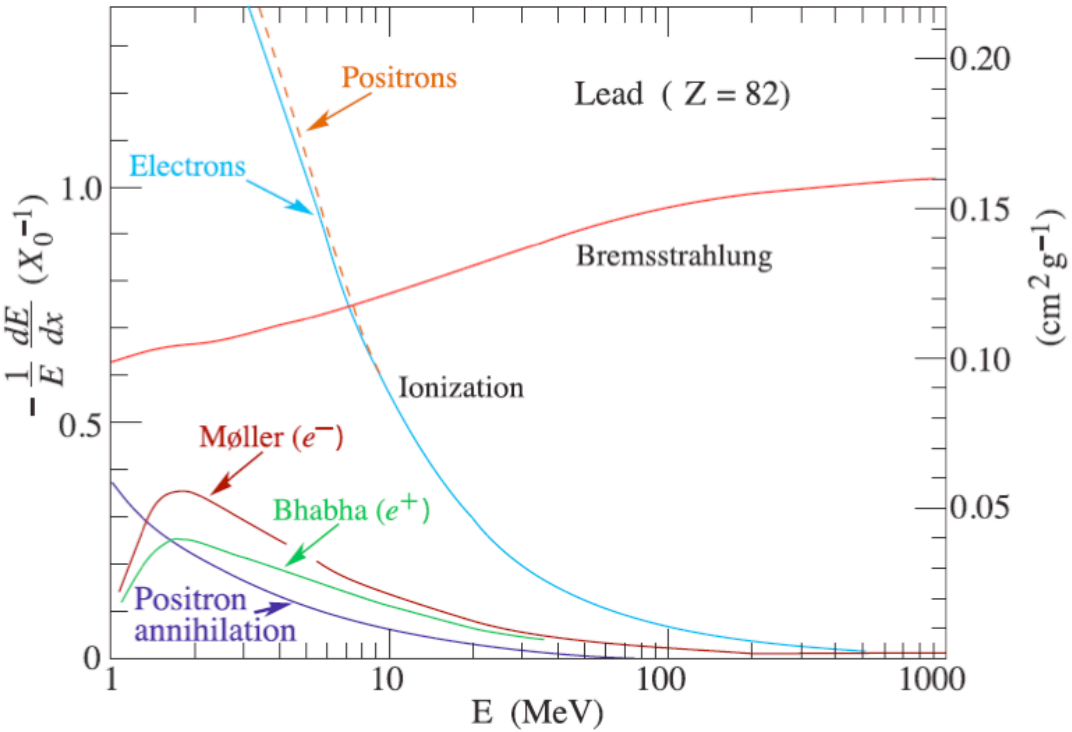

Figure 30.11: Fractional energy loss per radiation length in lead as a function of electron or positron energy. Electron (positron) scattering is considered as ionization when the energy loss per collision is below 0.255 MeV, and as Møller (Bhabha) scattering when it is above. Adapted from Fig. 3.2 from Messel and Crawford, *Electron-Photon Shower Distribution Function Tables for Lead, Copper, and Air Absorbers*, Pergamon Press, 1970. Messel and Crawford use $X_0(\mathrm{Pb}) = 5.82$ g/cm^2, but we have modified the figures to reflect the value given in the Table of Atomic and Nuclear Properties of Materials ($X_0(\mathrm{Pb}) = 6.37$ g/cm^2).

Gewichtsfaktoren für Äquivalentdosis

Table 3.2. Radiation weighting factors [3.2]

Radiation type and energy	Radiation weighting factor, w_R
Photons, all energies	1
Electrons and muons, all energies†	1
Neutrons	
< 10 keV	5
10 keV to 100 keV	10
> 100 keV to 2 MeV	20
> 2 MeV to 20 MeV	10
> 20 MeV	5
Protons, other than recoil protons, energy > 2 MeV	5
α-particles, fission fragments, heavy nuclei	20

† Excluding Auger electrons emitted from nuclei bound to DNA

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Mittlere Strahlungsdosis von verbreiteten Quellen

Table 3.4. Estimates of effective doses from some common sources

Source	Average dose per person (mSv/yr)		
	World population [3.3]	USA [3.4]	Germany [3.5]
Natural sources			
Overall	2.4	2.95	2 – 2.5
Cosmic rays	0.37	0.27	
Terrestial		0.28	≈ 0.1
Inhaled radon		2.0	0.8 – 1.6
Environmental sources			
Nuclear power	0.002		
Baggage check at airport		7 nSv/trip	
Subsonic airplane flight at 8000 m		2 μSv/hr	
Medical exposures			
Diagnosis	0.4 – 1	0.53	0.5 – 1.5
(e.g. 1 chest x-ray)		0.1 mSv/x-ray	
Occupational	0.002	0.1 – 3	

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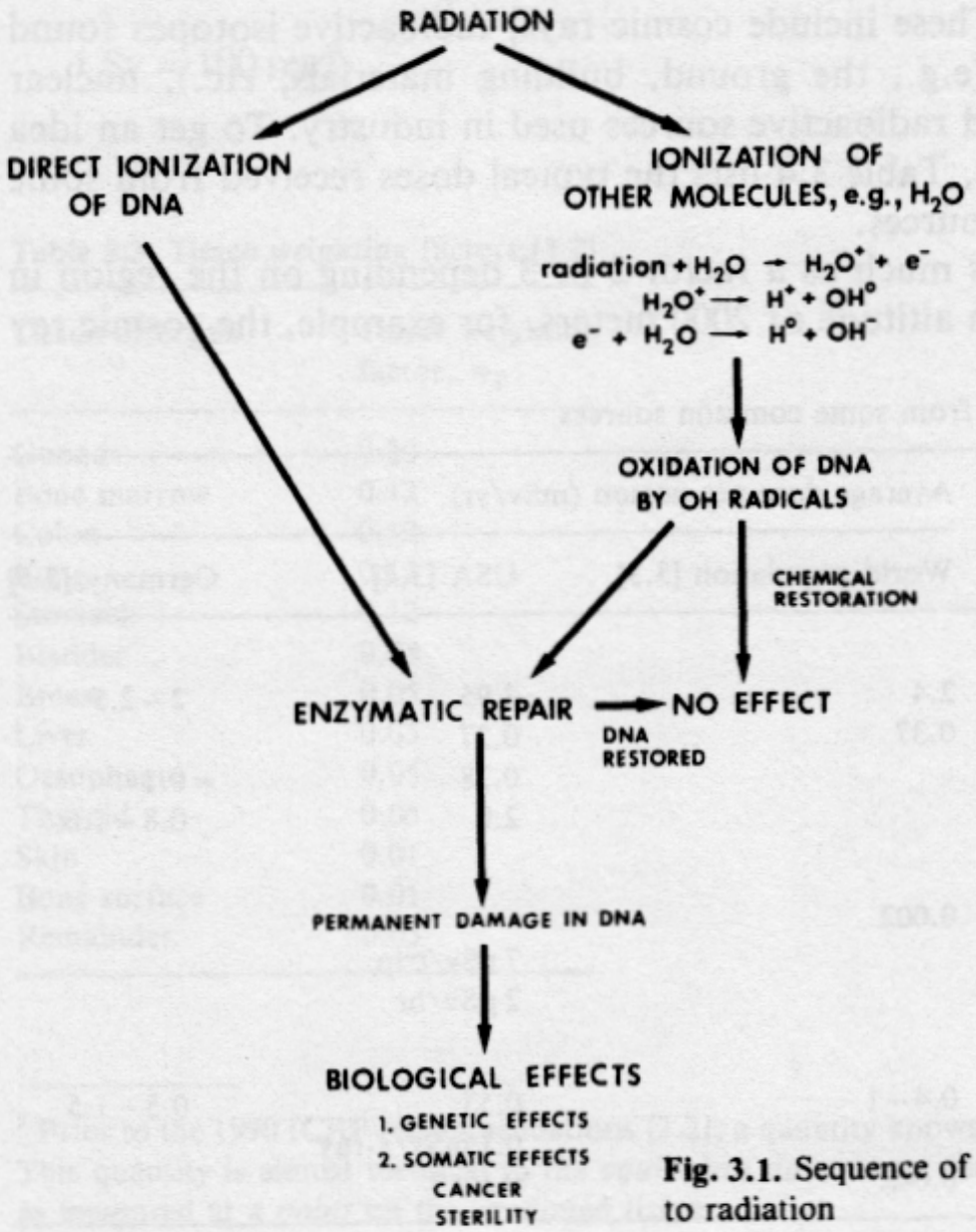

Fig. 3.1. Sequence of events occurring in living matter exposed to radiation