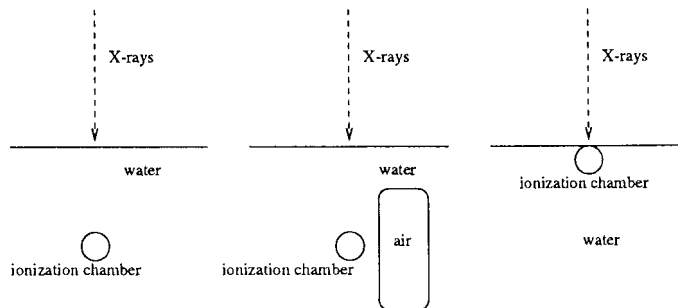


1. Tarkastele dosimetrian, algoritmien ja tarkkuuden osalta sadehoitokentän annoksen estimointia.
2. Määrittele
  - a) absorboitunut annos
  - b) kerma
  - c) säteilytys
3. Selvitä seuraavien dosimetrinen menetelmien toimintaperiaatteet.
  - a) Fricke-dosimetria
  - b) Termoluminesenssidosimetria
4. Tarkastele alla olevan kuvan kolmea eri mittausasetelmaa dosimetrian kannalta. (ionization chamber = ionisaatiokammio)



5. Mikä on sironneesta säteilystä, muodostuva annos 15 cm:n syvyydessä  $4 \times 20 \text{ cm}^2$  kenttäkoolla, jos annos vapaasti ilmassa syväannoskäyrän maksimia vastaavalla etäisyydellä on 1.0 Gy? Käytä taulukoita 4 MV:n lineaarikiihdyttimelle jolla hoitoetäisyys on 80 cm.
6. Monenko ioniparin muodostumista 1 R vastaa grammassa ilmaa, kun yhden ioniparin muodostamiseen ilmassa tarvitaan keskimäärin 33.97 eV? Mikä on talloin ilmaan absorboitunut annos 100 yC/kg säteilytyksessä?

Table A.2. Percent Depth Dose Data for 4-MV Photons, SSD 80 cm

Depth, cm	Field Size, Side of Square Field, cm						
	5.0	8.0	10.0	12.0	15.0	18.0	20.0
1.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2.0	96.4	97.0	97.2	97.3	97.5	97.6	97.7
3.0	91.2	92.2	92.5	92.7	93.0	93.3	93.5
4.0	95.5	96.9	97.4	97.8	98.4	98.9	99.2
5.0	80.0	81.8	82.4	82.8	83.2	83.8	84.1
6.0	74.4	76.8	77.7	78.2	78.7	79.3	79.6
7.0	69.3	72.0	73.0	73.7	74.4	74.9	75.3
8.0	64.7	67.6	68.6	69.3	70.0	70.8	71.3
9.0	60.2	63.3	64.3	65.1	66.0	66.9	67.6
10.0	56.4	59.3	60.5	61.4	62.4	63.3	63.9
11.0	52.5	55.5	56.7	57.6	58.7	59.7	60.3
12.0	48.7	51.8	53.1	54.1	55.2	56.2	56.9
13.0	45.4	48.4	49.8	50.8	51.9	53.0	53.7
14.0	42.3	45.3	46.7	47.7	48.8	49.9	50.6
15.0	39.5	42.3	43.7	44.7	45.9	47.0	47.7
16.0	36.8	39.5	40.8	41.8	43.0	44.2	45.0
17.0	34.4	37.0	38.3	39.3	40.6	41.8	42.6
18.0	32.1	34.6	35.9	37.0	38.2	39.4	40.2
19.0	29.8	32.4	33.7	34.7	36.0	37.1	37.9
20.0	27.7	30.1	31.5	32.5	33.8	35.0	35.8
25.0	19.8	21.8	22.9	23.9	25.0	26.0	26.7
30.0	13.9	15.6	16.5	17.3	18.4	19.4	20.1

Table A.4. Tissue-Air Ratios for 4-MV Photons

Depth, cm	Field Size, Side of Square Field, cm								
	0.0	5.0	8.0	10.0	11.0	12.0	15.0	17.0	20.0
1.0	0.999	1.017	1.029	1.036	1.039	1.042	1.051	1.055	1.061
2.0	0.973	1.004	1.022	1.031	1.035	1.039	1.049	1.055	1.061
3.0	0.928	0.972	0.994	1.004	1.009	1.014	1.025	1.031	1.040
4.0	0.881	0.933	0.959	0.971	0.977	0.982	0.996	1.004	1.015
5.0	0.835	0.892	0.923	0.936	0.942	0.947	0.960	0.967	0.978
6.0	0.780	0.848	0.885	0.902	0.909	0.915	0.928	0.936	0.947
7.0	0.734	0.807	0.847	0.866	0.874	0.880	0.896	0.905	0.915
8.0	0.690	0.769	0.812	0.831	0.839	0.846	0.862	0.871	0.884
9.0	0.655	0.731	0.775	0.795	0.803	0.810	0.828	0.839	0.854
10.0	0.612	0.697	0.743	0.763	0.771	0.779	0.799	0.810	0.825
11.0	0.582	0.663	0.707	0.729	0.738	0.747	0.767	0.779	0.794
12.0	0.552	0.628	0.672	0.695	0.705	0.714	0.736	0.747	0.763
13.0	0.521	0.597	0.641	0.664	0.675	0.684	0.706	0.717	0.733
14.0	0.490	0.566	0.610	0.634	0.644	0.653	0.676	0.688	0.704
15.0	0.462	0.538	0.581	0.604	0.615	0.623	0.646	0.659	0.676
16.0	0.435	0.510	0.553	0.575	0.585	0.593	0.617	0.630	0.643
17.0	0.413	0.486	0.527	0.549	0.559	0.568	0.592	0.605	0.623
18.0	0.392	0.462	0.501	0.524	0.534	0.543	0.567	0.580	0.598
19.0	0.370	0.437	0.476	0.498	0.509	0.518	0.542	0.555	0.573
20.0	0.348	0.413	0.450	0.473	0.483	0.492	0.517	0.530	0.548
21.0	0.332	0.394	0.430	0.452	0.462	0.471	0.495	0.509	0.526
22.0	0.315	0.375	0.410	0.431	0.441	0.450	0.474	0.487	0.504
23.0	0.299	0.356	0.389	0.410	0.420	0.428	0.453	0.466	0.483
24.0	0.282	0.337	0.369	0.389	0.398	0.407	0.431	0.444	0.461
25.0	0.269	0.322	0.353	0.372	0.381	0.390	0.413	0.426	0.443
26.0	0.255	0.306	0.336	0.355	0.364	0.372	0.395	0.408	0.424
27.0	0.242	0.291	0.320	0.338	0.347	0.355	0.377	0.390	0.406
28.0	0.228	0.275	0.304	0.322	0.330	0.338	0.359	0.372	0.388
29.0	0.214	0.260	0.287	0.305	0.313	0.320	0.341	0.354	0.370
30.0	0.201	0.244	0.271	0.288	0.296	0.303	0.323	0.336	0.352

Side Lengths of Square Fields Equivalent to Rectangular Fields

Long Axis (cm)	Short Axis (cm)														
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
2	2.0														
4	2.7	4.0													
6	3.1	4.6	6.0												
8	3.4	5.4	6.9	8.0											
10	3.6	5.8	7.5	8.9	10.0										
12	3.7	6.1	8.0	9.6	10.9	12.0									
14	3.8	6.3	8.4	10.1	11.6	12.9	14.0								
16	3.9	6.5	8.6	10.5	12.2	13.7	14.9	16.0							
18	4.0	6.6	8.9	10.8	12.7	14.3	15.7	16.9	18.0						
20	4.0	6.7	9.0	11.1	13.0	14.7	16.3	17.7	18.9	20.0					
22	4.0	6.8	9.1	11.3	13.3	15.1	16.8	18.3	19.7	20.9	22.0				
24	4.1	6.8	9.2	11.5	13.5	15.4	17.2	18.8	20.3	21.7	22.9	24.0			
26	4.1	6.9	9.3	11.6	13.7	15.7	17.5	19.2	20.9	22.4	23.7	24.9	26.0		
28	4.1	6.9	9.4	11.7	13.8	15.9	17.8	19.6	21.3	22.9	24.4	25.7	27.0	28.0	
30	4.1	6.9	9.4	11.7	13.9	16.0	18.0	19.9	21.7	23.3	24.9	26.4	27.7	29.0	30.0