

Specific Absorbed Fraction of Photon Energy

Specific Absorbed Fraction of Photon Energy

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Bladder Contents</i>						
Bladder wall	8.49E-04	1.40E-03	1.43E-03	9.83E-04	4.49E-04	2.56E-04
Stomach wall	2.83E-18*	4.25E-18†	1.20E-11†	3.28E-08†	4.53E-07	1.05E-06
Small intestine plus contents	1.52E-10*	2.28E-10†	1.76E-07	5.11E-06	1.24E-05	1.22E-05
Upper large intestine wall	1.71E-10*	2.57E-10†	1.02E-07†	3.04E-06	8.59E-06	8.31E-06
Lower large intestine wall	3.42E-07*	5.12E-07	7.80E-06	3.51E-05	4.16E-05	3.01E-05
Kidneys	1.52E-19*	2.28E-19†	3.95E-12†	2.46E-08†	4.05E-07	9.98E-07
Liver	2.61E-19*	3.91E-19†	2.37E-12†	2.05E-08	2.72E-07	5.55E-07
Lungs	4.23E-29*	6.39E-29†	5.55E-17†	7.65E-11†	1.31E-08	8.89E-08
"Other tissues" (suggested for muscle)	2.00E-07⊗	2.02E-06⊗	5.42E-06⊗	9.69E-06⊗	9.26E-06⊗	6.86E-06⊗
Ovaries	6.23E-09*	9.35E-09†	1.62E-06†	2.78E-05	3.58E-05	2.82E-05
Pancreas	3.63E-22*	5.45E-22†	2.11E-13†	6.51E-09†	2.92E-07	7.24E-07
Skeleton (suggested for total endosteal cells)	2.56E-11*	3.84E-11⊕	1.60E-08	1.16E-06	4.30E-06	4.06E-06
Red marrow	2.84E-08*	4.25E-08*	5.67E-08	3.88E-06	1.23E-05	1.00E-05
Skin	2.66E-08*	3.99E-08	3.75E-07	1.70E-06	2.26E-06	2.12E-06
Spleen	2.63E-22*	3.94E-22†	1.52E-13†	4.78E-09†	1.96E-07	3.87E-06
Testes	1.79E-09*	2.69E-09†	1.39E-06	1.54E-05	2.75E-05	1.88E-05
Thymus	5.91E-37*	8.87E-37†	1.32E-20†	2.05E-12†	2.06E-09†	2.67E-08†
Thyroid	6.20E-25*	9.31E-25*	1.24E-24†	2.86E-14†	1.55E-10†	4.05E-09†
Uterus	3.88E-06*	5.83E-06	4.28E-05	1.09E-04	1.02E-04	6.21E-05
Total body	1.43E-05	1.43E-05	1.42E-05	1.31E-05	1.00E-05	7.28E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	2.47E-04	2.56E-04	2.22E-04	2.07E-04	1.97E-04	1.57E-04
Stomach wall	1.02E-06	1.10E-06	1.86E-06	1.30E-06	1.83E-06	1.53E-06
Small intestine plus contents	1.03E-05	8.97E-06	8.84E-06	8.17E-06	8.42E-06	6.65E-06
Upper large intestine wall	8.37E-06	8.18E-06	6.19E-06	6.15E-06	5.80E-06	5.29E-06
Lower large intestine wall	2.51E-05	2.44E-05	2.09E-05	2.16E-05	2.02E-05	1.36E-05
Kidneys	1.00E-06	1.33E-06	1.17E-06	1.69E-06	1.26E-06	1.37E-06
Liver	7.70E-07	9.76E-07	1.02E-06	9.60E-07	1.19E-06	1.04E-06
Lungs	9.33E-08	1.65E-07	2.83E-07	3.07E-07	3.31E-07	1.04E-06
"Other tissues" (suggested for muscle)	6.28E-06⊗	6.13E-06⊗	5.71E-06⊗	5.42E-06⊗	5.11E-06⊗	4.27E-06⊗
Ovaries	2.72E-05	2.17E-05	1.35E-05	2.31E-05	1.66E-05	1.48E-05
Pancreas	1.10E-06	8.92E-07	1.00E-06	8.00E-07	1.40E-06	8.26E-07
Skeleton (suggested for total endosteal cells)	2.70E-06	2.03E-06	1.78E-06	1.72E-06	1.71E-06	1.55E-06
Red marrow	6.10E-06	4.33E-06	3.72E-06	3.47E-06	3.36E-06	3.07E-06
Skin	2.01E-06	2.24E-06	2.35E-06	2.22E-06	2.12E-06	1.89E-06
Spleen	5.29E-07	7.80E-07	8.59E-07	6.34E-07	1.12E-06	4.63E-07
Testes	1.59E-05	1.75E-05	1.57E-05	1.28E-05	1.40E-05	1.21E-05
Thymus	6.22E-08†	1.10E-07†	1.54E-07†	1.78E-07†	1.94E-07†	2.10E-07†
Thyroid	1.33E-08†	3.27E-08†	5.68E-08†	7.33E-08†	8.55E-08†	1.05E-07†
Uterus	5.51E-05	5.11E-05	4.68E-05	3.98E-05	4.04E-05	3.30E-05
Total body	6.58E-06	6.44E-06	5.98E-06	5.63E-06	5.35E-06	4.44E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

⊕ Adjustment on density or composition.

Source: From ICRP Report No. 23, Report of the Task Group on Reference Man, Pergamon Press, Oxford, England, 1975. By permission.

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Stomach Contents</i>						
Bladder wall	1.61E-18*	2.41E-18†	8.64E-12†	2.82E-08†	5.32E-07	1.17E-06
Stomach wall	3.21E-04	7.61E-04	8.96E-04	6.87E-04	3.28E-04	1.88E-04
Small intestine plus contents	1.99E-07*	2.99E-07	1.23E-06	6.72E-06	1.22E-05	1.08E-05
Upper large intestine wall	8.09E-07*	1.21E-06	5.67E-06	1.62E-05	1.90E-05	1.40E-05
Lower large intestine wall	1.71E-09*	2.56E-09†	2.80E-07	1.83E-06	4.78E-06	4.44E-06
Kidneys	3.83E-10*	5.74E-10†	4.17E-07	8.18E-06	1.65E-05	1.36E-05
Liver	2.14E-07*	3.22E-07*	4.29E-07	3.99E-06	8.27E-06	8.06E-06
Lungs	1.76E-07*	2.64E-07	2.60E-06	7.91E-06	9.61E-06	6.92E-06
"Other tissues" (suggested for muscle)	3.98E-08⊗	1.15E-06⊗	3.92E-06⊗	7.64E-06⊗	7.31E-06⊗	5.37E-06⊗
Ovaries	1.99E-14*	2.98E-14†	1.05E-09†	2.89E-07†	2.36E-06†	2.13E-06
Pancreas	8.30E-06*	1.24E-05	6.95E-05	1.40E-04	1.12E-04	7.10E-05
Skeleton (suggested for total endosteal cells)	3.86E-08*	5.79E-08	6.31E-07	3.05E-06	5.52E-06	4.00E-06
Red marrow	4.00E-08*	6.00E-08	6.67E-07	3.65E-06	8.53E-06	7.12E-06
Skin	1.38E-08*	2.07E-08	3.62E-07	1.53E-06	1.94E-06	1.66E-06
Spleen	1.12E-07*	1.69E-07†	1.06E-05	5.19E-05	5.98E-05	3.96E-05
Testes	3.42E-26*	5.13E-26†	1.89E-15†	5.20E-10†	5.50E-08†	1.58E-07
Thymus	2.19E-18*	3.29E-18†	1.18E-11†	3.41E-08†	1.58E-06	1.07E-06
Thyroid	5.67E-26*	8.51E-26†	2.27E-15†	5.70E-10†	5.82E-08†	2.59E-07
Uterus	7.51E-16*	1.13E-15†	2.81E-10†	1.90E-07†	1.45E-06	2.90E-06
Total body	1.43E-05	1.43E-05	1.42E-05	1.31E-05	9.75E-06	6.87E-06

Target	Energy (MeV)					
	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	7.91E-07	1.58E-06	1.65E-06	1.48E-06	1.03E-06	1.44E-06
Stomach wall	1.78E-04	1.79E-04	1.65E-04	1.48E-04	1.41E-04	1.15E-04
Small intestine plus contents	9.27E-06	9.08E-06	8.16E-06	7.37E-06	7.66E-06	6.38E-06
Upper large intestine wall	1.26E-05	1.13E-05	9.62E-06	1.17E-05	8.40E-06	7.91E-06
Lower large intestine wall	4.65E-06	4.35E-06	4.53E-06	4.51E-06	3.98E-06	2.76E-06
Kidneys	1.26E-05	1.13E-05	1.06E-05	9.84E-06	8.97E-06	7.42E-06
Liver	7.00E-06	7.02E-06	6.34E-06	6.15E-06	6.20E-06	4.89E-06
Lungs	5.97E-06	6.40E-06	5.72E-06	5.51E-06	4.91E-06	4.28E-06
"Other tissues" (suggested for muscle)	4.96E-06⊗	4.84E-06⊗	4.60E-06⊗	4.38E-06⊗	4.10E-06⊗	3.45E-06⊗
Ovaries	1.53E-06	1.70E-06	5.09E-06	3.02E-06†	2.86E-06†	2.42E-06†
Pancreas	6.37E-05	6.02E-05	5.23E-05	5.06E-05	4.40E-05	3.39E-05
Skeleton (suggested for total endosteal cells)	2.59E-06	2.08E-06	1.89E-06	1.79E-06	1.73E-06	1.61E-06
Red marrow	4.64E-06	3.61E-06	3.18E-06	2.90E-06	2.78E-06	2.66E-06
Skin	1.67E-06	2.04E-06	2.07E-06	1.96E-06	2.09E-06	1.70E-06
Spleen	3.56E-05	3.26E-05	3.04E-05	2.80E-05	2.49E-05	1.84E-05
Testes	2.41E-07	8.06E-08	5.72E-07†	5.91E-07†	5.95E-07†	5.61E-07†
Thymus	8.91E-07	7.81E-07	2.87E-06	2.26E-06	1.65E-06	1.42E-06†
Thyroid	4.35E-07†	5.26E-07†	5.82E-07†	5.96E-07†	6.02E-07†	5.67E-07†
Uterus	2.97E-06	3.08E-06	3.22E-06	3.28E-06	2.54E-06	4.00E-06
Total body	6.21E-06	6.11E-06	5.74E-06	5.39E-06	5.07E-06	4.22E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

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Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Small Intestine Plus Wall</i>						
Bladder wall	4.21E-10*	6.31E-10†	1.74E-07†	5.86E-06	1.02E-05	1.02E-05
Stomach wall	5.69E-07	1.80E-06	8.17E-06	1.42E-05	1.77E-05	1.45E-05
Small intestine plus contents	7.40E-04	6.61E-04	5.60E-04	3.71E-04	1.87E-04	1.13E-04
Upper large intestine wall	4.50E-04	4.48E-04	3.95E-04	2.74E-04	1.42E-04	8.66E-05
Lower large intestine wall	2.81E-05	5.12E-05	6.84E-05	6.33E-05	4.28E-05	2.82E-05
Kidneys	4.94E-09*	7.41E-09†	8.43E-07	6.92E-06	1.28E-05	1.30E-05
Liver	7.60E-08	3.52E-07	1.33E-06	4.59E-06	7.67E-06	7.17E-06
Lungs	4.44E-18*	6.67E-18†	9.65E-12†	6.31E-08	4.61E-07	7.93E-07
"Other tissues" (suggested for muscle)	6.96E-07⊗	2.14E-06⊗	4.24E-06⊗	7.31E-06⊗	7.49E-06⊗	5.95E-06⊗
Ovaries	1.38E-05*	2.07E-05	4.43E-05	6.26E-05	6.51E-05	4.23E-03
Pancreas	2.64E-11*	3.96E-11†	4.11E-08†	2.45E-06	7.92E-06	8.13E-06
Skeleton (suggested for total endosteal cells)	2.15E-07	7.10E-07	1.79E-06	5.23E-06	8.26E-06	5.61E-06
Red marrow	9.04E-07	2.97E-06	7.39E-06	2.08E-05	3.06E-05	1.92E-05
Skin	5.31E-08*	7.96E-08*	1.06E-07	7.67E-07	1.49E-06	1.52E-06
Spleen	2.12E-10*	3.18E-10†	6.00E-08†	2.67E-06	5.11E-06	5.95E-06
Testes	2.76E-18*	4.13E-18†	1.68E-11†	4.80E-08†	4.88E-07	1.10E-06
Thymus	1.05E-26*	1.58E-26†	1.07E-15†	4.01E-10†	4.76E-08†	2.52E-07†
Thyroid	4.34E-35*	6.50E-35†	1.11E-19†	5.17E-12†	3.48E-09†	3.84E-08†
Uterus	1.36E-06*	2.05E-06	1.97E-05	5.49E-05	5.74E-05	3.83E-05
Total body	1.43E-05*	1.43E-05	1.43E-05	1.37E-05	1.08E-05	7.82E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	9.28E-06	1.18E-05	6.79E-06	1.07E-05	7.97E-06	5.56E-06
Stomach wall	1.31E-05	1.16E-05	1.14E-05	1.08E-05	9.88E-06	7.84E-06
Small intestine plus contents	1.07E-04	1.07E-04	9.57E-05	9.07E-05	8.23E-05	6.68E-05
Upper large intestine wall	8.23E-05	7.83E-05	7.21E-05	6.69E-05	6.31E-05	4.98E-05
Lower large intestine wall	2.52E-05	2.32E-05	2.19E-05	2.03E-05	2.05E-05	1.63E-05
Kidneys	1.08E-05	1.09E-05	1.03E-05	8.67E-06	8.59E-06	6.26E-06
Liver	6.64E-06	6.20E-06	6.11E-06	5.67E-06	5.48E-06	4.39E-06
Lungs	9.02E-07	1.16E-06	1.17E-06	1.07E-06	1.17E-06	1.13E-06
"Other tissues" (suggested for muscle)	5.51E-06⊗	5.33E-06⊗	5.00E-06⊗	4.73E-06⊗	4.43E-06⊗	3.77E-06⊗
Ovaries	3.75E-05	3.00E-05	3.39E-05	2.31E-05	2.13E-05	2.81E-05
Pancreas	7.30E-06	7.17E-06	6.55E-06	5.08E-06	5.74E-06	5.21E-06
Skeleton (suggested for total endosteal cells)	3.54E-06	2.69E-06	2.53E-06	2.34E-06	2.26E-06	1.95E-06
Red marrow	1.16E-05	8.57E-06	7.78E-06	7.07E-06	6.77E-06	5.52E-06
Skin	1.63E-06	1.83E-06	1.93E-06	1.97E-06	1.75E-06	1.54E-06
Spleen	5.55E-06	5.41E-06	5.05E-06	5.28E-06	5.01E-06†	3.59E-06
Testes	1.28E-06	1.24E-06	1.79E-06	1.92E-06	2.12E-06	1.18E-06
Thymus	3.89E-07†	4.81E-07†	5.38E-07†	5.54E-07†	5.62E-07†	5.34E-07†
Thyroid	8.31E-08†	1.38E-07†	1.85E-07†	2.10E-07†	2.26E-07†	2.40E-07†
Uterus	3.31E-05	2.99E-05	2.71E-05	2.42E-05	2.21E-05	1.85E-05
Total body	7.02E-06	6.74E-06	6.27E-06	5.92E-06	5.51E-06	4.60E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

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Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Upper Large Intestine Contents</i>						
Bladder wall	3.32E-10*	4.97E-10†	1.25E-07†	3.87E-06	7.40E-06	8.92E-06
Stomach wall	2.11E-06*	3.16E-06	1.14E-05	2.22E-05	2.05E-05	1.49E-05
Small intestine plus contents	5.46E-06	5.06E-05	1.19E-04	1.50E-04	1.03E-04	6.49E-05
Upper large intestine wall	3.63E-04	8.01E-04	8.62E-04	5.57E-04	2.61E-04	1.52E-04
Lower large intestine wall	2.47E-06*	3.70E-06	1.14E-05	1.81E-05	1.51E-05	1.30E-05
Kidneys	3.18E-10*	4.77E-10†	3.55E-07	5.76E-06	1.25E-05	1.14E-05
Liver	1.58E-07*	2.37E-07	1.93E-06	7.43E-06	1.18E-05	1.00E-05
Lungs	3.97E-18*	5.95E-18†	1.18E-11†	7.16E-08	6.14E-07	9.96E-07
"Other tissues" (suggested for muscle)	7.42E-08⊗	8.77E-07⊗	3.19E-06⊗	6.95E-06⊗	7.28E-06⊗	5.74E-06⊗
Ovaries	2.01E-05*	3.02E-05	5.33E-05	7.41E-05	5.59E-05	4.53E-05
Pancreas	2.25E-11*	3.38E-11†	5.01E-08†	2.71E-06	8.10E-06	9.01E-06
Skeleton (suggested for total endosteal cells)	1.64E-07*	2.47E-07	1.37E-06	4.87E-06	7.35E-06	5.08E-06
Red marrow	6.91E-07*	1.04E-06	5.73E-06	1.93E-05	2.62E-05	1.66E-05
Skin	8.49E-10*	1.34E-09†	9.59E-08	9.69E-07	1.64E-06	1.52E-06
Spleen	5.77E-11*	8.66E-11†	5.09E-08†	1.57E-06	6.08E-06	5.82E-06
Testes	1.23E-17*	1.85E-17†	2.55E-11†	4.81E-08†	5.08E-07	9.33E-07
Thymus	1.34E-26*	2.02E-26†	1.58E-15†	5.43E-10†	5.78E-08†	3.51E-07
Thyroid	5.27E-35*	7.90E-35†	1.59E-19†	6.86E-12†	4.15E-09†	4.30E-08†
Uterus	4.28E-09*	6.41E-09†	1.21E-06	1.39E-05	2.81E-05	2.27E-05
Total body	1.43E-05	1.43E-05	1.43E-05	1.35E-05	1.05E-05	7.61E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	7.67E-06	6.53E-06	7.06E-06	4.83E-06	7.28E-06	4.26E-06
Stomach wall	1.32E-05	1.24E-05	1.16E-05	9.48E-06	1.01E-05	7.76E-06
Small intestine plus contents	5.89E-05	5.61E-05	5.05E-05	4.54E-05	4.21E-05	3.29E-05
Upper large intestine wall	1.47E-04	1.47E-04	1.39E-04	1.24E-04	1.18E-04	9.33E-05
Lower large intestine wall	1.06E-05	1.03E-05	1.08E-06	8.63E-06	8.14E-06	5.99E-06
Kidneys	9.84E-06	9.32E-06	9.40E-06	8.59E-06	7.31E-06	6.25E-06
Liver	9.31E-06	8.45E-06	8.11E-06	7.67E-06	7.24E-06	6.32E-06
Lungs	9.83E-07	1.17E-06	1.38E-06	1.43E-06	1.28E-06	1.13E-06
"Other tissues" (suggested for muscle)	5.22E-06	5.10E-06	4.80E-06	4.55E-06	4.36E-06	3.60E-06
Ovaries	4.10E-05	4.39E-05	2.31E-05	1.87E-05	3.33E-05	2.08E-05
Pancreas	8.74E-06	6.11E-06	6.85E-06	6.31E-06	7.00E-06	7.77E-06
Skeleton (suggested for total endosteal cells)	3.18E-06	2.49E-06	2.21E-06	2.13E-06	2.04E-06	1.75E-06
Red marrow	9.96E-06	7.45E-06	6.40E-06	6.05E-06	5.86E-06	4.85E-06
Skin	1.63E-06	1.92E-06	1.87E-06	1.86E-06	1.82E-06	1.76E-06
Spleen	5.01E-06	4.21E-06	4.55E-06	4.73E-06	3.66E-06	3.79E-06
Testes	1.15E-06	1.78E-06	1.92E-06	1.30E-06	1.74E-06†	1.51E-06†
Thymus	4.33E-07†	5.27E-07†	5.80E-07†	5.94E-07†	6.01E-07†	5.66E-07†
Thyroid	9.11E-08†	1.48E-07†	1.95E-07†	2.21E-07†	2.37E-07†	2.49E-07†
Uterus	1.68E-05	1.53E-05	1.53E-05	1.55E-05	1.44E-05	1.16E-05
Total body	6.79E-06	6.57E-06	6.17E-06	5.77E-06	5.46E-06	4.50E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission.

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Lower Large Intestine Contents</i>						
Bladder wall	1.38E-07*	2.08E-07†	6.01E-06	2.70E-05	3.34E-05	2.80E-05
Stomach wall	1.25E-08*	1.88E-08†	8.62E-07	5.03E-06	7.97E-06	6.96E-06
Small intestine plus contents	2.42E-06	2.78E-05	6.14E-05	7.81E-05	5.42E-05	3.65E-05
Upper large intestine wall	1.03E-05	2.22E-05	3.16E-05	3.07E-05	2.21E-05	1.61E-05
Lower large intestine wall	5.53E-04	1.13E-03	1.16E-03	7.02E-04	2.97E-04	1.76E-04
Kidneys	4.24E-12*	6.36E-12†	1.31E-08†	8.91E-07	2.59E-06	3.12E-06
Liver	2.92E-17*	4.38E-17†	2.34E-11†	3.25E-08	4.60E-07	8.95E-07
Lungs	2.61E-17*	3.92E-20†	4.15E-13†	2.91E-09†	1.15E-07	2.87E-07
"Other tissues" (suggested for muscle)	6.79E-08⊗	1.35E-06⊗	4.12E-06⊗	7.92E-06⊗	8.26E-06⊗	6.51E-06⊗
Ovaries	4.10E-05*	6.16E-05	1.62E-04	1.77E-04	1.06E-04	6.25E-05
Pancreas	1.71E-14*	2.57E-14†	1.18E-09†	5.69E-07	1.69E-06	3.05E-06
Skeleton (suggested for total endosteal cells)	4.30E-08	1.36E-06	5.69E-06	1.31E-05	1.30E-05	7.25E-06
Red marrow	1.81E-07	5.70E-06	2.37E-05	5.24E-05	4.68E-05	2.28E-05
Skin	8.10E-08	2.36E-07	4.75E-07	1.14E-06	1.88E-06	1.79E-06
Spleen	1.52E-12*	2.29E-12†	7.72E-09†	5.72E-07	3.20E-06	3.22E-06
Testes	4.67E-10*	7.01E-10†	2.21E-07†	4.41E-06	8.59E-06	6.27E-06
Thymus	1.02E-29*	1.53E-29†	2.27E-17†	4.46E-11†	1.03E-08†	7.60E-08†
Thyroid	1.05E-37*	1.58E-37†	3.76E-21†	7.26E-13†	8.56E-10†	1.26E-08†
Uterus	5.13E-09	7.69E-09†	2.33E-06	2.25E-05	3.65E-05	2.79E-05
Total body	1.43E-05	1.43E-05	1.43E-05	1.37E-05	1.08E-05	7.62E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	2.34E-05	1.94E-05	1.62E-05	2.02E-05	1.67E-05	1.04E-05
Stomach wall	6.34E-06	6.23E-06	4.98E-06	4.73E-06	5.49E-06	4.92E-06
Small intestine plus contents	3.32E-05	3.07E-05	2.84E-05	2.64E-05	2.51E-05	1.99E-05
Upper large intestine wall	1.50E-05	1.45E-05	1.25E-05	1.35E-05	1.08E-05	9.87E-06
Lower large intestine wall	1.74E-04	1.77E-04	1.62E-04	1.52E-04	1.39E-04	1.08E-04
Kidneys	3.47E-06	2.84E-06	3.08E-06	2.98E-06	3.54E-06	2.50E-06
Liver	1.02E-06	1.19E-06	1.29E-06	1.50E-06	1.24E-06	1.18E-06
Lungs	3.14E-07	3.49E-07	5.49E-07	5.49E-07	7.81E-07	5.78E-07
"Other tissues" (suggested for muscle)	6.01E-06⊗	5.84E-06⊗	5.48E-06⊗	5.18E-06⊗	4.89E-06⊗	4.09E-06⊗
Ovaries	7.13E-05	5.42E-05	5.50E-05	5.02E-05	4.63E-05	3.51E-05
Pancreas	2.49E-06	2.58E-06	2.43E-06	2.00E-06	2.48E-06	1.45E-06
Skeleton (suggested for total endosteal cells)	4.49E-06	3.59E-06	3.25E-06	3.02E-06	2.97E-06	2.43E-06
Red marrow	1.36E-05	1.07E-05	9.65E-06	8.77E-06	8.46E-06	6.82E-06
Skin	1.89E-06	2.03E-06	2.05E-06	2.23E-06	2.03E-06	1.85E-06
Spleen	2.76E-06	3.24E-06	3.56E-06	3.05E-06	3.20E-06	2.22E-06
Testes	7.25E-06	7.14E-06	4.86E-06	4.82E-06	6.10E-06	3.92E-06
Thymus	1.39E-07†	2.01E-07†	2.51E-07†	2.74E-07†	2.89E-07†	2.93E-07†
Thyroid	3.19E-08†	6.26E-08†	9.34E-08†	1.13E-07†	1.27E-07†	1.45E-07†
Uterus	2.53E-05	1.91E-05	1.79E-05	1.78E-05	1.52E-05	1.29E-05
Total body	6.77E-06	6.53E-06	6.10E-06	5.76E-06	5.44E-06	4.48E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission.

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Kidneys</i>						
Bladder wall	4.59E-19*	6.88E-19†	5.48E-12‡	2.72E-08†	3.14E-07	1.04E-06
Stomach wall	1.35E-09*	2.03E-09†	5.45E-07	7.99E-06	1.59E-05	1.47E-05
Small intestine plus contents	6.51E-09*	9.77E-09†	9.63E-07	6.48E-06	1.23E-05	1.14E-05
Upper large intestine wall	7.46E-10*	1.12E-09†	3.70E-07	6.25E-06	1.17E-05	1.13E-05
Lower large intestine wall	8.29E-12*	1.24E-11†	1.16E-08†	6.63E-07	1.81E-06	2.49E-06
Kidneys	3.28E-03	2.74E-03	2.04E-03	1.03E-03	3.93E-04	2.35E-04
Liver	4.43E-07*	6.65E-07*	4.68E-06	1.54E-05	1.95E-05	1.53E-05
Lungs	3.57E-08	5.36E-08*	7.15E-08	1.18E-06	3.27E-06	3.37E-06
"Other tissues" (suggested for muscle)	1.42E-06⊗	4.42E-06⊗	7.39E-06⊗	8.82E-06⊗	6.78E-06⊗	5.12E-06⊗
Ovaries	3.68E-14*	5.53E-14†	1.76E-09†	4.81E-07†	3.71E-06	4.13E-06
Pancreas	2.34E-08*	3.51E-08†	4.45E-06	2.44E-05	3.22E-05	2.63E-05
Skeleton (suggested for total endosteal cells)	2.24E-07*	3.36E-07	2.18E-06	7.54E-06	1.03E-05	6.40E-06
Red marrow	5.99E-07*	8.99E-07	5.72E-06	2.01E-05	2.76E-05	1.69E-05
Skin	1.66E-07*	2.49E-07	1.16E-06	2.50E-06	2.23E-06	1.93E-06
Spleen	6.19E-06*	9.28E-06	3.63E-05	6.69E-05	5.32E-05	3.30E-05
Testes	4.39E-27*	6.58E-27†	8.52E-16†	4.33E-10†	5.25E-08†	2.76E-07†
Thymus	7.07E-22*	1.06E-21†	2.52E-13†	6.17E-09†	3.51E-07	8.06E-07
Thyroid	8.15E-30*	1.22E-29†	3.87E-17†	9.30E-11†	2.07E-08†	1.40E-07†
Uterus	1.46E-15*	2.19E-15†	4.32E-10†	3.26E-07	1.85E-06	3.31E-06
Total body	1.43E-05	1.43E-05	1.40E-05	1.23E-05	9.01E-06	6.45E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	1.12E-06	1.32E-06	1.59E-06	1.47E-06	1.13E-06	1.92E-06
Stomach wall	1.20E-05	1.16E-05	1.07E-05	8.44E-06	1.00E-05	8.14E-06
Small intestine plus contents	1.02E-05	9.42E-06	9.02E-06	8.91E-06	8.05E-06	6.66E-06
Upper large intestine wall	1.03E-05	9.90E-06	9.20E-06	9.23E-06	7.29E-06	6.25E-06
Lower large intestine wall	3.05E-06	3.03E-06	2.84E-06	3.39E-06	2.93E-06	2.52E-06
Kidneys	2.39E-04	2.52E-04	2.26E-04	2.14E-04	1.93E-04	1.63E-04
Liver	1.36E-05	1.38E-05	1.22E-05	1.15E-05	1.10E-05	8.79E-06
Lungs	2.99E-06	3.28E-06	3.30E-06	2.96E-06	2.80E-06	2.72E-06
"Other tissues" (suggested for muscle)	4.95E-06⊗	4.93E-06⊗	4.71E-06⊗	4.47E-06⊗	4.22E-06⊗	3.55E-06⊗
Ovaries	4.44E-06	3.96E-06	5.43E-06	3.83E-06†	3.59E-06†	1.77E-08
Pancreas	2.28E-05	2.25E-05	2.24E-05	1.96E-05	1.50E-05	1.47E-05
Skeleton (suggested for total endosteal cells)	4.06E-06	3.39E-06	3.10E-06	2.99E-06	2.76E-06	2.46E-06
Red marrow	1.05E-05	8.59E-06	7.77E-06	7.43E-06	6.81E-06	5.85E-06
Skin	2.06E-06	2.29E-06	2.24E-06	2.13E-06	2.15E-06	1.89E-06
Spleen	3.11E-05	2.85E-05	2.70E-05	2.41E-05	2.20E-05	1.73E-05
Testes	4.23E-07†	5.18E-07†	5.77E-07†	5.93E-07†	5.98E-07†	5.65E-07†
Thymus	6.92E-07	1.41E-06	2.72E-07	1.13E-06†	4.67E-07	9.90E-07†
Thyroid	2.42E-07†	3.27E-07†	3.86E-07†	4.11E-07†	4.24E-07†	4.15E-07†
Uterus	3.91E-06	2.87E-06	2.77E-06	3.66E-06	1.95E-06	3.98E-06
Total body	5.90E-06	5.84E-06	5.48E-06	5.21E-06	4.87E-06	4.12E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission.

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Liver</i>						
Bladder wall	5.75E-19*	8.62E-19†	3.52E-12†	1.33E-08†	2.04E-07	6.16E-07
Stomach wall	3.85E-07*	5.78E-07*	7.71E-07	4.08E-06	8.90E-06	7.07E-06
Small intestine plus contents	1.62E-07*	2.43E-07	7.70E-07	2.95E-06	6.39E-06	6.32E-06
Upper large intestine wall	1.89E-07*	2.84E-07	1.71E-06	8.56E-06	1.18E-05	1.01E-05
Lower large intestine wall	2.73E-17*	4.10E-17†	2.02E-11†	2.65E-08†	3.34E-07	8.76E-07
Kidneys	8.39E-07*	1.26E-06	4.50E-06	1.57E-05	1.95E-05	1.58E-05
Liver	5.36E-04	4.96E-04	4.34E-04	2.97E-04	1.52E-04	9.14E-05
Lungs	7.76E-08	3.19E-06	9.46E-06	1.64E-05	1.45E-05	9.92E-06
"Other tissues" (suggested for muscle)	6.16E-07⊗	1.92E-06⊗	3.55E-06⊗	5.52E-06⊗	5.25E-06⊗	4.09E-06⊗
Ovaries	9.82E-15*	1.47E-14†	5.55E-10†	1.63E-07†	1.51E-06†	1.63E-06
Pancreas	1.47E-06*	2.21E-06*	2.94E-06	1.67E-05	2.18E-05	1.77E-05
Skeleton (suggested for total endosteal cells)	5.83E-08	5.37E-07	2.08E-06	5.80E-06	7.80E-06	4.93E-06
Red marrow	6.03E-08*	5.27E-07	1.96E-06	5.68E-06	9.33E-06	7.14E-06
Skin	5.76E-08*	8.64E-08	4.77E-07	1.64E-06	1.89E-06	1.81E-06
Spleen	7.27E-13	1.09E-12†	4.57E-09†	8.07E-07	2.93E-06	3.56E-06
Testes	2.17E-26*	3.26E-26†	9.37E-16†	2.77E-10†	3.42E-08†	1.90E-07†
Thymus	6.31E-16*	9.47E-16†	1.59E-10†	1.20E-07†	1.67E-06	2.50E-06
Thyroid	1.29E-24*	1.94E-24†	1.12E-14†	1.21E-09†	8.81E-08†	3.80E-07†
Uterus	1.75E-16*	2.62E-16†	8.22E-11†	8.39E-08†	9.07E-07	1.51E-06
Total body	1.43E-05	1.43E-05	1.42E-05	1.29E-05	9.48E-06	6.54E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	5.60E-07	1.21E-06	5.80E-07	8.48E-07	9.02E-07	9.93E-07
Stomach wall	6.96E-06	6.50E-06	6.44E-06	6.00E-06	6.11E-06	5.17E-06
Small intestine plus contents	6.01E-06	5.44E-06	5.16E-06	5.10E-06	4.64E-06	4.16E-06
Upper large intestine wall	8.71E-06	8.84E-06	7.71E-06	6.52E-06	6.96E-06	5.21E-06
Lower large intestine wall	8.55E-07	1.12E-06	8.88E-07	1.24E-06	9.53E-07	1.40E-06
Kidneys	1.36E-05	1.29E-05	1.18E-05	1.14E-05	1.10E-05	8.23E-06
Liver	8.82E-05	8.85E-05	8.07E-05	7.48E-05	6.86E-05	5.58E-05
Lungs	8.84E-06	8.23E-06	7.90E-06	7.72E-06	6.96E-06	5.60E-06
"Other tissues" (suggested for muscle)	3.82E-06⊗	3.85E-06⊗	3.69E-06⊗	3.46E-06⊗	3.30E-06⊗	2.80E-06⊗
Ovaries	1.80E-06	6.53E-07	2.49E-06†	3.44E-06	2.22E-06†	1.92E-06†
Pancreas	1.35E-05	1.66E-05	1.36E-05	1.21E-05	9.99E-06	8.75E-06
Skeleton (suggested for total endosteal cells)	3.17E-06	2.53E-06	2.30E-06	2.26E-06	2.20E-06	1.85E-06
Red marrow	4.64E-06	3.72E-06	3.21E-06	3.26E-06	3.17E-06	2.62E-06
Skin	1.89E-06	2.08E-06	2.08E-06	2.02E-06	2.10E-06	1.75E-06
Spleen	3.34E-06	3.44E-06	3.81E-06	2.95E-06	3.14E-06	2.14E-06
Testes	3.05E-07†	3.92E-07†	8.76E-07	4.70E-07†	4.79E-07†	4.62E-07†
Thymus	2.27E-06	4.64E-06	2.54E-06	2.17E-06	2.65E-06	3.92E-06
Thyroid	8.23E-07	6.32E-07†	6.81E-07†	6.87E-07†	6.90E-07†	6.40E-07†
Uterus	1.40E-06	1.52E-06	1.28E-06	2.07E-06	1.81E-06	1.38E-06
Total body	5.94E-06	5.86E-06	5.49E-06	5.16E-06	4.86E-06	4.06E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission.

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Lungs</i>						
Bladder wall	3.53E-28*	5.30E-28⊕	2.65E-16⊕	2.75E-10⊕	5.21E-08⊕	1.05E-07†
Stomach wall	5.37E-07*	8.05E-07	3.45E-06	8.04E-06	9.44E-06	7.19E-06
Small intestine plus contents	1.65E-17*	2.47E-17⊕	2.92E-11⊕	4.67E-08	3.60E-07	7.11E-07
Upper large intestine wall	2.53E-17*	3.80E-17⊕	4.52E-11⊕	7.70E-08	5.12E-07	8.35E-07
Lower large intestine wall	6.26E-20*	9.39E-20⊕	1.13E-12⊕	7.29E-09⊕	8.32E-08	1.78E-07
Kidneys	6.42E-11*	9.64E-11⊕	5.81E-08⊕	1.24E-06	2.97E-06	3.25E-06
Liver	7.16E-08	2.28E-06	7.25E-06	1.40E-05	1.29E-05	9.52E-06
Lungs	8.17E-04	6.58E-04	4.71E-04	2.30E-04	8.99E-05	5.05E-05
"Other tissues" (suggested for muscle)	3.89E-06⊗	6.82E-06⊗	9.44E-06⊗	1.00E-05⊗	7.05E-06⊗	4.87E-06⊗
Ovaries	5.25E-24*	7.88E-24⊕	3.48E-14⊕	3.13E-09⊕	2.30E-07⊕	3.02E-07†
Pancreas	8.53E-09*	1.28E-08⊕	6.38E-07	9.00E-06	1.27E-05	1.04E-05
Skeleton (suggested for total endosteal cells)	2.71E-08	7.11E-07	3.56E-06	1.04E-05	1.20E-05	6.56E-06
Red marrow	2.81E-08	7.53E-07	3.97E-06	1.20E-05	1.46E-05	8.36E-06
Skin	4.70E-08*	7.05E-08	6.44E-07	1.94E-06	2.19E-06	1.92E-06
Spleen	6.63E-07*	9.95E-07	4.70E-06	1.27E-05	1.10E-05	9.05E-06
Testes	8.51E-36*	1.28E-35⊕	5.76E-20⊕	5.56E-12⊕	5.03E-09⊕	1.92E-08†
Thymus	2.22E-07*	3.33E-07⊕	3.35E-06	1.78E-05	2.09E-05	1.79E-05
Thyroid	4.05E-12*	6.07E-12⊕	2.29E-08⊕	8.09E-07	2.30E-06	3.85E-06
Uterus	3.81E-25*	5.72E-25⊕	1.11E-14⊕	2.07E-09⊕	1.86E-07⊕	2.80E-07
Total body	1.43E-05	1.43E-05	1.41E-05	1.26E-05	8.78E-06	5.70E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	1.83E-07†	2.55E-07†	3.09E-07†	3.32E-07†	3.43E-07†	3.43E-07†
Stomach wall	6.61E-06	6.32E-06	6.34E-06	6.14E-06	6.45E-06	3.05E-06
Small intestine plus contents	7.14E-07	9.57E-07	1.08E-06	1.04E-06	1.16E-06	1.11E-06
Upper large intestine wall	8.57E-07	1.32E-06	1.38E-06	1.45E-06	1.37E-06	1.75E-06
Lower large intestine wall	4.05E-07	2.69E-07	3.21E-07	2.13E-07	2.34E-07	2.69E-07
Kidneys	3.14E-06	3.61E-06	3.22E-06	3.61E-06	2.31E-06	2.82E-06
Liver	8.81E-06	8.18E-06	7.72E-06	7.20E-06	6.52E-06	5.78E-06
Lungs	5.00E-05	5.01E-05	4.55E-05	4.32E-05	3.92E-05	3.08E-05
"Other tissues" (suggested for muscle)	4.61E-06⊗	4.62E-06⊗	4.31E-06⊗	4.04E-06⊗	3.81E-06⊗	3.17E-06⊗
Ovaries	4.41E-07†	5.28E-07†	5.74E-07†	5.87E-07†	5.94E-07†	5.58E-07†
Pancreas	8.94E-06	9.63E-06	7.11E-06	7.54E-06	5.86E-06	6.10E-06
Skeleton (suggested for total endosteal cells)	4.08E-06	3.45E-06	3.17E-06	2.87E-06	2.93E-06	2.40E-06
Red marrow	5.21E-06	4.35E-06	4.02E-06	3.69E-06	3.70E-06	3.02E-06
Skin	2.10E-06	2.34E-06	2.30E-06	2.25E-06	2.16E-06	1.73E-06
Spleen	8.18E-06	7.31E-06	7.18E-06	5.31E-06	6.23E-06	5.61E-06
Testes	4.62E-08†	8.43E-08†	1.22E-07†	1.43E-07†	1.58E-07†	1.74E-07†
Thymus	1.42E-05	1.26E-05	1.37E-05	1.35E-05	1.17E-05	8.45E-06
Thyroid	2.97E-06	4.15E-06	4.66E-06	2.75E-06	3.00E-06	2.64E-06†
Uterus	3.53E-07	3.29E-07	4.05E-07	9.28E-07	5.55E-07†	9.39E-07
Total body	5.11E-06	4.99E-06	4.66E-06	4.36E-06	4.12E-06	3.41E-06

* Extrapolation from higher energy.

⊕ Adjustment on density or composition.

† Build-up factor method.

⊗ Calculated by difference.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission.

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Muscle</i> ⊗						
Bladder wall	2.00E-07	2.02E-06	5.42E-06	9.69E-06	9.26E-06	6.86E-06
Stomach wall	3.98E-08	1.15E-06	3.92E-06	7.64E-06	7.31E-06	4.60E-06
Small intestine plus contents	6.96E-07	2.14E-06	4.24E-06	7.31E-06	7.49E-06	5.95E-06
Upper large intestine wall	4.38E-06	4.81E-06	6.20E-06	8.22E-06	7.74E-06	6.12E-06
Lower large intestine wall	6.79E-08	1.35E-06	4.12E-06	7.92E-06	8.26E-06	6.51E-06
Kidneys	1.42E-06	4.42E-06	7.39E-06	8.82E-06	6.78E-06	5.12E-06
Liver	6.16E-07	1.92E-06	3.55E-06	5.52E-06	5.25E-06	4.09E-06
Lungs	3.89E-06	6.82E-06	9.44E-06	1.00E-05	7.05E-06	4.87E-06
"Other tissues" (suggested for muscle)	1.81E-05	1.70E-05	1.52E-05	1.15E-05	7.13E-06	5.08E-06
Ovaries	4.11E-06	9.31E-06	1.19E-05	1.23E-05	1.00E-05	7.57E-06
Pancreas	2.41E-06	6.73E-06	1.04E-05	1.21E-05	9.45E-06	6.87E-06
Skeleton (suggested for total endosteal cells)	3.85E-07	9.43E-07	1.63E-06	3.06E-06	3.82E-06	3.66E-06
Red marrow	2.01E-06	4.60E-06	8.73E-06	1.59E-05	1.56E-05	8.81E-06
Skin	4.00E-06	6.06E-06	6.46E-06	5.41E-06	3.48E-06	2.60E-06
Spleen	1.18E-06	3.78E-06	6.79E-06	9.42E-06	7.63E-06	5.48E-06
Testes	4.99E-08	7.21E-07	2.66E-06	5.71E-06	5.52E-06	4.28E-06
Thymus	1.74E-05	2.52E-05	2.59E-05	1.31E-05	1.23E-05	5.93E-06
Thyroid	3.35E-06	8.66E-06	1.19E-05	1.16E-05	7.22E-06	4.81E-06
Uterus	2.02E-05	1.76E-05	1.80E-05	1.42E-05	1.16E-05	8.77E-06
Total body	1.43E-05	1.37E-05	1.25E-05	9.93E-06	6.60E-06	4.86E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	6.28E-06	6.13E-06	5.71E-06	5.42E-06	5.11E-06	4.27E-06
Stomach wall	4.96E-06	4.84E-06	4.60E-06	4.38E-06	4.10E-06	3.45E-06
Small intestine plus contents	5.51E-06	5.33E-06	5.00E-06	4.73E-06	4.43E-06	3.77E-06
Upper large intestine wall	5.73E-06	5.61E-06	5.31E-06	5.00E-06	4.68E-06	3.97E-06
Lower large intestine wall	6.01E-06	5.84E-06	5.48E-06	5.18E-06	4.89E-06	4.09E-06
Kidneys	4.95E-06	4.93E-06	4.71E-06	4.47E-06	4.22E-06	3.55E-06
Liver	3.82E-06	3.85E-06	3.69E-06	3.46E-06	3.30E-06	2.80E-06
Lungs	4.61E-06	4.62E-06	4.31E-06	4.04E-06	3.81E-06	3.17E-06
"Other tissues" (suggested for muscle)	5.03E-06	5.22E-06	4.99E-06	4.65E-06	4.36E-06	3.66E-06
Ovaries	7.02E-06	6.84E-06	6.40E-06	6.00E-06	5.65E-06	4.75E-06
Pancreas	6.32E-06	6.20E-06	5.71E-06	5.43E-06	5.17E-06	4.20E-06
Skeleton (suggested for total endosteal cells)	3.74E-06	3.83E-06	3.67E-06	3.54E-06	3.33E-06	2.83E-06
Red marrow	5.58E-06	4.75E-06	4.26E-06	3.85E-06	3.95E-06	2.98E-06
Skin	2.74E-06	3.14E-06	3.15E-06	2.96E-06	2.81E-06	2.37E-06
Spleen	5.14E-06	5.07E-06	4.79E-06	4.55E-06	4.23E-06	3.60E-06
Testes	4.14E-06	4.27E-06	4.08E-06	3.97E-06	4.59E-06	3.20E-06
Thymus	1.03E-05	5.77E-06	4.35E-06	7.16E-06	5.70E-06	6.00E-06
Thyroid	4.63E-06	4.76E-06	4.45E-06	4.19E-06	3.94E-06	3.27E-06
Uterus	8.30E-06	6.46E-06	8.93E-06	5.29E-06	7.01E-06	6.15E-06
Total body	4.82E-06	4.97E-06	4.75E-06	4.45E-06	4.18E-06	3.51E-06

⊗ Calculated by difference.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission.

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Ovaries</i>						
Bladder wall	1.79E-08*	2.69E-08†	3.42E-06	2.65E-05	3.99E-05	2.91E-05
Stomach wall	8.09E-14*	1.21E-13†	2.07E-09†	5.22E-07	2.40E-06	3.24E-06
Small intestine plus contents	2.87E-06	2.23E-05	5.91E-05	9.45E-05	7.22E-05	4.80E-05
Upper large intestine wall	8.94E-06	6.76E-05	1.08E-04	1.03E-04	6.38E-05	4.16E-05
Lower large intestine wall	9.94E-06	8.15E-05	1.46E-04	1.45E-04	8.86E-05	5.62E-05
Kidneys	3.71E-14*	5.56E-14†	1.90E-09†	5.45E-07	2.64E-06	3.53E-06
Liver	1.05E-14*	1.58E-14†	5.74E-10†	2.42E-07	1.34E-06	2.00E-06
Lungs	5.12E-26	7.68E-26†	1.02E-14†	9.26E-10†	8.58E-08	2.06E-07
“Other tissues” (suggested for muscle)	4.11E-06⊗	9.31E-06⊗	1.19E-05⊗	1.23E-05⊗	1.00E-05⊗	7.57E-06⊗
Ovaries	9.68E-02	5.91E-02	3.26E-02	1.15E-02	3.58E-03	2.22E-03
Pancreas	4.74E-18*	7.10E-18†	3.03E-11†	7.93E-08†	8.55E-07	1.99E-06
Skeleton (suggested for total endosteal cells)	2.70E-08*	4.06E-08	1.39E-06	7.90E-06	1.14E-05	6.94E-06
Red marrow	1.14E-07*	1.71E-07	5.85E-06	3.28E-05	4.51E-05	2.50E-05
Skin	8.61E-12*	1.29E-11†	1.85E-08	5.06E-07	1.35E-06	1.51E-06
Spleen	1.02E-16*	1.53E-16†	7.80E-11†	9.57E-08	1.03E-06	1.77E-06
Thymus	3.01E-33*	4.51E-33†	1.05E-18†	1.83E-11†	8.00E-09†	7.15E-08†
Thyroid	2.30E-23*	3.45E-23*	4.61E-23†	2.50E-13†	5.98E-10†	1.09E-08†
Uterus	1.82E-06*	2.74E-06	5.12E-05	1.44E-04	1.26E-04	8.03E-05
Total body	1.43E-05	1.43E-05	1.43E-05	1.39E-05	1.13E-05	8.10E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	2.45E-05	2.29E-05	2.28E-05	2.04E-05	1.72E-05	1.47E-05
Stomach wall	2.82E-06	2.90E-06	2.48E-06	3.25E-06	3.12E-06	3.13E-06
Small intestine plus contents	4.19E-05	4.07E-05	3.57E-05	3.34E-05	3.15E-05	2.51E-05
Upper large intestine wall	3.99E-05	3.82E-05	3.36E-05	3.19E-05	2.97E-05	2.21E-05
Lower large intestine wall	5.07E-05	4.88E-05	4.25E-05	4.02E-05	3.84E-05	3.37E-05
Kidneys	3.47E-06	3.92E-06	3.63E-06	3.32E-06	3.62E-06	2.98E-06
Liver	2.11E-06	2.11E-06	2.17E-06	2.14E-06	2.30E-06	1.76E-06
Lungs	2.56E-07	3.88E-07	5.40E-07	5.62E-07	5.86E-07	7.01E-07
"Other tissues" (suggested for muscle)	7.02E-06⊗	6.84E-06⊗	6.40E-06⊗	6.00E-06⊗	5.65E-06⊗	4.75E-06⊗
Ovaries	2.48E-03	2.62E-03	2.42E-03	2.28E-03	2.12E-03	1.72E-03
Pancreas	1.77E-06	1.90E-06	3.18E-06	1.76E-06	9.78E-07	2.66E-06
Skeleton (suggested for total endosteal cells)	4.18E-06	3.18E-06	2.88E-06	2.69E-06	2.60E-06	2.16E-06
Red marrow	1.43E-05	1.06E-05	9.34E-06	8.52E-06	8.06E-06	6.32E-06
Skin	1.63E-06	1.81E-06	1.90E-06	1.75E-06	1.56E-06	1.52E-06
Spleen	1.99E-06	2.40E-06	2.05E-06	1.62E-06	2.52E-06	1.98E-06
Thymus	1.40E-07†	2.11E-07†	2.66E-07†	2.92E-07†	3.08E-07†	3.13E-07†
Thyroid	3.01E-08†	6.22E-08†	9.61E-08†	1.17E-07†	1.31E-07†	1.51E-07†
Uterus	7.51E-05	6.18E-05	5.32E-05	4.86E-05	4.77E-05	3.91E-05
Total body	7.16E-06	6.88E-06	6.38E-06	5.97E-06	5.65E-06	4.70E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission.

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Pancreas</i>						
Bladder wall	9.31E-22*	1.40E-21†	3.01E-13†	7.08E-09†	1.68E-07	5.22E-07
Stomach wall	2.26E-06	3.91E-05	1.10E-04	1.57E-04	1.13E-04	6.73E-05
Small intestine plus contents	2.59E-11*	3.89E-11†	4.01E-08†	1.87E-06	6.39E-06	7.11E-06
Upper large intestine wall	3.88E-11*	5.82E-11†	6.06E-08†	2.79E-06	8.27E-06	8.32E-06
Lower large intestine wall	1.41E-14*	2.12E-14†	8.81E-10†	3.08E-07	1.73E-06	2.22E-06
Kidneys	2.26E-08*	3.39E-08†	3.23E-06	2.50E-05	3.37E-05	2.65E-05
Liver	1.54E-07*	2.30E-07	3.61E-06	1.64E-05	2.24E-05	1.76E-05
Lungs	2.75E-09*	4.12E-09†	1.16E-06	8.87E-06	1.29E-05	1.02E-05
"Other tissues" (suggested for muscle)	2.41E-06⊗	6.73E-06⊗	1.04E-05⊗	1.21E-05⊗	9.45E-06⊗	6.87E-06⊗
Ovaries	5.28E-18*	7.92E-18†	3.07E-11†	7.99E-08†	1.29E-06†	1.82E-06
Pancreas	1.47E-02	1.09E-02	7.14E-03	3.16E-03	1.10E-03	6.51E-04
Skeleton (suggested for total endosteal cells)	3.77E-08*	5.66E-08	7.68E-07	5.02E-06	9.58E-06	6.58E-06
Red marrow	7.85E-08*	1.18E-07	1.46E-06	9.15E-06	1.78E-05	1.27E-05
Skin	7.33E-09*	1.10E-08*	1.47E-08	5.52E-07	1.39E-06	1.50E-06
Spleen	1.45E-06	4.48E-05	1.31E-04	1.79E-04	1.25E-04	7.62E-05
Testes	9.66E-30*	1.45E-29†	4.87E-17†	1.17E-10†	2.50E-08†	1.64E-07†
Thymus	1.99E-18*	2.98E-18†	1.78E-11†	5.77E-08†	1.70E-06	1.73E-06
Thyroid	1.21E-26*	1.81E-26†	2.08E-15†	7.82E-10†	7.99E-08†	3.78E-07†
Uterus	1.65E-18*	2.48E-18†	1.75E-11†	1.10E-07	1.01E-06	1.79E-06
Total body	1.43E-05	1.43E-05	1.43E-05	1.39E-05	1.11E-05	7.92E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	5.61E-07	6.82E-07	4.03E-07	1.02E-06	1.51E-06	1.19E-06
Stomach wall	6.54E-05	5.84E-05	5.40E-05	4.96E-05	4.54E-05	4.02E-05
Small intestine plus contents	6.67E-06	6.06E-06	5.90E-06	5.62E-06	5.27E-06	4.52E-06
Upper large intestine wall	7.94E-06	7.43E-06	7.18E-06	6.76E-06	5.91E-06	5.04E-06
Lower large intestine wall	2.06E-06	1.84E-06	1.85E-06	2.33E-06	1.54E-06	1.91E-06
Kidneys	2.27E-05	2.13E-05	1.94E-05	1.82E-05	1.63E-05	1.47E-05
Liver	1.56E-05	1.41E-05	1.29E-05	1.21E-05	1.08E-05	9.50E-06
Lungs	8.92E-06	8.21E-06	7.43E-06	6.77E-06	6.54E-06	5.20E-06
"Other tissues" (suggested for muscle)	6.32E-06⊗	6.20E-06⊗	5.71E-06⊗	5.43E-06⊗	5.17E-06⊗	4.20E-06⊗
Ovaries	1.14E-06	1.28E-06	3.50E-06	2.37E-06†	2.25E-06†	1.94E-06†
Pancreas	6.88E-04	7.29E-04	6.74E-04	6.33E-04	5.72E-04	4.58E-04
Skeleton (suggested for total endosteal cells)	4.00E-06	3.17E-06	2.86E-06	2.79E-06	2.60E-06	2.14E-06
Red marrow	7.70E-06	5.97E-06	5.34E-06	5.14E-06	4.76E-06	3.87E-06
Skin	1.57E-06	1.74E-06	1.90E-06	1.77E-06	1.69E-06	1.58E-06
Spleen	6.70E-05	6.59E-05	5.78E-05	5.34E-05	5.07E-05	3.75E-05
Testes	2.76E-07†	2.15E-07	4.28E-07†	4.50E-07†	4.61E-07†	4.48E-07†
Thymus	3.07E-06	1.83E-06	1.75E-06	2.15E-06	2.05E-06†	1.77E-06†
Thyroid	5.52E-07†	6.49E-07†	9.16E-08	7.11E-07†	7.11E-07†	6.61E-07†
Uterus	2.32E-06	2.17E-06	2.01E-06	1.87E-06	2.05E-06	1.42E-06
Total body	6.99E-06	6.74E-06	6.22E-06	5.90E-06	5.55E-06	4.53E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

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Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Skeleton (suggested for</i>						
<i>Cancellous Bone, Cortical Bone,</i>						
<i>Red Marrow, and Yellow Marrow)</i>						
Bladder wall	2.27E-11*	3.40E-11†	2.00E-08†	2.96E-07	1.51E-06	2.12E-06
Stomach wall	1.45E-07*	2.18E-07*	2.90E-07	1.06E-06	1.73E-06	2.11E-06
Small intestine plus contents	1.52E-07*	2.28E-07	5.01E-07	1.69E-06	3.09E-06	2.81E-06
Upper large intestine wall	2.12E-07*	3.17E-07	6.44E-07	1.38E-06	2.57E-06	2.56E-06
Lower large intestine wall	6.48E-07*	9.71E-07	1.84E-06	3.46E-06	4.10E-06	3.97E-06
Kidneys	3.02E-07*	4.54E-07*	6.05E-07	1.81E-06	3.26E-06	3.01E-06
Liver	1.24E-07*	1.87E-07	4.79E-07	1.67E-06	2.37E-06	2.55E-06
Lungs	1.69E-07*	2.54E-07	1.04E-06	3.20E-06	4.42E-06	3.63E-06
"Other tissues" (suggested for muscle)	3.85E-07⊗	9.43E-07⊗	1.63E-06⊗	3.06E-06⊗	3.82E-06⊗	3.66E-06⊗
Ovaries	2.12E-08*	3.18E-08†	9.03E-07†	3.85E-06†	3.20E-06	2.81E-06
Pancreas	3.91E-07*	5.87E-07*	7.83E-07†	1.39E-06	3.22E-06	2.78E-06
Skeleton (suggested for total endosteal cells)	9.34E-05	8.97E-05	8.42E-05	6.84E-05	4.10E-05	1.81E-05
Red marrow	9.42E-05	8.85E-05	8.31E-05	6.45E-05	3.77E-05	1.65E-05
Skin	4.95E-07	1.18E-06	1.85E-06	2.27E-06	2.40E-06	2.35E-06
Spleen	6.52E-07*	9.78E-07*	1.30E-06*	1.96E-06	2.76E-06	2.09E-06
Testes	1.81E-11*	2.71E-11†	2.22E-08†	8.29E-07†	1.73E-06	2.59E-06
Thymus	2.85E-07*	4.27E-07*	5.69E-07†	7.64E-07	1.87E-06	2.19E-06
Thyroid	1.32E-07*	1.98E-07	2.64E-07†	1.94E-06†	2.91E-06	2.76E-06
Uterus	9.28E-11*	1.39E-10†	4.96E-08†	1.23E-06	1.63E-06	2.11E-06
Total body	1.43E-05	1.42E-05	1.40E-05	1.28E-05	9.31E-06	5.73E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	1.68E-06	2.28E-06	1.37E-06	2.56E-06	1.87E-06	1.94E-06
Stomach wall	2.07E-06	2.02E-06	1.76E-06	1.90E-06	1.72E-06	1.48E-06
Small intestine plus contents	2.73E-06	2.77E-06	2.79E-06	2.36E-06	2.35E-06	1.98E-06
Upper large intestine wall	2.67E-06	2.40E-06	2.61E-06	2.33E-06	2.32E-06	1.77E-06
Lower large intestine wall	3.82E-06	3.24E-06	3.58E-06	3.03E-06	2.72E-06	2.54E-06
Kidneys	3.29E-06	3.12E-06	4.02E-06	3.16E-06	2.43E-06	2.32E-06
Liver	2.39E-06	2.44E-06	2.41E-06	2.30E-06	2.50E-06	2.05E-06
Lungs	3.50E-06	3.38E-06	3.29E-06	3.03E-06	3.09E-06	2.30E-06
"Other tissues" (suggested for muscle)	3.74E-06 [⊗]	3.82E-06 [⊗]	3.67E-06 [⊗]	3.54E-06 [⊗]	3.33E-06 [⊗]	2.83E-06 [⊗]
Ovaries	2.46E-06	3.75E-06	3.16E-06 [†]	2.79E-06 [†]	2.75E-06 [†]	2.22E-06 [†]
Pancreas	3.90E-06	3.11E-06	3.29E-06	3.71E-06	3.50E-06	1.59E-06
Skeleton (suggested for total endosteal cells)	1.29E-05	1.19E-05	1.11E-05	1.01E-05	9.39E-06	7.79E-06
Red marrow	1.15E-05	1.06E-05	1.01E-05	9.19E-06	8.37E-06	7.06E-06
Skin	2.63E-06	3.00E-06	2.87E-06	2.85E-06	2.62E-06	2.46E-06
Spleen	2.32E-06	2.90E-06	2.96E-06	2.02E-06	2.17E-06	1.23E-06
Testes	2.23E-06	1.98E-06	2.24E-06	2.37E-06	3.88E-06	2.13E-06
Thymus	1.65E-06	2.64E-06	2.84E-06	1.41E-06	2.17E-06 [†]	2.78E-06
Thyroid	3.31E-06	3.86E-06	1.60E-06	3.82E-06	1.82E-07	1.91E-06 [†]
Uterus	2.24E-06	1.97E-06	3.15E-06	1.98E-06	1.57E-06	1.65E-06
Total body	5.01E-06	4.93E-06	4.70E-06	4.43E-06	4.16E-06	3.50E-06

[⊗] Extrapolation from higher energy.

[†] Build-up factor method.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission.

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Skin</i>						
Bladder wall	2.14E-07*	3.20E-07*	4.27E-07	1.91E-06	1.94E-06	1.79E-06
Stomach wall	2.74E-07*	4.11E-07*	5.48E-07	2.02E-06	2.58E-06	2.06E-06
Small intestine plus contents	6.45E-08*	9.68E-08*	1.29E-07	8.64E-07	1.72E-06	1.69E-06
Upper large intestine wall	1.26E-07*	1.89E-07*	2.52E-07	1.19E-06	1.95E-06	1.83E-06
Lower large intestine wall	5.72E-08*	8.59E-08*	1.14E-07	9.04E-07	1.65E-06	1.84E-06
Kidneys	1.82E-07*	2.72E-07	1.18E-06	2.81E-06	2.91E-06	2.08E-06
Liver	4.77E-08*	7.15E-08	4.86E-07	1.78E-06	2.32E-06	2.01E-06
Lungs	8.04E-08*	1.21E-07	7.45E-07	2.54E-06	2.94E-06	2.17E-06
*Other tissues** (suggested for muscle)	4.00E-06⊗	6.06E-06⊗	6.46E-06⊗	5.41E-06⊗	3.48E-06⊗	2.60E-06⊗
Ovaries	8.61E-12	1.29E-11†	1.93E-08†	7.68E-07†	1.86E-06	1.22E-06
Pancreas	1.41E-08*	2.12E-08*	2.83E-08†	9.03E-07	1.45E-06	1.39E-06
Skeleton (suggested for total endosteal cells)	1.85E-06	4.30E-06	6.58E-06	8.80E-06	8.06E-06	4.19E-06
Red marrow	1.61E-06	3.90E-06	5.97E-06	7.98E-06	7.39E-06	4.02E-06
Skin	2.05E-04*	1.03E-04	5.57E-05	2.24E-05	8.07E-06	5.33E-06
Spleen	1.67E-07*	2.50E-07*	3.34E-07	1.57E-06	2.49E-06	2.03E-06
Testes	8.27E-07	5.82E-06	8.59E-06	9.45E-06	4.85E-06	3.04E-06
Thymus	1.88E-08*	2.82E-08†	5.47E-07	1.56E-06	2.27E-06	2.22E-06
Thyroid	1.25E-06*	1.88E-06*	2.50E-06	5.24E-06	3.33E-06	2.50E-06
Uterus	5.17E-08*	7.75E-08*	1.03E-07	6.49E-07	1.84E-06	1.61E-06
Total body	1.13E-05	9.06E-06	7.77E-06	6.17E-06	4.21E-06	2.87E-06

Target	Energy (MeV)					
	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	1.91E-06	2.16E-06	2.65E-06	2.69E-06	2.28E-06	1.50E-06
Stomach wall	1.97E-06	2.24E-06	2.23E-06	2.04E-06	1.94E-06	1.61E-06
Small intestine plus contents	1.73E-06	1.90E-06	2.01E-06	1.93E-06	1.80E-06	1.56E-06
Upper large intestine wall	1.66E-06	2.00E-06	2.25E-06	1.78E-06	1.86E-06	1.44E-06
Lower large intestine wall	1.78E-06	2.08E-06	2.25E-06	1.91E-06	2.08E-06	1.45E-06
Kidneys	2.29E-06	2.59E-06	2.60E-06	2.38E-06	2.30E-06	1.98E-06
Liver	2.02E-06	2.34E-06	2.25E-06	2.20E-06	2.21E-06	1.73E-06
Lungs	2.27E-06	2.34E-06	2.37E-06	2.33E-06	2.23E-06	1.84E-06
"Other tissues" (suggested for muscle)	2.74E-06⊗	3.14E-06⊗	3.15E-06⊗	2.96E-06⊗	2.81E-06⊗	2.37E-06⊗
Ovaries	1.77E-06	1.02E-06	2.11E-06	1.75E-06	2.10E-06	1.22E-06
Pancreas	2.07E-06	2.02E-06	1.63E-06	1.78E-06	1.87E-06	1.35E-06
Skeleton (suggested for total endosteal cells)	2.99E-06	2.93E-06	2.85E-06	2.74E-06	2.51E-06	2.18E-06
Red marrow	2.85E-06	2.72E-06	2.63E-06	2.59E-06	2.32E-06	2.06E-06
Skin	6.05E-06	6.93E-06	6.93E-06	6.38E-06	6.01E-06	4.78E-06
Spleen	2.06E-06	2.27E-06	2.67E-06	1.87E-06	1.82E-06	1.76E-06
Testes	3.82E-06	2.86E-06	3.10E-06	3.06E-06	2.97E-06	3.20E-06
Thymus	2.49E-06	2.99E-06	2.43E-06	1.94E-06	2.72E-06	2.13E-06
Thyroid	2.73E-06	2.89E-06	2.40E-06	2.31E-06	2.82E-06	2.18E-06
Uterus	1.39E-06	1.96E-06	2.58E-06	2.11E-06	1.74E-06	2.19E-06
Total body	2.81E-06	3.15E-06	3.15E-06	2.97E-06	2.81E-06	2.35E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission.

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Spleen</i>						
Bladder wall	6.70E-22*	1.00E-21†	2.23E-13†	5.34E-09†	2.28E-07†	3.15E-07
Stomach wall	8.63E-07*	1.29E-06	1.34E-05	5.33E-05	5.86E-05	4.09E-05
Small intestine plus contents	1.77E-10*	2.65E-10†	9.39E-08	1.49E-06	5.08E-06	5.60E-06
Upper large intestine wall	1.18E-10*	1.77E-10†	6.70E-08†	2.18E-06	5.92E-06	6.20E-06
Lower large intestine wall	1.82E-12*	2.73E-12†	5.78E-09†	4.55E-07	2.01E-06	2.35E-06
Kidneys	7.02E-06*	1.05E-05	3.63E-05	6.65E-05	5.30E-05	3.61E-05
Liver	7.20E-13*	1.08E-12†	4.25E-09†	5.99E-07	2.93E-06	3.78E-06
Lungs	6.50E-07*	9.76E-07	4.97E-06	1.25E-05	1.23E-05	8.97E-06
"Other tissues" (suggested for muscle)	1.18E-06⊗	3.78E-06⊗	6.79E-06⊗	9.42E-06⊗	7.63E-06⊗	5.48E-06⊗
Ovaries	9.82E-17*	1.47E-16†	7.94E-11†	8.80E-08†	1.19E-06†	1.14E-06
Pancreas	1.56E-06	4.29E-05	1.26E-04	1.87E-04	1.23E-04	7.35E-05
Skeleton (suggested for total endosteal cells)	6.83E-09	2.92E-07	1.70E-06	5.79E-06	8.30E-06	5.06E-06
Red marrow	7.07E-09	3.02E-07	1.74E-06	6.07E-06	1.05E-05	7.47E-06
Skin	7.80E-09*	1.17E-08	3.10E-08	1.54E-06	1.98E-06	1.74E-06
Spleen	5.44E-03	4.66E-03	3.59E-03	1.86E-03	7.24E-04	4.21E-04
Testes	1.22E-29*	1.83E-29†	4.62E-17†	9.74E-11†	2.09E-08†	1.42E-07†
Thymus	5.50E-20*	8.25E-20†	2.18E-12†	1.83E-08†	2.51E-07	9.39E-07
Thyroid	6.30E-27*	9.45E-27†	9.31E-16†	4.27E-10†	5.15E-08†	2.70E-07†
Uterus	7.54E-19*	1.13E-18†	9.33E-12†	4.07E-08†	6.87E-07	1.61E-06
Total body	1.43E-05	1.43E-05	1.42E-05	1.30E-05	9.47E-06	6.52E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	6.27E-07	4.52E-07	1.25E-06	8.91E-07	9.65E-07	9.26E-07†
Stomach wall	3.36E-05	3.39E-05	2.93E-05	3.14E-05	2.65E-05	2.06E-05
Small intestine plus contents	5.08E-06	4.77E-06	4.57E-06	4.67E-06	4.10E-06	3.55E-06
Upper large intestine wall	4.36E-06	4.81E-06	4.58E-06	4.63E-06	4.65E-06	3.03E-06
Lower large intestine wall	2.27E-06	2.41E-06	2.06E-06	2.11E-06	2.22E-06	1.81E-06
Kidneys	3.14E-05	2.93E-05	2.59E-05	2.55E-05	2.33E-05	1.79E-05
Liver	3.67E-06	3.69E-06	3.53E-06	3.45E-06	3.27E-06	2.82E-06
Lungs	7.91E-06	7.56E-06	6.87E-06	6.21E-06	6.38E-06	5.23E-06
"Other tissues" (suggested for muscle)	5.14E-06⊗	5.07E-06⊗	4.79E-06⊗	4.55E-06⊗	4.23E-06⊗	3.60E-06⊗
Ovaries	2.05E-06	3.70E-06	1.70E-06	2.17E-06†	3.46E-07	9.91E-08
Pancreas	6.58E-05	6.70E-05	5.80E-05	5.13E-05	4.94E-05	3.75E-05
Skeleton (suggested for total endosteal cells)	3.25E-06	2.65E-06	2.48E-06	2.36E-06	2.18E-06	1.94E-06
Red marrow	5.04E-06	3.90E-06	3.64E-06	3.35E-06	3.19E-06	2.82E-06
Skin	1.81E-06	2.18E-06	2.16E-06	2.05E-06	1.80E-06	1.66E-06
Spleen	4.32E-04	4.49E-04	4.10E-04	3.77E-04	3.55E-04	2.73E-04
Testes	2.45E-07†	3.30E-07†	3.88E-07†	4.14E-07†	4.26E-07†	4.17E-07†
Thymus	1.33E-06	1.65E-06	2.42E-06	4.14E-07	2.24E-06	1.27E-06†
Thyroid	4.16E-07†	5.10E-07†	5.68E-07†	5.83E-07†	5.88E-07†	5.58E-07†
Uterus	1.42E-06	1.61E-06	2.11E-06	6.25E-07	1.76E-06	2.23E-06
Total body	5.93E-06	5.82E-06	5.46E-06	5.16E-06	4.81E-06	4.02E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission.

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Testes</i>						
Bladder wall	5.00E-09*	7.50E-09†	2.26E-06	1.74E-05	2.51E-05	1.89E-05
Stomach wall	1.39E-25*	2.08E-25†	3.73E-15†	6.66E-10†	6.18E-08	8.57E-08
Small intestine plus contents	2.67E-18*	4.01E-18†	1.62E-11†	4.66E-08	8.04E-07	1.25E-06
Upper large intestine wall	1.35E-17*	2.03E-17†	2.75E-11†	4.78E-08†	6.70E-07	1.06E-06
Lower large intestine wall	1.30E-09*	1.95E-09†	7.90E-07	6.85E-06	1.31E-05	1.06E-05
Kidneys	4.67E-27*	7.01E-27†	9.01E-16†	4.33E-10†	3.81E-08	1.16E-07
Liver	2.58E-26*	3.87E-26†	9.61E-16†	2.74E-10†	2.73E-08	9.67E-08
Lungs	2.24E-36*	3.36E-36†	1.83E-20†	1.65E-12†	1.49E-09†	1.23E-08
"Other tissues" (suggested for muscle)	4.99E-08⊗	7.21E-07⊗	2.66E-06⊗	5.71E-06⊗	5.52E-06⊗	4.28E-06⊗
Pancreas	9.64E-30*	1.45E-29†	4.97E-17†	1.17E-10†	2.49E-08†	1.63E-07†
Skeleton (suggested for total endosteal cells)	7.33E-11*	1.10E-10⊕	2.40E-08	1.15E-06	4.36E-06	4.10E-06
Red marrow	3.24E-09*	4.86E-09*	6.49E-09	6.46E-07	3.22E-06	3.12E-06
Skin	1.47E-06	9.12E-06	1.53E-05	1.39E-05	7.51E-06	4.93E-06
Spleen	1.31E-29*	1.97E-29†	4.57E-17†	9.84E-11†	2.10E-08†	6.08E-08
Testes	2.43E-02	1.86E-02	1.23E-02	5.34E-03	1.77E-03	1.07E-03
Thymus	2.20E-24*	3.30E-24*	4.40E-24†	5.01E-14†	2.17E-10†	5.16E-09†
Thyroid	2.50E-28*	3.75E-28*	5.00E-28†	7.32E-16†	1.68E-11†	7.89E-10†
Total body	1.43E-05	1.38E-05	1.26E-05	1.00E-05	6.84E-06	5.03E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	1.70E-05	1.75E-05	1.74E-05	1.38E-05	1.35E-05	9.58E-06
Stomach wall	1.71E-07	4.07E-07	2.71E-07	4.06E-07	4.80E-07	4.52E-07
Small intestine plus contents	1.50E-06	1.85E-06	1.78E-06	1.78E-06	1.86E-06	1.58E-06
Upper large intestine wall	1.33E-06	1.10E-06	1.40E-06	1.16E-06	2.30E-06	1.42E-06
Lower large intestine wall	9.91E-06	9.83E-06	7.24E-06	7.98E-06	7.32E-06	7.40E-06
Kidneys	2.04E-07	3.51E-07	5.07E-07	5.63E-07	4.05E-07	7.27E-07
Liver	1.48E-07	1.77E-07	3.61E-07	4.16E-07	4.07E-07	3.97E-07
Lungs	4.38E-08	4.94E-08	1.01E-07	1.60E-07	1.20E-07	1.68E-07
"Other tissues" (suggested for muscle)	4.14E-06⊗	4.27E-06⊗	4.08E-06⊗	3.97E-06⊗	4.59E-06⊗	3.20E-06⊗
Pancreas	2.76E-07†	1.28E-07	3.61E-07	4.50E-07†	6.34E-07	4.48E-07†
Skeleton (suggested for total endosteal cells)	2.73E-06	2.28E-06	2.15E-06	2.00E-06	1.95E-06	1.71E-06
Red marrow	2.25E-06	1.81E-06	1.69E-06	1.51E-06	1.61E-06	1.41E-06
Skin	5.13E-06	5.48E-06	5.15E-06	5.11E-06	4.59E-06	3.93E-06
Spleen	7.38E-08	4.55E-07	2.12E-07	2.38E-07	5.73E-07	2.33E-07
Testes	1.17E-03	1.23E-03	1.16E-03	1.04E-03	9.82E-04	7.66E-04
Thymus	1.62E-08†	3.82E-08†	6.43E-08†	8.18E-08†	9.46E-08†	1.14E-07†
Thyroid	3.53E-09†	1.17E-08†	2.46E-08†	3.51E-08†	4.35E-08†	6.00E-08†
Total body	4.82E-06	4.91E-06	4.69E-06	4.47E-06	4.23E-06	3.54E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

⊕ Adjustment on density or composition.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission.

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Thyroid</i>						
Bladder wall	8.78E-25*	1.32E-24*	1.76E-24†	3.15E-14†	1.61E-10†	4.12E-09†
Stomach wall	2.07E-25*	3.11E-25†	4.50E-15†	7.26E-10†	2.01E-07	1.90E-07
Small intestine plus contents	4.58E-35*	6.87E-35†	1.08E-19†	5.26E-12†	3.49E-09†	1.97E-08
Upper large intestine wall	9.33E-35*	1.40E-34†	1.88E-19†	7.08E-12†	4.20E-09†	4.35E-08†
Lower large intestine wall	8.33E-38*	1.25E-37†	2.75E-21†	5.66E-13†	6.64E-10†	1.00E-08†
Kidneys	8.87E-30*	1.33E-29†	3.98E-17†	9.31E-11†	2.06E-08†	1.20E-07
Liver	1.26E-24*	1.90E-24†	1.16E-14†	1.19E-09†	1.93E-07	3.05E-07
Lungs	1.52E-13*	2.28E-12†	3.30E-08	1.23E-06	3.89E-06	3.67E-06
“Other tissues” (suggested for muscle)	3.35E-06⊗	8.66E-06⊗	1.19E-05⊗	1.16E-05⊗	7.22E-06⊗	4.81E-06⊗
Ovaries	2.33E-23*	3.50E-23*	4.66E-23†	2.50E-13†	5.97E-10†	1.09E-08†
Pancreas	1.24E-26*	1.86E-26†	2.08E-15†	7.80E-10†	7.98E-08†	1.91E-07
Skeleton (suggested for total endosteal cells)	1.79E-09*	2.69E-09	2.84E-07	2.99E-06	6.35E-06	4.45E-06
Red marrow	2.68E-09*	4.02E-09	3.14E-07	2.74E-06	6.46E-06	4.87E-06
Skin	5.06E-07*	7.59E-07	3.26E-06	5.35E-06	3.66E-06	2.64E-06
Spleen	6.81E-27*	1.02E-26†	9.64E-16†	4.29E-10†	1.16E-07	3.75E-07
Testes	2.48E-28*	3.72E-28*	4.96E-28†	7.32E-16†	1.67E-11†	7.87E-10†
Thymus	1.23E-09*	1.84E-09†	2.53E-07	1.13E-05	2.28E-05	1.65E-05
Thyroid	4.29E-02*	2.93E-02	1.81E-02	7.41E-03	2.42E-03	1.44E-03
Uterus	5.98E-24*	8.97E-24*	1.20E-23†	2.03E-13†	5.28E-10†	9.99E-09†
Total body	1.43E-05	1.42E-05	1.35E-05	1.08E-05	6.95E-06	4.71E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	1.35E-08†	3.30E-08†	5.71E-08†	7.36E-08†	8.56E-08†	1.05E-07†
Stomach wall	1.45E-07	4.44E-07	4.62E-07	6.42E-07	3.70E-07	5.20E-07
Small intestine plus contents	5.80E-08	2.47E-08	1.38E-07	1.91E-07	1.92E-07	2.04E-07
Upper large intestine wall	4.03E-08	3.63E-08	1.51E-07	2.29E-07	1.85E-07	3.92E-07
Lower large intestine wall	2.59E-08†	5.22E-08†	8.09E-08†	9.91E-08†	1.11E-07†	1.30E-07†
Kidneys	1.40E-07	1.69E-07	4.12E-07	5.96E-07	4.35E-07	3.09E-07
Liver	4.28E-07	5.49E-07	6.54E-07	7.28E-07	8.78E-07	7.72E-07
Lungs	3.38E-06	3.67E-06	3.83E-06	3.35E-06	3.17E-06	3.22E-06
"Other tissues" (suggested for muscle)	4.63E-06⊗	4.76-06⊗	4.45E-06⊗	4.19E-06⊗	3.94E-06⊗	3.27E-06⊗
Ovaries	3.00E-08†	6.21E-08†	9.62E-08†	1.17E-07†	1.31E-07†	1.51E-07†
Pancreas	3.98E-07	2.34E-07	1.88E-07	1.49E-06	7.11E-07	6.61E-07
Skeleton (suggested for total endosteal cells)	2.98E-06	2.61E-06	2.39E-06	2.33E-06	2.23E-06	1.97E-06
Red marrow	3.27E-06	2.89E-06	2.57E-06	2.56E-06	2.47E-06	2.11E-06
Skin	2.87E-06	2.97E-06	3.07E-06	2.96E-06	2.76E-06	2.41E-06
Spleen	4.36E-07	4.40E-07	7.21E-07	6.30E-07	4.40E-07	6.85E-07
Testes	3.52E-09†	1.17E-08†	2.46E-08†	3.51E-08†	4.36E-08†	6.00E-08†
Thymus	1.52E-05	1.52E-05	1.23E-05	1.32E-05	1.46E-05	9.37E-06
Thyroid	1.55E-03	1.66E-03	1.54E-03	1.45E-03	1.31E-03	1.05E-03
Uterus	2.80E-08†	5.89E-08†	9.19E-08†	1.12E-07†	1.27E-07†	1.46E-07†
Total body	4.42E-06	4.50E-07	4.26E-06	4.03E-06	3.78E-06	3.18E-06

* Extrapolation from higher energy.

† Build-up factor method.

⊗ Calculated by difference.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission

Specific Absorbed Fraction of Photon Energy (Continued)

Target	Energy (MeV)					
	0.010	0.015	0.020	0.030	0.050	0.100
<i>Source in Total Body</i>						
Bladder wall	1.16E-05	1.43E-05	1.84E-05	1.09E-05	1.04E-05	6.41E-06
Stomach wall	1.38E-05	1.41E-05	1.46E-05	1.14E-05	8.61E-06	5.76E-06
Small intestine plus contents	1.44E-05	1.45E-05	1.39E-05	1.34E-05	9.92E-06	7.56E-06
Upper large intestine wall	1.47E-05	1.51E-05	1.34E-05	1.36E-05	9.72E-06	7.39E-06
Lower large intestine wall	1.46E-05	1.21E-05	1.37E-05	1.26E-05	1.04E-05	6.69E-06
Kidneys	1.40E-05	1.45E-05	1.28E-05	1.06E-05	8.19E-06	6.00E-06
Liver	1.44E-05	1.42E-05	1.42E-05	1.23E-05	8.99E-06	6.23E-06
Lungs	1.32E-05	1.34E-05	1.43E-05	1.26E-05	8.40E-06	5.41E-06
"Other tissues" (suggested for muscle)	1.43E-05⊗	1.37E-05⊗	1.25E-05⊗	9.93E-06⊗	6.60E-06⊗	4.86E-06⊗
Ovaries	1.66E-05	2.47E-05	1.42E-05	1.23E-05	8.16E-06	7.01E-06
Pancreas	1.49E-05	1.43E-05	1.68E-05	1.24E-05	1.09E-05	6.65E-06
Skeleton (suggested for total endosteal cells)	1.51E-06	1.61E-05	1.82E-05	2.01E-05	1.64E-05	8.44E-06
Red marrow	1.56E-05	1.69E-05	1.95E-05	2.29E-05	1.90E-05	1.01E-05
Skin	1.14E-05	9.15E-06	7.62E-06	5.38E-06	3.49E-06	2.66E-06
Spleen	1.70E-05	1.20E-05	1.34E-05	1.26E-05	8.43E-06	6.16E-06
Testes	1.55E-05	1.27E-05	9.36E-06	8.90E-06	6.16E-06	4.36E-06
Thymus	1.37E-05	1.97E-05	2.03E-05	1.06E-05	1.02E-05	5.29E-06
Thyroid	1.97E-05	1.30E-05	1.54E-05	8.65E-06	7.45E-06	3.06E-06
Uterus	1.58E-05	1.37E-05	1.44E-05	1.23E-05	1.04E-05	7.93E-06
Total body	1.42E-05	1.38E-05	1.32E-05	1.14E-05	8.13E-06	5.41E-06

Energy (MeV)

Target	0.200	0.500	1.000	1.500	2.000	4.000
Bladder wall	6.16E-06	6.24E-06	6.78E-06	5.62E-06	4.76E-06	5.41E-06
Stomach wall	6.74E-06	6.14E-06	5.48E-06	4.09E-06	4.60E-06	3.98E-06
Small intestine plus contents	7.01E-06	6.81E-06	6.31E-06	5.85E-06	5.40E-06	4.82E-06
Upper large intestine wall	6.31E-06	6.75E-06	6.02E-06	5.34E-06	5.15E-06	4.23E-06
Lower large intestine wall	5.92E-06	6.83E-06	6.38E-06	5.89E-06	7.11E-06	4.03E-06
Kidneys	6.10E-06	6.06E-06	5.92E-06	4.88E-06	4.70E-06	3.94E-06
Liver	5.78E-06	5.99E-06	5.92E-06	5.02E-06	4.74E-06	4.28E-06
Lungs	4.97E-06	5.36E-06	4.58E-06	4.05E-06	3.85E-06	3.45E-06
"Other tissues" (suggested for muscle)	4.82E-06⊗	4.97E-06⊗	4.75E-06⊗	4.45E-06⊗	4.18E-06⊗	3.51E-06⊗
Ovaries	6.51E-06	5.84E-06	4.20E-06	6.57E-06	6.14E-06	6.47E-06
Pancreas	7.65E-06	5.95E-06	5.30E-06	4.90E-06	8.38E-06	3.84E-06
Skeleton (suggested for total endosteal cells)	5.75E-06	5.16E-06	4.69E-06	4.33E-06	4.22E-06	3.37E-06
Red marrow	6.57E-06	5.68E-06	5.17E-06	4.71E-06	4.65E-06	3.64E-06
Skin	2.81E-06	3.09E-06	3.15E-06	3.14E-06	2.81E-06	2.42E-06
Spleen	6.25E-06	6.16E-06	5.74E-06	4.66E-06	4.24E-06	3.59E-06
Testes	3.82E-06	6.49E-06	5.71E-06	4.90E-06	4.58E-06	4.31E-06
Thymus	8.53E-06	5.22E-06	4.11E-06	6.07E-06	5.03E-06	5.34E-06
Thyroid	4.35E-06	4.94E-06	5.24E-06	4.03E-06	4.12E-06	4.91E-06
Uterus	7.52E-06	5.97E-06	8.02E-06	4.98E-06	6.21E-06	5.48E-06
Total body	4.95E-06	4.97E-06	4.72E-06	4.40E-06	4.16E-06	3.48E-06

⊗ Calculated by difference.

Source: From ICRP Report No. 23, *Report of the Task Group on Reference Man*, Pergamon Press, Oxford, England, 1975. By permission.

Total Mass Attenuation Coefficients, μ/ρ , cm^2/g

Energy (MeV)

Material	0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.8	1.0	1.25	1.5	2	3	4	5	6	8	10.0
H	0.295	0.265	0.243	0.212	0.189	0.173	0.160	0.140	0.126	0.113	0.103	0.0876	0.0691	0.0572	0.0502	0.0446	0.0371	0.0321
Be	0.132	0.119	0.109	0.0945	0.0847	0.0773	0.0715	0.0628	0.0565	0.0504	0.0459	0.0394	0.0313	0.0266	0.0234	0.0211	0.0180	0.0161
C	0.149	0.134	0.122	0.106	0.0953	0.0870	0.0805	0.0707	0.0636	0.0568	0.0518	0.0444	0.0356	0.0304	0.0270	0.0245	0.0213	0.0194
N	0.150	0.134	0.123	0.106	0.0955	0.0869	0.0805	0.0707	0.0636	0.0568	0.0517	0.0445	0.0357	0.0306	0.0273	0.0249	0.0218	0.0200
O	0.151	0.134	0.123	0.107	0.0953	0.0870	0.0806	0.0708	0.0636	0.0568	0.0518	0.0445	0.0359	0.0309	0.0276	0.0254	0.0224	0.0206
Na	0.151	0.130	0.118	0.102	0.0912	0.0833	0.0770	0.0676	0.0608	0.0546	0.0496	0.0427	0.0348	0.0303	0.0274	0.0254	0.0229	0.0215
Mg	0.160	0.135	0.122	0.106	0.0944	0.0860	0.0795	0.0699	0.0627	0.0560	0.0512	0.0442	0.0360	0.0315	0.0286	0.0266	0.0242	0.0228
Al	0.161	0.134	0.120	0.103	0.0922	0.0840	0.0777	0.0683	0.0614	0.0548	0.0500	0.0432	0.0353	0.0310	0.0282	0.0264	0.0241	0.0229
Si	0.172	0.139	0.125	0.107	0.0954	0.0869	0.0802	0.0706	0.0635	0.0567	0.0517	0.0447	0.0367	0.0323	0.0296	0.0277	0.0254	0.0243
P	0.174	0.137	0.122	0.104	0.0928	0.0846	0.0780	0.0685	0.0617	0.0551	0.0502	0.0436	0.0358	0.0316	0.0290	0.0273	0.0252	0.0242
S	0.188	0.144	0.127	0.108	0.0958	0.0874	0.0806	0.0707	0.0635	0.0568	0.0519	0.0448	0.0371	0.0328	0.0302	0.0284	0.0266	0.0255
Ar	0.188	0.135	0.117	0.0977	0.0867	0.0790	0.0730	0.0638	0.0573	0.0512	0.0468	0.0407	0.0338	0.0301	0.0279	0.0266	0.0248	0.0241
K	0.215	0.149	0.127	0.106	0.0938	0.0852	0.0786	0.0689	0.0618	0.0552	0.0505	0.0438	0.0365	0.0327	0.0305	0.0289	0.0274	0.0267
Ca	0.238	0.158	0.132	0.109	0.0965	0.0876	0.0809	0.0708	0.0634	0.0566	0.0518	0.0451	0.0376	0.0338	0.0316	0.0302	0.0285	0.0280
Fe	0.344	0.183	0.138	0.106	0.0919	0.0828	0.0762	0.0664	0.0595	0.0531	0.0485	0.0424	0.0361	0.0330	0.0313	0.0304	0.0295	0.0294

Cu	0.427	0.206	0.147	0.108	0.0916	0.0820	0.0751	0.0654	0.0585	0.0521	0.0476	0.0418	0.0357	0.0330	0.0316	0.0309	0.0303	0.0305
Mo	1.03	0.389	0.225	0.130	0.0998	0.0851	0.0761	0.0648	0.0575	0.0510	0.0467	0.0414	0.0365	0.0349	0.0344	0.0344	0.0349	0.0359
Sn	1.58	0.563	0.303	0.153	0.109	0.0886	0.0776	0.0647	0.0568	0.0501	0.0459	0.0408	0.0367	0.0355	0.0355	0.0358	0.0368	0.0385
I	1.83	0.648	0.339	0.165	0.114	0.0913	0.0792	0.0653	0.0571	0.0502	0.0460	0.0409	0.0370	0.0360	0.0361	0.0365	0.0377	0.0394
W	4.21	1.44	0.708	0.293	0.174	0.125	0.101	0.0763	0.0640	0.0544	0.0492	0.0437	0.0405	0.0402	0.0409	0.0418	0.0438	0.0465
Pt	4.75	1.64	0.795	0.324	0.191	0.135	0.107	0.0800	0.0659	0.0554	0.0501	0.0445	0.0414	0.0411	0.0418	0.0427	0.0448	0.0477
Tl	5.16	1.80	0.866	0.346	0.204	0.143	0.112	0.0824	0.0675	0.0563	0.0508	0.0452	0.0420	0.0416	0.0423	0.0433	0.0454	0.0484
Pb	5.29	1.84	0.896	0.356	0.208	0.145	0.114	0.0836	0.0684	0.0569	0.0512	0.0457	0.0421	0.0420	0.0426	0.0436	0.0459	0.0489
U	1.06	2.42	1.17	0.452	0.259	0.176	0.136	0.0952	0.0757	0.0615	0.0548	0.0484	0.0445	0.0440	0.0446	0.0455	0.0479	0.0511
Air	0.151	0.134	0.123	0.106	0.0953	0.0868	0.0804	0.0706	0.0655	0.0567	0.0517	0.0445	0.0357	0.0307	0.0274	0.0250	0.0220	0.0202
NaI	1.57	0.568	0.305	0.155	0.111	0.0901	0.0789	0.0657	0.0577	0.0508	0.0465	0.0412	0.0367	0.0351	0.0347	0.0347	0.0354	0.0366
H ₂ O	0.167	0.149	0.136	0.118	0.106	0.0966	0.0896	0.0786	0.0706	0.0630	0.0575	0.0493	0.0396	0.0339	0.0301	0.0275	0.0240	0.0219
Concrete*	0.169	0.139	0.124	0.107	0.0954	0.0870	0.0804	0.0706	0.0635	0.0567	0.0517	0.0445	0.0363	0.0317	0.0287	0.0268	0.0243	0.0229
Tissue†	0.163	0.144	0.132	0.115	0.100	0.0936	0.0867	0.0761	0.0683	0.0600	0.0556	0.0478	0.0384	0.0329	0.0292	0.0267	0.0233	0.0212

*Ordinary concrete: 0.56 percent H, 49.5 percent O, 31.35 percent Si, 4.56 percent Al, 8.26 percent Ca, 1.22 percent Fe, 0.24 percent Mg, 1.71 percent Na, 1.92 percent K, 0.12 percent S by weight.

†Tissue is material of the average composition of man.

Source: Etherington, H. (ed) *Nuclear Engineering Handbook*, McGraw-Hill, New York, 1958. By permission.

Mass Energy Absorption Coefficients, μ_a/ρ , cm²/g

Energy (MeV)

Material	0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.8	1.0	1.25	1.5	2	3	4	5	6	8	10.0
H	0.0411	0.0487	0.0531	0.0575	0.0589	0.0591	0.0590	0.0575	0.0557	0.0533	0.0509	0.0467	0.0401	0.0354	0.0318	0.0291	0.0252	0.0255
Be	0.0183	0.0217	0.0237	0.0256	0.0263	0.0264	0.0263	0.0256	0.0248	0.0237	0.0227	0.0210	0.0183	0.0164	0.0151	0.0141	0.0127	0.0118
C	0.0215	0.0246	0.0267	0.0288	0.0296	0.0297	0.0296	0.0289	0.0280	0.0268	0.0256	0.0237	0.0209	0.0190	0.0177	0.0166	0.0153	0.0145
N	0.0224	0.0249	0.0267	0.0288	0.0296	0.0297	0.0296	0.0289	0.0280	0.0268	0.0256	0.0238	0.0211	0.0193	0.0180	0.0171	0.0158	0.0151
O	0.0233	0.0252	0.0271	0.0289	0.0296	0.0297	0.0296	0.0289	0.0280	0.0268	0.0257	0.0238	0.0212	0.0195	0.0183	0.0175	0.0163	0.0157
Na	0.0289	0.0258	0.0266	0.0279	0.0283	0.0284	0.0284	0.0276	0.0268	0.0257	0.0246	0.0229	0.0207	0.0194	0.0185	0.0179	0.0171	0.0168
Mg	0.0335	0.0276	0.0278	0.0290	0.0294	0.0293	0.0292	0.0285	0.0276	0.0265	0.0254	0.0237	0.0215	0.0203	0.0194	0.0188	0.0182	0.0180
Al	0.0373	0.0283	0.0275	0.0283	0.0287	0.0286	0.0286	0.0278	0.0270	0.0259	0.0248	0.0232	0.0212	0.0200	0.0192	0.0188	0.0183	0.0182
Si	0.0435	0.0300	0.0286	0.0291	0.0293	0.0290	0.0290	0.0282	0.0274	0.0263	0.0252	0.0236	0.0217	0.0206	0.0198	0.0194	0.0190	0.0189
P	0.0501	0.0315	0.0292	0.0289	0.0290	0.0290	0.0287	0.0280	0.0271	0.0260	0.0250	0.0234	0.0216	0.0206	0.0200	0.0197	0.0194	0.0195
S	0.0601	0.0351	0.0310	0.0301	0.0301	0.0300	0.0298	0.0288	0.0279	0.0268	0.0258	0.0242	0.0224	0.0215	0.0209	0.0206	0.0206	0.0206
Ar	0.0729	0.0368	0.0302	0.0278	0.0274	0.0272	0.0270	0.0260	0.0252	0.0242	0.0233	0.0220	0.0206	0.0199	0.0195	0.0195	0.0194	0.0197
K	0.0909	0.0433	0.0340	0.0304	0.0298	0.0295	0.0291	0.0282	0.0272	0.0261	0.0251	0.0237	0.0222	0.0217	0.0214	0.0212	0.0215	0.0219
Ca	0.111	0.0489	0.0367	0.0318	0.0309	0.0304	0.0300	0.0290	0.0279	0.0268	0.0258	0.0244	0.0230	0.0225	0.0222	0.0223	0.0225	0.0231
Fe	0.225	0.0810	0.0489	0.0340	0.0307	0.0294	0.0287	0.0274	0.0261	0.0250	0.0242	0.0231	0.0224	0.0224	0.0222	0.0231	0.0239	0.0250

Cu	0.310	0.107	0.0594	0.0368	0.0316	0.0296	0.0286	0.0271	0.0260	0.0247	0.0237	0.0229	0.0223	0.0227	0.0231	0.0237	0.0248	0.0261
Mn	0.922	0.294	0.141	0.0617	0.0422	0.0348	0.0315	0.0281	0.0263	0.0248	0.0239	0.0233	0.0237	0.0250	0.0262	0.0274	0.0296	0.0316
Sn	1.469	0.471	0.222	0.0873	0.0534	0.0403	0.0346	0.0294	0.0268	0.0248	0.0239	0.0233	0.0243	0.0259	0.0276	0.0291	0.0316	0.0339
I	1.726	0.557	0.260	0.100	0.0589	0.0433	0.0366	0.0303	0.0274	0.0252	0.0241	0.0236	0.0247	0.0265	0.0283	0.0299	0.0327	0.0353
W	4.112	1.356	0.631	0.230	0.121	0.0786	0.0599	0.0426	0.0353	0.0302	0.0281	0.0271	0.0287	0.0311	0.0335	0.0355	0.0390	0.0426
Pt	4.645	1.556	0.719	0.262	0.138	0.0892	0.0666	0.0465	0.0375	0.0315	0.0293	0.0280	0.0296	0.0320	0.0343	0.0365	0.0400	0.0438
Tl	5.057	1.717	0.791	0.285	0.152	0.0972	0.0718	0.0491	0.0393	0.0326	0.0301	0.0288	0.0304	0.0326	0.0349	0.0354	0.0406	0.0446
Pb	5.193	1.753	0.821	0.294	0.156	0.0994	0.0738	0.0505	0.0402	0.0332	0.0306	0.0293	0.0305	0.0330	0.0352	0.0373	0.0412	0.0450
U	0.963	2.337	1.096	0.392	0.208	0.132	0.0968	0.0628	0.0482	0.0383	0.0346	0.0324	0.0332	0.0352	0.0374	0.0394	0.0443	0.0474
Air	0.0233	0.0251	0.0268	0.0288	0.0296	0.0297	0.0296	0.0289	0.0280	0.0268	0.0256	0.0238	0.0211	0.0194	0.0181	0.0172	0.0160	0.0153
NaI	1.466	0.476	0.224	0.0889	0.0542	0.0410	0.0354	0.0299	0.0273	0.0253	0.0242	0.0235	0.0241	0.0254	0.0268	0.0281	0.0303	0.0325
H ₂ O	0.0253	0.0278	0.0300	0.0321	0.0328	0.0330	0.0329	0.0321	0.0311	0.0298	0.0285	0.0264	0.0233	0.0213	0.0198	0.0188	0.0173	0.0165
Concrete*	0.0416	0.0300	0.0289	0.0294	0.0297	0.0296	0.0295	0.0287	0.0278	0.0272	0.0256	0.0239	0.0216	0.0203	0.0194	0.0188	0.0180	0.0177
Tissue†	0.0271	0.0282	0.0293	0.0312	0.0317	0.0320	0.0319	0.0311	0.0300	0.0288	0.0276	0.0256	0.0220	0.0206	0.0192	0.0182	0.0168	0.0160

*Ordinary concrete: 0.56 per cent H, 49.5 per cent O, 31.35 per cent Si, 4.56 per cent Al, 8.26 per cent Ca, 1.22 per cent Fe, 0.24 per cent Mg, 1.71 per cent Na, 1.92 per cent K, 0.12 per cent S by weight.

†Tissue is material of the average composition of man.

Source: Etherington, H. (ed) Nuclear Engineering Handbook, McGraw-Hill, New York, 1958. By permission.