AAPM TG-43U1 Consensus Brachytherapy Dosimetry Datasets

The following tables are adapted from Rivard *et al*., Med. Phys. 31, 633-674 (2004).

Data for sources that are no longer available have been removed, and typographical errors in data have been corrected as described in Rivard *et al*., Med. Phys. 31, 3532-3533 (2004).

Table I. NIST standard WAFAC calibration dates for air kerma strength for each manufacturer, and dose rate constant values. Note that for a given source type, the % change in Λ from the 1999 value is different for different seed models.

Manufacturer and source type		NIST date used by ADCL and NIST as standard	$_{CONSENSUS}\Lambda$ [cGy · h^{-1} · U^{-1}]	% difference in Λ from 1999 value
Amersham 6702	^{125}I	April 15, 1998	1.036	N/A
Amersham 6711	^{125}I	April 15, 1998	0.965	N/A
Best Medical 2301	^{125}I	August 18, 2000	1.018	+3.3%
NASI MED3631-A/M	^{125}I	June 30, 2001	1.036	+1.0%
Bebig/Theragenics 125.SO6	^{125}I	January 27, 2001	1.012	+2.2%
Theragenics 200	^{103}Pd	July 8, 2000	0.686	+4.0%
NASI MED3633	^{103}Pd	April 23, 2001	0.688	+4.3%

Table II. Consensus g(r) values for five ^{125}I sources (Imagyn 125I is no longer available).

	Line source approximation					Point source approximation				
r [cm]	Amersham 6702 L = 3.0 mm	Amersham 6711 L = 3.0 mm	Best 2301 L = 4.0 mm	NASI MED3631-A/M L = 4.2 mm	Bebig I25.SO6 L = 3.5 mm	Amersham 6702	Amersham 6711	Best 2301	NASI MED3631-A/M	Bebig I25.SO6
0.10	1.020	1.055	1.033		*1.010*	0.673	0.696	0.579		
0.15	**1.022**	1.078	1.029		**1.018**	**0.809**	0.853	0.725		**0.760**
0.25	**1.024**	1.082	1.027	*0.998*	*1.030*	**0.929**	0.982	0.878	*0.842*	0.908
0.50	1.030	1.071	1.028	*1.025*	*1.030*	1.008	1.048	0.991	*0.985*	1.001
0.75	1.020	**1.042**	1.030	*1.019*	**1.020**	1.014	**1.036**	1.020	*1.008*	1.012
1.00	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.50	0.935	0.908	0.938	0.954	0.937	0.939	0.912	0.945	0.962	0.942
2.00	0.861	0.814	0.866	0.836	0.857	0.866	0.819	0.875	0.845	0.863
3.00	0.697	0.632	0.707	0.676	0.689	0.702	0.636	0.715	0.685	0.695
4.00	0.553	0.496	0.555	0.523	0.538	0.557	0.499	0.562	0.530	0.543
5.00	0.425	0.364	0.427	0.395	0.409	0.428	0.367	0.432	0.401	0.413
6.00	0.322	0.270	0.320	0.293	0.313	0.324	0.272	0.324	0.297	0.316
7.00	0.241	0.199	0.248	0.211	0.232	0.243	0.200	0.251	0.214	0.234
8.00	0.179	0.148	0.187		0.176	0.180	0.149	0.189		0.178
9.00	0.134	0.109	0.142		0.134	0.135	0.110	0.144		0.135
10.00	0.0979	0.0803	0.103		0.0957	0.0986	0.0810	0.104		0.0967

Interpolated data are **boldface**, and *italicized* data are non-consensus data obtained from candidate datasets.

Table III. Consensus g(r) values for two ^{103}Pd sources.

r [cm]	Line source approximation		Point source approximation	
	Theragenics 200 L = 4.23 mm	NASI MED3633 L = 4.20 mm	Theragenics 200	NASI MED3633
0.10	0.911		0.494	
0.15	1.21		0.831	
0.25	1.37	*1.331*	1.154	*1.123*
0.30	1.38	*1.322*	1.220	*1.170*
0.40	1.36	*1.286*	1.269	*1.201*
0.50	1.30	1.243	1.248	*1.194*
0.75	**1.15**	1.125	**1.137**	*1.113*
1.00	1.000	1.000	1.000	1.000
1.50	0.749	0.770	0.755	0.776
2.00	0.555	0.583	0.561	0.589
2.50	0.410	0.438	0.415	0.443
3.00	0.302	0.325	0.306	0.329
3.50	**0.223**	0.241	**0.226**	0.244
4.00	0.163	0.177	0.165	0.179
5.00	0.0887	0.098	0.0900	0.099
6.00	0.0482	0.053	0.0489	0.054
7.00	**0.0262**	0.028	**0.0266**	0.028
10.00	0.00615		0.00624	

Interpolated data are **boldface**, and *italicized* data are non-consensus data obtained from candidate datasets.

Table IV. F(r,θ) for Amersham model 6702.

Polar angle θ (degrees)	r [cm]					
	0.5	1	2	3	4	5
0	0.385	0.420	0.493	0.533	0.569	0.589
5	0.413	0.472	0.546	0.586	0.613	0.631
10	0.531	0.584	0.630	0.660	0.681	0.697
15	0.700	0.700	0.719	0.738	0.749	0.758
20	0.788	0.789	0.793	0.805	0.810	0.814
30	0.892	0.888	0.888	0.891	0.892	0.892
40	0.949	0.948	0.944	0.944	0.944	0.944
50	0.977	0.973	0.967	0.967	0.967	0.967
60	0.989	0.985	0.983	0.983	0.983	0.983
70	0.996	0.992	0.990	0.990	0.990	0.990
80	1.000	0.998	0.998	0.998	0.998	0.998
$\phi_{an}(r)$	0.986	0.960	0.952	0.951	0.954	0.954

Table V. F(r,θ) for Amersham model 6711.

Polar angle θ (degrees)	r [cm]					
	0.5	1	2	3	4	5
0	0.333	0.370	0.442	0.488	0.520	0.550
5	0.400	0.429	0.497	0.535	0.561	0.587
10	0.519	0.537	0.580	0.609	0.630	0.645
20	0.716	0.705	0.727	0.743	0.752	0.760
30	0.846	0.834	0.842	0.846	0.848	0.852
40	0.926	0.925	0.926	0.926	0.928	0.928
50	0.972	0.972	0.970	0.969	0.969	0.969
60	0.991	0.991	0.987	0.987	0.987	0.987
70	0.996	0.996	0.996	0.995	0.995	0.995
80	1.000	1.000	1.000	0.999	0.999	0.999
$\phi_{an}(r)$	0.973	0.944	0.941	0.942	0.943	0.944

Table VI. F(r,θ) for Best Medical model 2301.

Polar angle θ (degrees)	r [cm]						
	1	2	3	4	5	6	7
0	0.867	0.854	0.922	0.902	0.894	0.893	0.858
5	0.724	0.720	0.726	0.738	0.753	0.771	0.800
10	0.653	0.671	0.699	0.727	0.732	0.764	0.782
20	0.785	0.794	0.809	0.814	0.825	0.852	0.821
30	0.900	0.890	0.885	0.892	0.899	0.915	0.873
40	0.982	0.954	0.947	0.939	0.943	0.976	0.937
50	1.014	0.992	0.985	0.991	0.997	0.989	0.961
60	1.030	1.010	1.009	1.007	1.010	1.019	1.002
70	1.036	1.026	1.016	1.023	1.011	1.035	1.010
80	1.010	1.030	1.019	1.017	1.010	1.020	1.005
$\phi_{an}(r)$	0.986	0.976	0.968	0.971	0.969	0.991	0.969

Table VII. F(r,θ) for NASI model MED3631-A/M.

Polar angle θ (degrees)	r [cm]					
	0.25	0.5	1	2	5	10
0	0.770	0.658	0.699	0.666	0.718	0.771
10	0.786	0.672	0.655	0.674	0.727	0.758
20	0.805	0.734	0.739	0.762	0.794	0.815
30	0.875	0.833	0.840	0.851	0.870	0.878
40	0.910	0.895	0.901	0.908	0.918	0.914
50	0.946	0.939	0.947	0.949	0.957	0.955
60	0.967	0.970	0.974	0.975	0.983	0.973
70	0.987	0.988	0.992	0.990	0.993	0.990
80	0.998	0.999	1.003	0.996	0.999	0.999
$\phi_{an}(r)$	1.288	1.008	0.952	0.945	0.948	0.948

Table VIII. F(r,θ) for Bebig/Theragenics Corporation model I25.S06.

Polar angle θ (degrees)	r [cm]							
	0.25	*0.5*	1	2	3	4	*5*	*7*
0	*0.302*	*0.429*	0.512	0.579	0.610	0.631	*0.649*	*0.684*
5	*0.352*	*0.436*	0.509	0.576	0.610	0.635	*0.651*	*0.689*
10	*0.440*	*0.476*	0.557	0.622	0.651	0.672	*0.689*	*0.721*
20	*0.746*	*0.686*	0.721	0.757	0.771	0.785	*0.790*	*0.807*
30	*0.886*	*0.820*	0.828	0.846	0.857	0.862	*0.867*	*0.874*
40	*0.943*	*0.897*	0.898	0.907	0.908	0.913	*0.918*	*0.912*
50	*0.969*	*0.946*	0.942	0.947	0.944	0.947	*0.949*	*0.946*
60	*0.984*	*0.974*	0.970	0.974	0.967	0.966	*0.967*	*0.976*
70	*0.994*	*0.989*	0.988	0.990	0.984	0.985	*0.987*	*0.994*
80	*0.998*	*0.998*	0.998	1.000	0.994	1.000	*0.993*	*0.999*
$\phi_{an}(r)$	*1.122*	*0.968*	0.939	0.939	0.938	0.940	*0.941*	*0.949*

Italicized data are non-consensus data obtained from candidate datasets.

Table X. F(r,θ) for Theragenics Corporation model 200.

Polar angle θ (degrees)	r (cm)								
	0.25	*0.5*	0.75	1	2	3	4	5	*7.5*
0	*0.619*	*0.694*	*0.601*	0.541	0.526	0.504	0.497	0.513	*0.547*
1	*0.617*	*0.689*	*0.597*	0.549	0.492	0.505	0.513	0.533	*0.580*
2	*0.618*	*0.674*	*0.574*	0.534	0.514	0.517	0.524	0.538	*0.568*
3	*0.620*	*0.642*	*0.577*	0.538	0.506	0.509	0.519	0.532	*0.570*
5	*0.617*	*0.600*	*0.540*	0.510	0.499	0.508	0.514	0.531	*0.571*
7	*0.579*	*0.553*	*0.519*	0.498	0.498	0.509	0.521	0.532	*0.568*
10	*0.284*	*0.496*	*0.495*	0.487	0.504	0.519	0.530	0.544	*0.590*
12	*0.191*	*0.466*	*0.486*	0.487	0.512	0.529	0.544	0.555	*0.614*
15	*0.289*	*0.446*	*0.482*	0.490	0.523	0.540	0.556	0.567	*0.614*
20	*0.496*	*0.442*	*0.486*	0.501	0.547	0.568	0.585	0.605	*0.642*
25	*0.655*	*0.497*	*0.524*	0.537	0.582	0.603	0.621	0.640	*0.684*
30	*0.775*	*0.586*	*0.585*	0.593	0.633	0.654	0.667	0.683	*0.719*
40	*0.917*	*0.734*	*0.726*	0.727	0.750	0.766	0.778	0.784	*0.820*
50	*0.945*	*0.837*	*0.831*	0.834	0.853	0.869	0.881	0.886	*0.912*
60	*0.976*	*0.906*	*0.907*	0.912	0.931	0.942	0.960	0.964	*0.974*
70	*0.981*	*0.929*	*0.954*	0.964	0.989	1.001	1.008	1.004	*1.011*
75	*0.947*	*0.938*	*0.961*	0.978	1.006	1.021	1.029	1.024	*1.033*
80	*0.992*	*0.955*	*0.959*	0.972	1.017	1.035	1.046	1.037	*1.043*
85	*1.007*	*0.973*	*0.960*	0.982	0.998	1.030	1.041	1.036	*1.043*
$\phi_{an}(r)$	*1.130*	*0.880*	*0.859*	0.855	0.870	0.884	0.895	0.897	*0.918*

Italicized data are non-consensus data obtained from candidate datasets.

Table XI. F(r,θ) for NASI model MED3633.

Polar angle θ (degrees)	r [cm]					
	0.25	0.5	1	2	5	10
0	0.807	0.650	0.564	0.589	0.609	0.732
10	0.692	0.548	0.526	0.533	0.569	0.641
20	0.721	0.596	0.593	0.611	0.651	0.715
30	0.827	0.726	0.722	0.732	0.755	0.786
40	0.897	0.823	0.817	0.823	0.837	0.853
50	0.935	0.887	0.888	0.890	0.900	0.906
60	0.964	0.936	0.940	0.940	0.948	0.939
70	0.991	0.974	0.973	0.973	0.980	0.975
80	1.002	0.994	0.997	0.994	1.001	0.987
$\phi_{an}(r)$	1.257	0.962	0.903	0.895	0.898	0.917

Table XV. Dose rates (cGy · h^{-1} · U^{-1}) as a function of distance for 7 brachytherapy sources using the 1-D dosimetry formalism of **Eq. (11)** with interpolation for $g_L(r)$ and $\phi_{an}(r)$.

r (cm)	Amersham model 6702	Amersham model 6711	Best model 2301	NASI model MED3631-A/M	Bebig model I25.SO6	Theragenics model 200	NASI model MED3633
0.5	4.119	3.937	3.978	4.112	3.922	3.014	3.184
1.0	0.995	0.911	1.004	0.986	0.950	0.587	0.626
1.5	0.413	0.368	0.419	0.420	0.398	0.199	0.215
2.0	0.213	0.186	0.217	0.207	0.205	0.0837	0.0914
3.0	0.0768	0.0643	0.0783	0.0746	0.0733	0.0206	0.0227
4.0	0.0344	0.0284	0.0347	0.0325	0.0323	0.00634	0.00697
5.0	0.0169	0.0134	0.0171	0.0157	0.0157	0.00221	0.00247
6.0	0.00890	0.00688	0.00908	0.00811	0.00840	0.000846	0.000933
7.0	0.00490	0.00373	0.00506	0.00429	0.00459	0.000342	0.000364