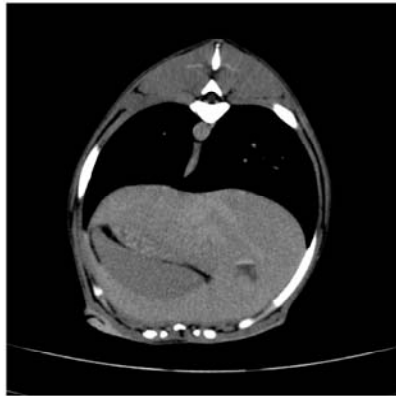


## Captions of Supplemental Figures

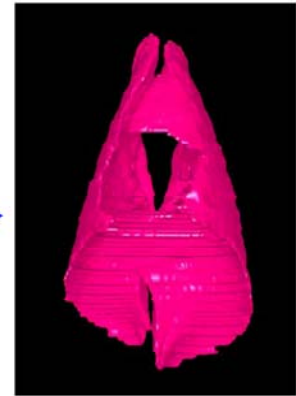
- Figure S1.** Creation of a polygon-mesh model of the canine lungs within *3D Doctor™*.
- Figure S2.** Creation of a NURBS surface model of the canine lungs within *Rhinoceros™*.
- Figure S3.** Construction of a NURBS-pipe model of the canine small intestine and colon.
- Figure S4.** The rib cages as seen in its polygon-mesh model (A) and its NURBS surface model (B).
- Figure S5.** Original bladder versus reduced bladder in the canine phantom.
- Figure S6.** Graphical comparison of individual organ masses in the UF canine phantom, the ORNL 5-year human phantom, and the ORNL 10-year human phantom.
- Figure S7.** Specific absorbed fractions to various target tissues in the UF canine, ORNL 5-year, and ORNL 10-year phantoms for photon sources in (A) the skeleton, (B) liver, (C) spleen, and (D) kidneys.
- Figure S8.** Selected values of electron absorbed fraction for organ self-irradiation in the UF canine phantom.



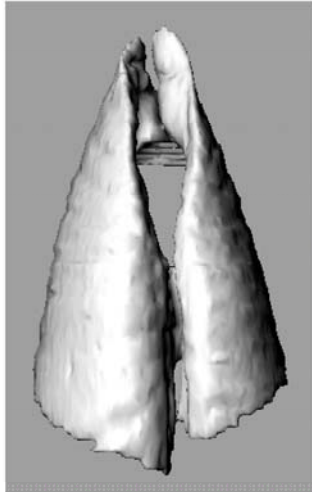
*Original CT image*



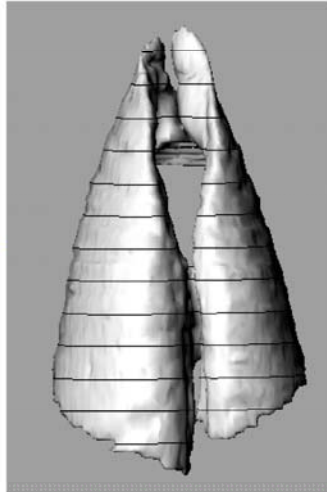
*Segmented CT image*



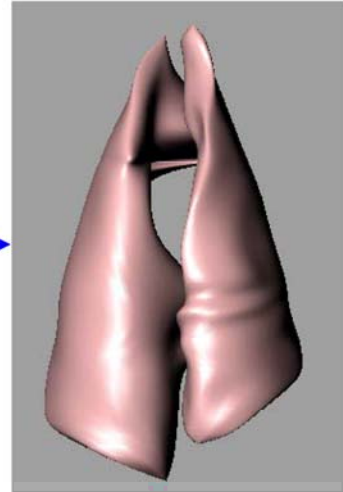
*Polygon-mesh surface*



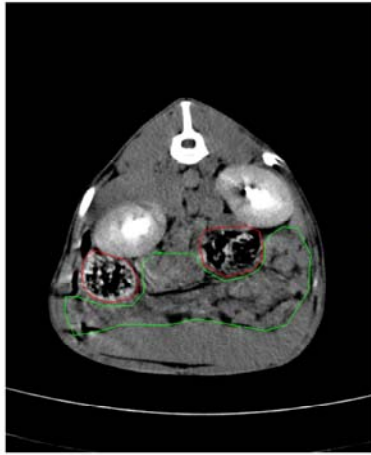
*Polygon-mesh lung model*



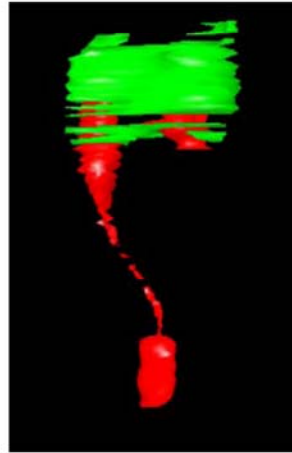
*Lung contours*



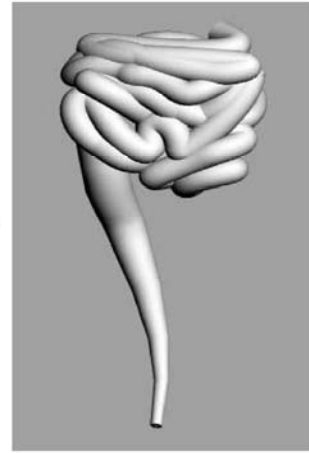
*NURBS lung model*



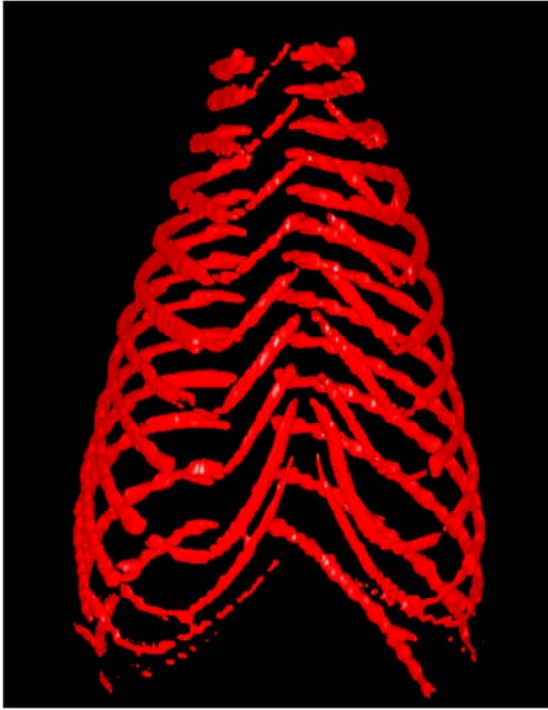
*Intestinal Area Segmentation*



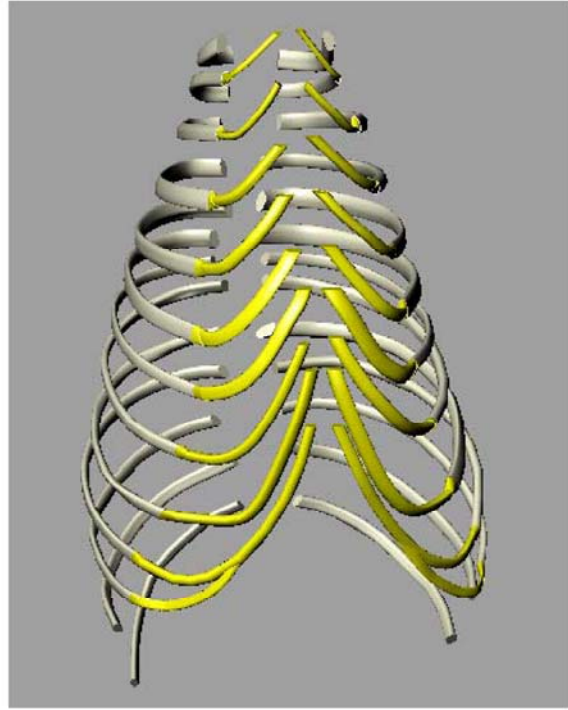
*Intestines within 3D Doctor*



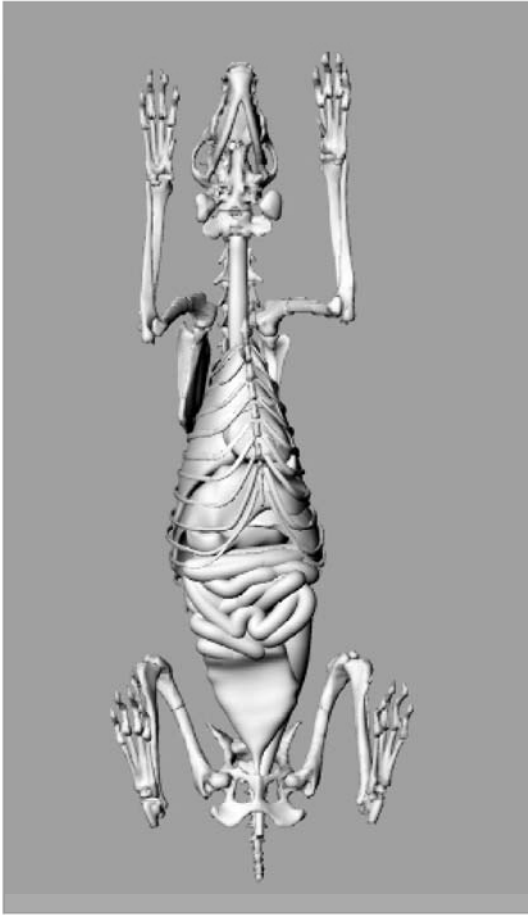
*Intestines within Rhinoceros*



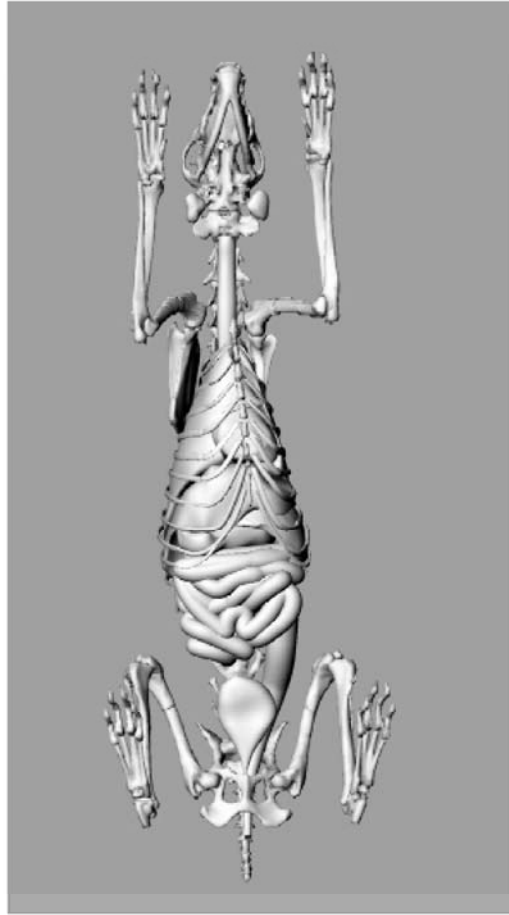
*Polygon-mesh model of the ribs*



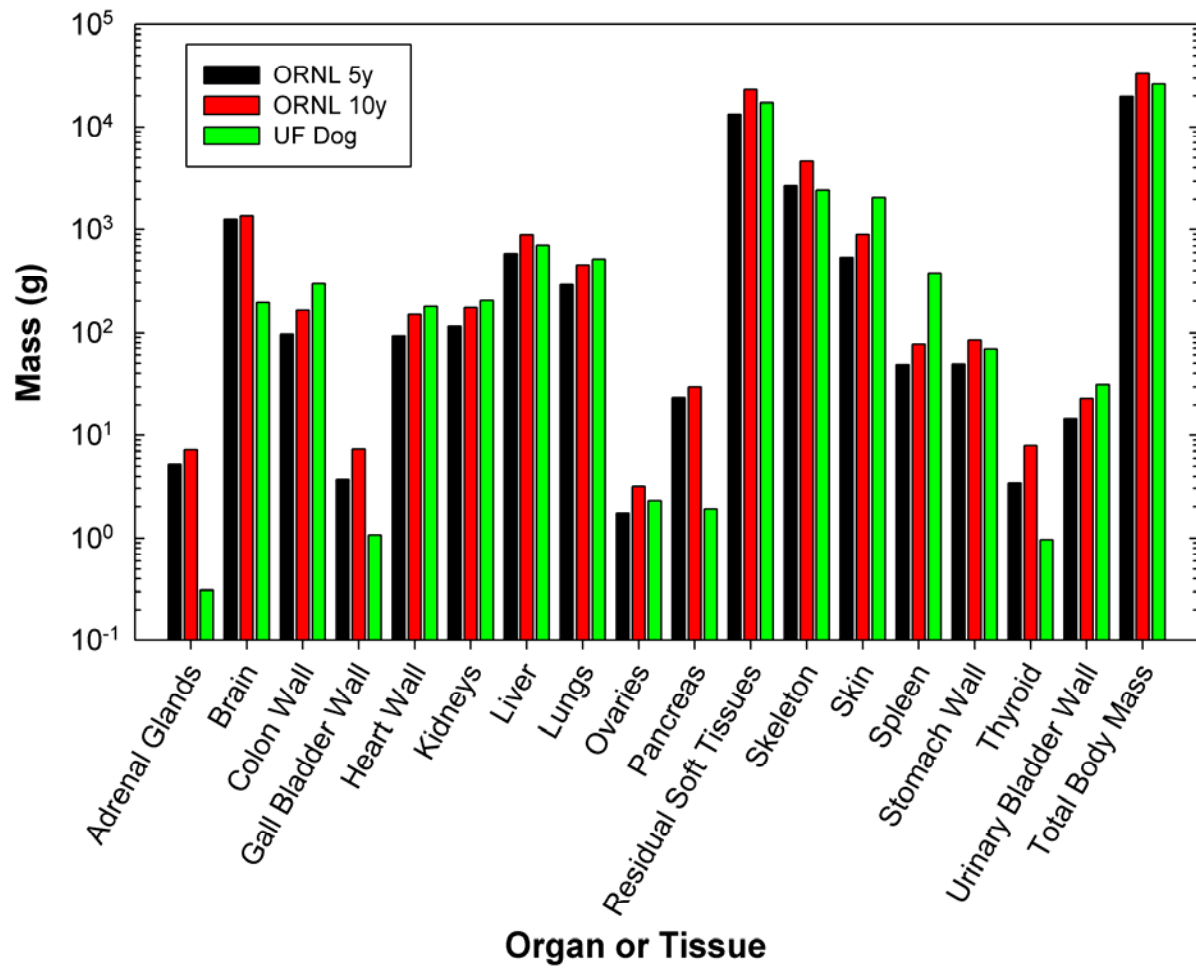
*NURBS surface model of the ribs*

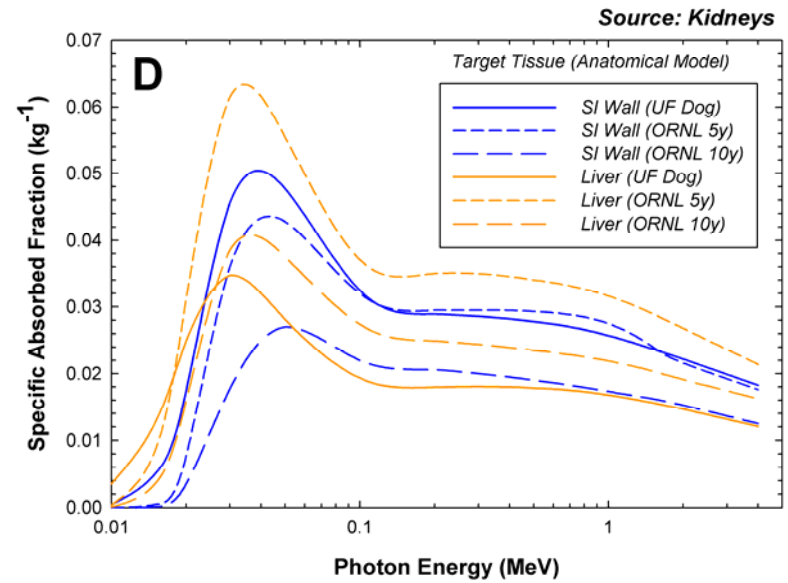
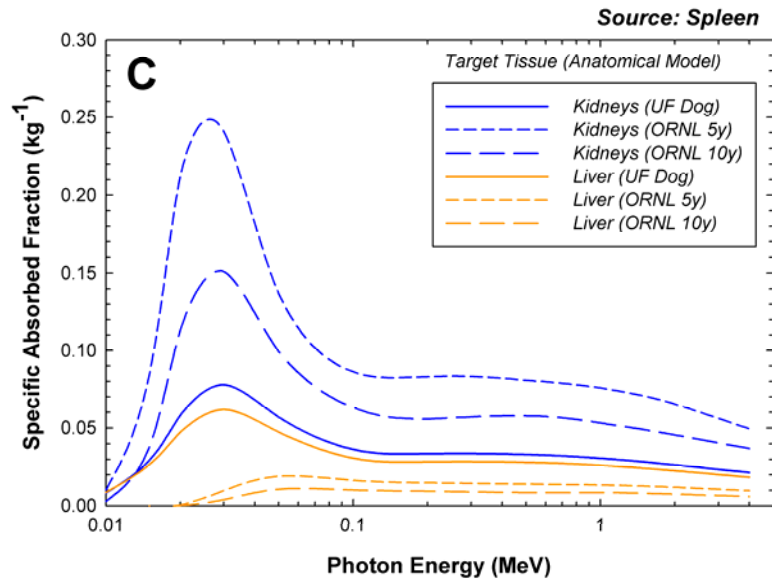
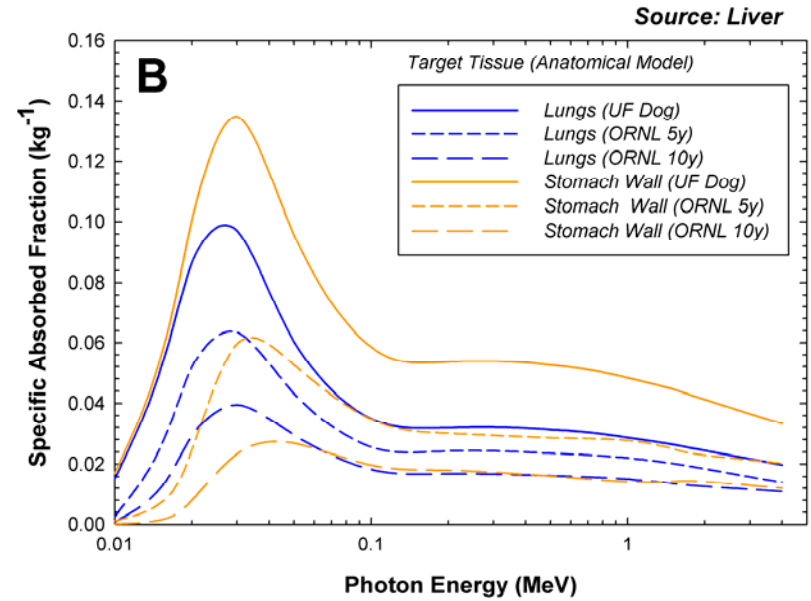
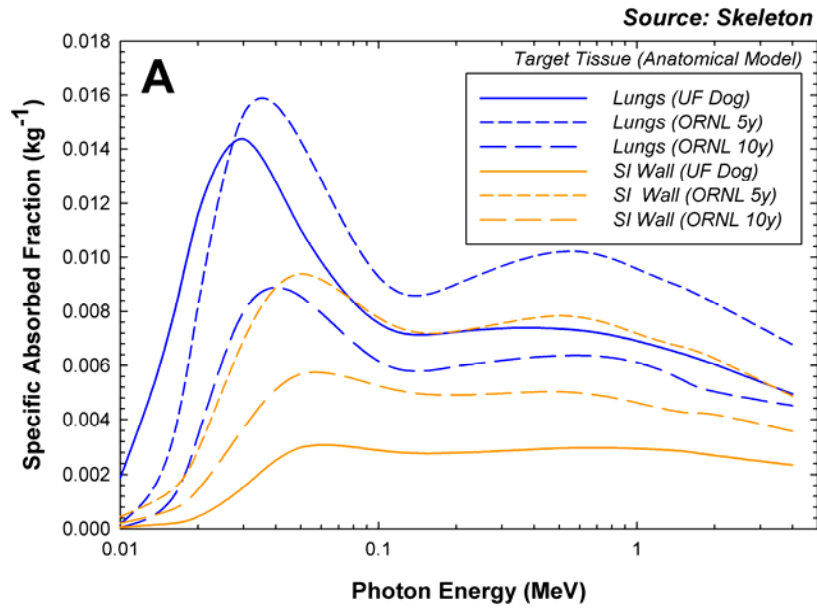


*Original model of urinary bladder*

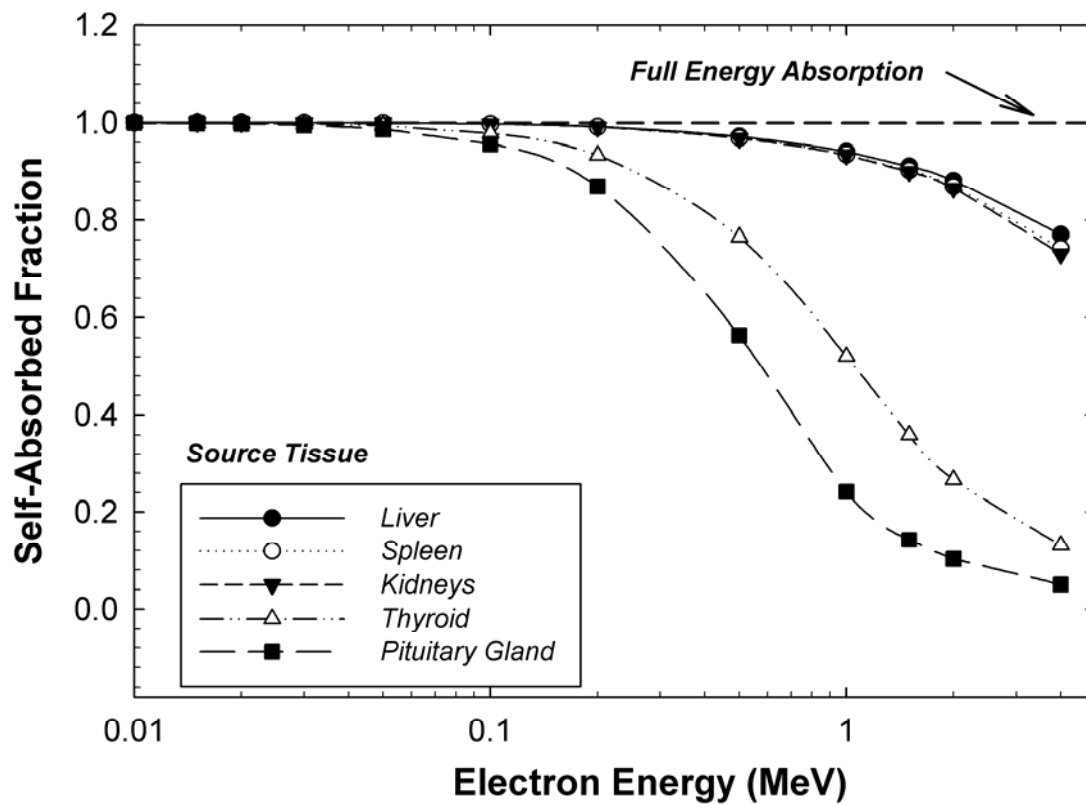


*Revised model of urinary bladder*









**Supplemental Table S1.** Segmented organs and their volumes and masses within the hybrid-voxel UF canine model.

Organ System	Density (g / cm <sup>3</sup> )	Organ Volume (cm <sup>3</sup> )	Organ Mass (g)	Organ System	Density (g / cm <sup>3</sup> )	Organ Volume (cm <sup>3</sup> )	Organ Mass (g)
<b>Respiratory System</b>				<b>Skeletal System</b>			
Trachea - wall	1.04	37.51	39.01	Cranium	1.40	174.20	243.88
Lung (Left)	0.296	630.81	186.72	Mandible	1.40	82.11	114.96
Lung (Right)	0.296	1119.54	331.38	Scapulae	1.40	99.50	139.29
<b>Totals:</b>		<b>1787.86</b>	<b>557.11</b>	Sternum	1.40	12.90	18.07
<b>Alimentary System</b>				Ribs	1.40	113.77	159.28
Salivary glands	1.04	30.36	31.57	Coastal cartilage	1.40	37.95	53.13
Esophagus - wall	1.04	11.11	11.56	Vertebrae (cervical)	1.40	118.80	166.32
Stomach - wall	1.04	66.02	68.66	Vertebrae (thoracic)	1.40	129.84	181.78
Stomach - contents	1.04	316.24	328.89	Vertebrae (lumbar)	1.40	129.15	180.81
Small Intestine - wall	1.04	176.78	183.85	Sacrum	1.40	24.69	34.56
Small Intestine - contents	1.04	494.64	514.43	Vertebrae (caudal)	1.40	26.82	37.55
Colon - wall	1.04	180.26	187.47	Os Coxae	1.40	105.19	147.27
Colon - contents	1.04	296.79	308.66	Femur - upper half	1.40	80.56	112.78
Liver	1.04	680.58	707.80	Femur - lower half	1.40	82.40	115.36
Gall Bladder - wall	1.04	1.01	1.05	Tibiae	1.40	112.44	157.42
Gall Bladder - contents	1.04	5.98	6.22	Fibulae	1.40	8.46	11.85
Pancreas	1.04	1.83	1.91	Hind paw bones	1.40	53.29	74.60
<b>Totals:</b>		<b>2261.61</b>	<b>2352.07</b>	Humerus - upper half	1.40	72.22	101.11
<b>Circulatory System</b>				Humerus - lower half	1.40	73.02	102.22
Heart - wall	1.04	170.97	177.81	Radii	1.40	62.81	87.93
Heart - content	1.04	236.85	246.32	Ulnae	1.40	53.66	75.13
<b>Totals:</b>		<b>407.82</b>	<b>424.13</b>	Front paw bones	1.40	97.79	136.91
<b>Urogenital System</b>				<b>Totals:</b>		<b>1751.58</b>	<b>2452.22</b>
Kidney (Left)	1.04	98.05	101.97	<b>Additional Tissues</b>			
Kidney (Right)	1.04	96.92	100.80	Air passages	0.0012	64.78	0.08
Urinary Bladder - wall	1.04	30.09	31.29	Adrenal Gland (Left)	1.04	0.18	0.19
Urinary Bladder - contents	1.04	97.54	101.44	Adrenal Gland (Right)	1.04	0.11	0.12
Ovary (Left)	1.04	1.384	1.44	Brain	1.04	82.83	86.15
Ovary (Right)	1.04	0.59	0.62	Eyes	1.04	9.36	9.73
Uterus	1.04	3.976	4.14	Pituitary gland	1.04	0.016	0.02
<b>Totals:</b>		<b>328.54</b>	<b>341.69</b>	Spinal cord	1.04	18.104	18.83
<b>Integumentary System</b>				Spleen	1.04	362.37	376.86
Skin	1.04	2000.04	2080.04	Thymus	1.04	0.76	0.79
				Thyroid	1.04	0.94	0.98
				Residual Soft Tissues (RST)	1.04	16679.90	17347.09
				<b>Totals:</b>		<b>17219.35</b>	<b>17840.84</b>
						<b>Total Body Tissues (kg)</b>	<b>24.5</b>
						<b>Total Body Mass (kg)</b>	<b>26.0</b>



**Supplemental Table S3.** Absorbed fractions and specific absorbed fractions for electron sources in the liver of the UF 24-kg canine phantom.

<i>Absorbed Fractions for Electron Sources in the Liver of the UF 26-kg Canine Phantom</i>														
Target Organ	Mass (g)	Method	<i>Electron Energy (MeV)</i>											
			0.01	0.015	0.02	0.03	0.05	0.1	0.2	0.5	1	1.5	2	4
<i>Adrenal Gland (L)</i>	0.19		0	0	0	0	0	0	0	0	0	0	0	0
<i>Adrenal Gland (R)</i>	0.12		0	0	0	0	0	0	0	0	0	0	0	0
<i>Brain</i>	86.15		0	0	0	0	0	0	0	0	0	0	0	0
<i>Colon Wall</i>	187.47	D	2.03E-07	5.06E-07	9.74E-07	2.13E-06	5.13E-06	1.55E-05	4.88E-05	1.56E-04	3.24E-04	4.82E-04	6.37E-04	1.25E-03
<i>Esophagus Wall</i>	11.56	E1000	2.39E-09	7.97E-09	1.65E-08	3.97E-08	1.23E-07	3.71E-07	9.76E-07	3.52E-06	8.75E-06	2.13E-05	4.50E-05	1.11E-04
<i>Eyes</i>	9.73		0	0	0	0	0	0	0	0	0	0	0	0
<i>Gall Bladder Wall</i>	1.05	D	6.26E-07	1.29E-06	2.28E-06	4.77E-06	1.12E-05	3.62E-05	1.09E-04	3.53E-04	6.04E-04	7.04E-04	7.52E-04	9.31E-04
<i>Heart Wall</i>	177.81	D	5.33E-08	1.78E-07	3.69E-07	8.86E-07	2.75E-06	8.29E-06	2.18E-05	7.86E-05	1.96E-04	3.90E-04	6.32E-04	2.06E-03
<i>Kidney (L)</i>	101.97		0	0	0	0	0	0	0	0	0	0	0	0
<i>Kidney (R)</i>	100.80	D	5.04E-07	1.01E-06	1.71E-06	3.47E-06	1.00E-05	2.88E-05	8.44E-05	2.96E-04	6.45E-04	1.02E-03	1.46E-03	3.26E-03
<i>Liver</i>	707.80	D	1.00E+00	1.00E+00	1.00E+00	1.00E+00	9.99E-01	9.97E-01	9.92E-01	9.72E-01	9.41E-01	9.11E-01	8.82E-01	7.71E-01
<i>Lung (L)</i>	186.72	D	4.04E-07	9.38E-07	1.68E-06	3.19E-06	8.83E-06	2.63E-05	7.07E-05	2.12E-04	5.00E-04	9.13E-04	1.42E-03	4.10E-03
<i>Lung (R)</i>	331.38	D	5.60E-06	1.11E-05	2.08E-05	4.17E-05	1.04E-04	3.34E-04	9.61E-04	3.00E-03	6.61E-03	1.06E-02	1.47E-02	3.00E-02
<i>Ovary (L)</i>	1.44		0	0	0	0	0	0	0	0	0	0	0	0
<i>Ovary (R)</i>	0.62		0	0	0	0	0	0	0	0	0	0	0	0
<i>Pancreas</i>	1.91	E1000	2.39E-10	4.82E-10	8.42E-10	1.79E-09	5.01E-09	1.65E-08	4.53E-08	1.53E-07	3.33E-07	5.21E-07	7.13E-07	1.48E-06
<i>Pituitary Gland</i>	0.02		0	0	0	0	0	0	0	0	0	0	0	0
<i>Residual Soft Tissues</i>	17347.09	D	3.25E-05	6.90E-05	1.15E-04	2.38E-04	5.96E-04	1.90E-03	5.72E-03	1.97E-02	4.04E-02	5.92E-02	7.69E-02	1.35E-01
<i>Salivary Glands</i>	31.57		0	0	0	0	0	0	0	0	0	0	0	0
<i>Skeleton (Homogeneous)</i>	2452.22	D	1.25E-06	2.51E-06	4.39E-06	9.32E-06	2.61E-05	8.58E-05	2.36E-04	7.99E-04	1.74E-03	2.72E-03	3.72E-03	7.71E-03
<i>Skin</i>	2080.04		0	0	0	0	0	0	0	0	0	0	0	0
<i>Small Intestine Wall</i>	183.85		0	0	0	0	0	0	0	0	0	0	0	0
<i>Spinal Cord</i>	18.83		0	0	0	0	0	0	0	0	0	0	0	0
<i>Spleen</i>	376.86	D	2.80E-06	6.03E-06	9.30E-06	1.79E-05	4.66E-05	1.46E-04	4.47E-04	1.50E-03	3.13E-03	4.75E-03	6.51E-03	1.33E-02
<i>Stomach Wall</i>	68.66	D	8.24E-07	1.89E-06	3.11E-06	6.60E-06	1.64E-05	4.97E-05	1.48E-04	5.21E-04	1.12E-03	1.71E-03	2.37E-03	4.92E-03
<i>Thymus</i>	0.79		0	0	0	0	0	0	0	0	0	0	0	0
<i>Thyroid</i>	0.98		0	0	0	0	0	0	0	0	0	0	0	0
<i>Tracheal Wall</i>	39.01		0	0	0	0	0	0	0	0	0	0	0	0
<i>Urinary Bladder Wall</i>	31.29		0	0	0	0	0	0	0	0	0	0	0	0
<i>Uterus</i>	4.14		0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Body Tissues</b>	<b>24542.06</b>		<b>1.00E+00</b>	<b>1.00E+00</b>	<b>1.00E+00</b>	<b>1.00E+00</b>	<b>1.00E+00</b>	<b>1.00E+00</b>	<b>9.99E-01</b>	<b>9.98E-01</b>	<b>9.96E-01</b>	<b>9.94E-01</b>	<b>9.91E-01</b>	<b>9.73E-01</b>
<i>Specific Absorbed Fractions (kg<sup>-1</sup>) for Electron Sources in the Liver of the UF 26-kg Canine Phantom</i>														
Target Organ	Mass (g)	Method	<i>Electron Energy (MeV)</i>											
			0.01	0.015	0.02	0.03	0.05	0.1	0.2	0.5	1	1.5	2	4
<i>Adrenal Gland (L)</i>	0.19		0	0	0	0	0	0	0	0	0	0	0	0
<i>Adrenal Gland (R)</i>	0.12		0	0	0	0	0	0	0	0	0	0	0	0
<i>Brain</i>	86.15		0	0	0	0	0	0	0	0	0	0	0	0
<i>Colon Wall</i>	187.47	D	1.08E-06	2.70E-06	5.19E-06	1.13E-05	2.74E-05	8.28E-05	2.60E-04	8.33E-04	1.73E-03	2.57E-03	3.40E-03	6.68E-03
<i>Esophagus Wall</i>	11.56	E1000	2.07E-07	6.90E-07	1.43E-06	3.44E-06	1.07E-05	3.21E-05	8.44E-05	3.05E-04	7.57E-04	1.84E-03	3.89E-03	9.58E-03
<i>Eyes</i>	9.73		0	0	0	0	0	0	0	0	0	0	0	0
<i>Gall Bladder Wall</i>	1.05	D	5.97E-04	1.23E-03	2.17E-03	4.55E-03	1.07E-02	3.45E-02	1.04E-01	3.37E-01	5.76E-01	6.72E-01	7.17E-01	8.88E-01
<i>Heart Wall</i>	177.81	D	3.00E-07	1.00E-06	2.07E-06	4.98E-06	1.55E-05	4.66E-05	1.22E-04	4.42E-04	1.10E-03	2.19E-03	3.56E-03	1.16E-02
<i>Kidney (L)</i>	101.97		0	0	0	0	0	0	0	0	0	0	0	0
<i>Kidney (R)</i>	100.80	D	5.00E-06	9.99E-06	1.70E-05	3.44E-05	9.92E-05	2.85E-04	8.37E-04	2.93E-03	6.40E-03	1.01E-02	1.45E-02	3.23E-02
<i>Liver</i>	707.80	D	1.41E+00	1.41E+00	1.41E+00	1.41E+00	1.41E+00	1.41E+00	1.40E+00	1.37E+00	1.33E+00	1.29E+00	1.25E+00	1.09E+00
<i>Lung (L)</i>	186.72	D	2.16E-06	5.03E-06	9.00E-06	1.71E-05	4.73E-05	1.41E-04	3.78E-04	1.14E-03	2.68E-03	4.89E-03	7.62E-03	2.19E-02
<i>Lung (R)</i>	331.38	D	1.69E-05	3.34E-05	6.27E-05	1.26E-04	3.13E-04	1.01E-03	2.90E-03	9.04E-03	2.00E-02	3.20E-02	4.45E-02	9.06E-02
<i>Ovary (L)</i>	1.44		0	0	0	0	0	0	0	0	0	0	0	0
<i>Ovary (R)</i>	0.62		0	0	0	0	0	0	0	0	0	0	0	0
<i>Pancreas</i>	1.91	E1000	1.26E-07	2.53E-07	4.42E-07	9.38E-07	2.63E-06	8.64E-06	2.38E-05	8.04E-05	1.75E-04	2.73E-04	3.74E-04	7.77E-04
<i>Pituitary Gland</i>	0.02		0	0	0	0	0	0	0	0	0	0	0	0
<i>Residual Soft Tissues</i>	17347.09	D	1.88E-06	3.98E-06	6.61E-06	1.37E-05	3.43E-05	1.10E-04	3.30E-04	1.13E-03	2.33E-03	3.42E-03	4.43E-03	7.76E-03
<i>Salivary Glands</i>	31.57		0	0	0	0	0	0	0	0	0	0	0	0
<i>Skeleton (Homogeneous)</i>	2452.22	D	5.09E-07	1.02E-06	1.79E-06	3.80E-06	1.07E-05	3.50E-05	9.63E-05	3.26E-04	7.08E-04	1.11E-03	1.52E-03	3.15E-03
<i>Skin</i>	2080.04		0	0	0	0	0	0	0	0	0	0	0	0
<i>Small Intestine Wall</i>	183.85		0	0	0	0	0	0	0	0	0	0	0	0
<i>Spinal Cord</i>	18.83		0	0	0	0	0	0	0	0	0	0	0	0
<i>Spleen</i>	376.86	D	7.44E-06	1.60E-05	2.47E-05	4.76E-05	1.24E-04	3.86E-04	1.19E-03	3.98E-03	8.31E-03	1.26E-02	1.73E-02	3.53E-02
<i>Stomach Wall</i>	68.66	D	1.20E-05	2.76E-05	4.53E-05	9.61E-05	2.38E-04	7.24E-04	2.15E-03	7.59E-03	1.63E-02	2.50E-02	3.46E-02	7.17E-02
<i>Thymus</i>	0.79		0	0	0	0	0	0	0	0	0	0	0	0
<i>Thyroid</i>	0.98		0	0	0	0	0	0	0	0	0	0	0	0
<i>Tracheal Wall</i>	39.01		0	0	0	0	0	0	0	0	0	0	0	0
<i>Urinary Bladder Wall</i>	31.29		0	0	0	0	0	0	0	0	0	0	0	0
<i>Uterus</i>	4.14		0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Body Tissues</b>	<b>24542.06</b>		<b>4.07E-02</b>	<b>4.07E-02</b>	<b>4.07E-02</b>	<b>4.07E-02</b>	<b>4.07E-02</b>	<b>4.07E-02</b>	<b>4.07E-02</b>	<b>4.07E-02</b>	<b>4.06E-02</b>	<b>4.05E-02</b>	<b>4.04E-02</b>	<b>3.96E-02</b>

Note: D - Direct Monte Carlo, C - Converse Monte Carlo, E1000 - Extrapolated below 1000 keV, E500 - Extrapolated below 500 keV