

Wounded Willy & Damaged Debbie



TEACHING & TRAINING PHANTOMS FOR CIVILIAN HOSPITAL EMERGENCY ROOMS

With 69 pathologies and traumas available between Wounded Willy & Damaged Debbie, these training phantoms provide unlimited repetition of views without human exposure. Both phantoms demonstrate and evaluate positioning and imaging techniques, including kVp, mAs, contrast, optical density, OFD, and TFD. Their radiographs are optically equivalent to those of humans in density and contrast.

Wounded Willy & Damaged Debbie—available in realistic and inclusive skin tones—yield radiographs resembling those of a human body with human technical factors and limited artifacts, articulated to enable basic views to be presented, and with an appropriate level of human anatomy. They are well-balanced patient substitutes for basic training of radiologic technologists, particularly in military or emergency room environments. The concept of grouping a large number of casualties into two teaching/training phantoms originated at the Fleet Hospital & Operations Training Center in Camp Pendleton, California.

Model Numbers

RS-600TA: Opaque Wounded Willy & Damaged Debbie

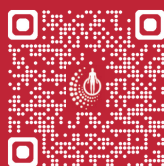
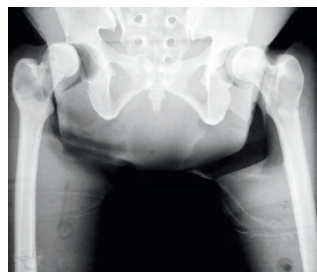
RS-600TTA: Transparent Wounded Willy & Damaged Debbie

RS-601TA: Opaque Wounded Willy

RS-601TTA: Transparent Wounded Willy

RS-602TA: Opaque Damaged Debbie

RS-602TTA: Transparent Damaged Debbie



RSDphantoms.com
Call: 310-518-0527

Pathologies & Traumas (01-69)

No	Phantom	Description	Location	External Markings
-01	Willy	Metallic fragment in orbit	R	None
-02	Willy	Multiple fragments in lower face	N/A	None
-03	Willy	Step deformity of intraorbital rim	L	None
-04	Willy	Separated fracture of frontal zygomatic suture	L	None
-05	Willy	Metallic foreign body over skull	N/A	None
-06	Willy	Mandible fracture with missing bone	N/A	Open wound
-07	Debbie	Mandibular fractures	R	None
-08	Debbie	Mandibular fractures	L	None
-09	Debbie	Cloudy maxillary sinus	L	None
-10	Debbie	Fracture of nasal bones with mild displacement	N/A	None
-11	Willy	Displacement fracture of mandibular condyle & coronoid process	R	None
-12	Willy	Displacement fracture of mandibular condyle & coronoid process	L	None
-13	Willy	C4/C5 compression fracture	N/A	None
-14	Willy	C7 fracture by bullet	R	Bullet or foreign body hole
-15	Willy	C-spine bullet posterior to trachea shadow	N/A	Bullet or foreign body hole
-16	Willy	Fracture of lateral ribs 6 & 7	R	None
-17	Willy	Mediolateral fracture of ribs 8 & 9	L	None
-18	Willy	Multiple rib fractures, four metallic fragments visible	R	None
-19	Willy	12th rib fracture	R	None
-20	Willy	Bullet in hemothorax overlaying 8th rib	L	Bullet or foreign body hole
-21	Willy	Bullet in mid-chest overlaying heart shadow	L	None
-22	Willy	2cm metallic fragment mid-chest	R	Bullet or foreign body hole
-23	Willy	Bullet visible below costal margin under 11th rib	L	Bullet or foreign body hole
-24	Willy	One bullet in lower quadrant	R	Bullet or foreign body hole
-25	Willy	Shattered distal scapulae, three metallic fragments	R	Bullet or foreign body hole
-26	Willy	Shattered distal scapulae	L	Bullet or foreign body hole
-27	Debbie	Widened mediastinum & pleural effusion	L	None
-28	Debbie	Chest tube cavity	R	Bullet or foreign body hole
-29	Debbie	Infiltrate	R	None
-30	Debbie	Infiltrate	L	None
-31	Debbie	Bullet in mid-chest	N/A	Bullet or foreign body hole
-32	Willy	Unstable fracture of L1	N/A	None
-33	Willy	Compression fracture of L5	N/A	None
-34	Debbie	Metallic foreign body lateral to PSOAS	R	Bullet or foreign body hole
-35	Debbie	Compression fracture of L4	N/A	None
-36	Debbie	Metallic fragments, mid-abdomen in LQ	L	Bullet or foreign body hole

No	Phantom	Description	Location	External Markings
-37	Debbie	Bullet in mid-abdomen in RQ	R	Bullet or foreign body hole
-38	Debbie	Metallic fragments, three in RUQ back	R	Bullet or foreign body hole
-39	Debbie	Metallic fragments, two in LUQ back	L	Bullet or foreign body hole
-40	Willy	ILIAC crest comminuted fracture with metallic fragments in left quadrant	L	Bruise
-41	Debbie	Displaced fracture of pubic ramus, superior & inferior	L	None
-42	Debbie	Sacroiliac disruption	L	None
-43	Debbie	Fractured sternum	N/A	None
-44	Willy	Non-displace pubic ramus fracture	L	None
-45	Willy	Superior & inferior pubic ramus fracture	R	None
-46	Willy	Symphysis diastasis	N/A	None
-47	Willy	Sacroiliac joint disruption	R	None
-48	Willy	Bullet in sacrum	R	None
-49	Willy	Shattered acetabulum	L	None
-50	Willy	Shattered femoral head	L	None
-51	Willy	Left femur comminuted fracture	L	None
-52	Debbie	Proximal tibia fracture	L	None
-53	Willy	Comminuted fracture of tibia and fibula	R	Bullet or foreign body hole
-54	Willy	Displaced ankle fracture	R	None
-55	Debbie	Minimally displaced distal fibula fracture	R	None
-56	Debbie	Displaced fracture of calcaneus bone	R	None
-57	Willy	Displaced fracture of radius and ulna	L	None
-58	Debbie	Volar angulated distal radius and ulna fracture	R	Bullet or foreign body hole
-59	Willy	Angulated comminuted fracture of mid-shaft radius and ulna	R	None
-60	Debbie	Minimally displaced distal radius fracture not involving wrist, offset bone ends	L	None
-61	Debbie	Humerus shaft fracture	L	None
-62	Debbie	Femur fracture	L	None
-63	Debbie	Scapulae shattered with two metal fragments on right	R	None
-64	Debbie	Scapulae shattered with one metal fragments on left	L	None
-65	Willy	Two metallic fragments on right superior angle	R	None
-66	Willy	Three metallic fragments on left superior angle	L	None
-67	Willy	3rd and 4th metacarpals shattered	L	Bruised
-68	Willy	Glenoid fracture on left scapular	L	None
-69	Debbie	Radius fracture	L	None



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RSD SOFT TISSUE

Energy (MeV)	Mean (HU)	Calculated (μ)	μ (ICRU 44)	% Difference	Ratio
00.08	60.30	0.1948	0.1932	0.80%	0.9921
00.10	52.88	0.1797	0.1795	0.15%	0.9985
00.12	57.10	0.1717	0.1709	0.44%	0.9956
00.14	52.95	0.1623	0.1624	0.07%	1.0007
00.20	--	0.1477	0.1439	2.61%	0.9746
00.30	--	0.1245	0.1246	0.04%	1.0004
00.60	--	0.0950	0.0941	1.01%	0.9900
00.80	--	0.0825	0.0826	0.13%	1.0013
01.00	--	0.0744	0.0743	0.18%	0.9982
02.00	--	0.0520	0.0519	0.18%	0.9982
03.00	--	0.0351	0.0357	1.71%	1.0174
06.00	--	0.0288	0.0291	0.88%	1.0088
08.00	--	0.0252	0.0255	0.98%	1.0099
10.00	--	0.0229	0.0232	1.49%	1.0151
15.00	--	0.0203	0.0203	0.15%	0.9985
20.00	--	0.0189	0.0189	0.17%	1.0017

RSD CORTICAL TISSUE

Energy (MeV)	Mean (HU)	Calculated (μ)	μ (ICRU 44)	% Difference	Ratio
00.08	1365	0.4345	0.4280	1.51%	0.9851
00.10	1048	0.3496	0.3562	1.84%	1.0188
00.12	0977	0.3211	0.3274	1.91%	1.0195
00.14	0902	0.2932	0.2986	1.80%	1.0184
00.20	--	0.2511	0.2513	0.09%	1.0009
00.30	--	0.2155	0.2137	0.84%	0.9916
00.60	--	0.1596	0.1598	0.11%	1.0011
00.80	--	0.1403	0.1402	0.10%	0.9990
01.00	--	0.1274	0.1261	1.06%	0.9895
02.00	--	0.0883	0.0885	0.17%	1.0017
03.00	--	0.0611	0.0625	2.29%	1.0235
06.00	--	0.0512	0.0525	2.46%	1.0253
08.00	--	0.0468	0.0474	1.20%	1.0121
10.00	--	0.0446	0.0444	0.39%	0.9962
15.00	--	0.0410	0.0409	0.16%	0.9984
20.00	--	0.0393	0.0397	1.02%	1.0103

RSD TRABECULAR TISSUE (SPONGIOSA)

Energy (MeV)	Mean (HU)	Calculated (μ)	μ (ICRU 44)	% Difference	Ratio
00.08	551	0.2849	--	--	--
00.10	515	0.2586	--	--	--
00.12	439	0.2337	--	--	--
00.14	318	0.1541	--	--	--

Soft Tissues: There are unlimited small variations in density and absorption throughout the human body. Phantom soft tissue is closely controlled to have an average density similar to that of these tissues.

Skeletons: RSD skeletons are highly detailed polymer moldings which reproduce the shape, mass density, and attenuation coefficients of cortical bone and spongiosa. RSD's proprietary moldings allow for continuous production, eliminate the restrictions of human skeletal bones (including limited availability, unethical collection of human bone specimens, variable size, and uncertain chemical composition), and avoid the loss of marrow in dried natural skeletons, thereby making RSD skeletons superior to "real bone."

Molds: Molds for RSD cortical bone and spongiosa were made from human skeletons consistent with the sizes of the soft tissue molds.

ICRU 44: RSD skeletons conform closely to the standards established by the International Commission on Radiation Units and Measurements (ICRU Report 44); the mass density is reduced slightly to account for a small decrease in calcium content in older patients.

LINEAR ATTENUATION DATA

- Monte Carlo simulation was used to calculate linear attenuation coefficients as a function of the beam.
- Monte Carlo results were validated with linear attenuation coefficients derived from Hounsfield Unit measurements at discrete energy levels.
- RSD phantom material linear attenuation data were compared to NIST data using ICRU Report 44 compositions of human tissues.
- NIST data was interpolated when necessary.

Materials	Density (g/cc)
RSD Soft Tissue (Opaque)	1.08
RSD Soft Tissue (Transparent)	1.10
RSD Cortical Bone	1.83
RSD Trabecular Bone	1.17

