



TEACHING & TRAINING AID FOR PROPER NEEDLE PLACEMENT & SKILL MAINTENANCE

- Instrumental for teaching, training, and maintaining skills
- Review of fluoroscopy system
- Eliminates biohazards associated with cadavers

RSD Injection Phantom helps one learn and hone skills for proper needle placement for a variety of interventional techniques. Fluoroscopic needle placement can be taught or practiced realistically without fear of biological contamination hazards associated with fresh or frozen cadavers.

Fluoroscopically, the look and feel of the anatomical landmarks is important and can be demonstrated with the use of RSD Injection Phantom. Needle placement for caudals, epidurals, selective nerve and root blocks, medial branch blocks, facet injections and sympathetic blocks can all be demonstrated. Practice RF needle-placement along with disc needle-placement plus injection techniques for shoulder, hip, and symphysis pubis—all in the convenience and safety of your own laboratory or teaching facility. There is now no need to deal with local, state, and federal regulations regarding biohazards associated with cadavers.

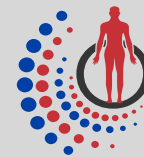
RSD Injection Phantom has the capability for injections not only in the spine, but also at one shoulder, one hip, and at the pubis symphysis.

The skeletal structures of RSD Injection Phantom are covered with a soft gel and a latex skin, supported by a hard, synthetic material.

Further simplifications are the elimination of skeletal articulations that permit joint or spinal motions and the elimination of rib numbers 2 to 9; the rigid flesh makes these superfluous. Positioning of the RSD Injection Phantom as a single unit provides complete and realistic positioning capabilities.

The gel-filled injectable parts of the RSD Injection Phantom are completely encased in a latex skin. Allergic reactions are not expected to be a concern for the vast majority of users. The materials and design processes in RSD Injection Phantom are made not only to simplify the overall process but also to keep it as realistic as possible.

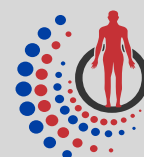
RSD Injection Phantom has been tested to determine the probable effective life of injection sites; a gel/skin section was used for a trial and six hundred injections were made in a dime-sized area. There was no perceptible degradation of the latex skin or of the gel itself. Considering the far greater area available in the RSD Injection Phantom, it is unlikely that repairs or refurbishments will be needed for a very long time.



Applications

Practice needle placement for pain management techniques

Protocol verification



Modalities

X-Ray

Fluoroscopy

Model Numbers

Model No.	Product Description
RS-1300	RSD Injection Phantom

Contact RSD or an authorized RSD dealer for custom pathologies and traumas.

Materials See page 30 for more information.

RSD Soft Tissue	RSD Cortical Bone	RSD Trabecular Bone
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Specifications

Packing Size	Packing Weight
122W x 41D x 51H cm	73 kg
48W x 16D x 20H in	160 lb.

Soft Tissues: There are unlimited, small variations in density and absorption throughout the human body. Phantom soft tissue is closely controlled to have the average density 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 skeleton bones (including limited availability, unethical collection of human bone specimen, variable size, and uncertain chemical composition), and avoid the loss of marrows in dried natural skeletons thereby making RSD skeletons superior to "real bone."

Molds: Molds for the 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 No. 44](#)); mass density is reduced slightly to take into account a small decrease in calcium content for older patients.

LINEAR ATTENUATION DATA

1. Monte Carlo simulation was used to calculate linear attenuation coefficients as a function of beam.
2. Monte Carlo results were validated with linear attenuation coefficients derived from Hounsfield Unit measurements at discreet energy levels.
3. RSD Phantom material linear attenuation data was compared to NIST data using ICRU Report 44 compositions of human tissues.
4. 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

RSD SOFT TISSUE					
Energy (MeV)	Mean (HU)	Calculated (M)	μ (ICRU 44)	% Difference	Ratio
00.08	60.30	0.1948	0.1932	0.0080	0.9921
00.10	52.88	0.1797	0.1795	0.0015	0.9985
00.12	57.10	0.1717	0.1709	0.0044	0.9956
00.14	52.95	0.1623	0.1624	0.0007	1.0007
00.20	--	0.1477	0.1439	0.0261	0.9746
00.30	--	0.1245	0.1246	0.0004	1.0004
00.60	--	0.0950	0.0941	0.0101	0.9900
00.80	--	0.0825	0.0826	0.0013	1.0013
01.00	--	0.0744	0.0743	0.0018	0.9982
02.00	--	0.0520	0.0519	0.0018	0.9982
03.00	--	0.0351	0.0357	0.0171	1.0174
06.00	--	0.0288	0.0291	0.0088	1.0088
08.00	--	0.0252	0.0255	0.0098	1.0099
10.00	--	0.0229	0.0232	0.0149	1.0151
15.00	--	0.0203	0.0203	0.0015	0.9985
20.00	--	0.0189	0.0189	0.0017	1.0017

RSD CORTICAL BONE					
Energy (MeV)	Mean (HU)	Calculated (M)	μ (ICRU 44)	% Difference	Ratio
00.08	1365	0.4345	0.4280	0.0151	0.9851
00.10	1048	0.3496	0.3562	0.0184	1.0188
00.12	0977	0.3211	0.3274	0.0191	1.0195
00.14	0902	0.2932	0.2986	0.0180	1.0184
00.20	--	0.2511	0.2513	0.0009	1.0009
00.30	--	0.2155	0.2137	0.0084	0.9916
00.60	--	0.1596	0.1598	0.0011	1.0011
00.80	--	0.1403	0.1402	0.0010	0.9990
01.00	--	0.1274	0.1261	0.0106	0.9895
02.00	--	0.0883	0.0885	0.0017	1.0017
03.00	--	0.0611	0.0625	0.0229	1.0235
06.00	--	0.0512	0.0525	0.0246	1.0253
08.00	--	0.0468	0.0474	0.0120	1.0121
10.00	--	0.0446	0.0444	0.0039	0.9962
15.00	--	0.0410	0.0409	0.0016	0.9984
20.00	--	0.0393	0.0397	0.0102	1.0103

RSD TRABECULAR BONE (SPONGIOSA)					
Energy (MeV)	Mean (HU)	Calculated (M)	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	--	--	--