



RSVP Phantom™ Head II with Bite Feature

The RSVP Phantom™ Head was developed to provide stereotactic localization and dose verification for radiosurgery machines. Charles W. Coffey, II, Ph.D., established the design criteria that The Phantom Laboratory used in constructing the RSVP Phantom™. The phantom may be used for a variety of radiosurgery applications including periodic quality assurance evaluations and acceptance testing. In addition the phantom may be used to perform re-evaluations after equipment or software upgrades. In 2013 The Phantom Laboratory worked with Michael S. Gossman, M.S., DABR, FAAPM, to develop the RSVP Phantom™ Head II with Bite Feature, providing for both stereotactic radiosurgery and radiotherapy quality assurance with bite tray systems.

The phantom's design provides full simulation of the localization and irradiation sequences. The anatomically accurate head form is filled with water to simulate the radiation absorption and scatter of human soft tissue. The heavy-duty outer shell of the RSVP Phantom™ is designed to accommodate the anchoring screws needed for proper positioning of the head frame. The movable lower jaw and upper teeth provide for the use of bite tray systems. An internal container called a tumor vessel can be positioned anywhere within the head form by manipulating an external position rod. This vessel may be filled with either a radiation-sensitive gel for alignment evaluations or with radiation dosimeters for quantitative dose measurements.

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Stereotactic Localization

The phantom provides an accurate evaluation of stereotactic localization. To perform an evaluation dose sensitive gels, non light sensitive film, TLDs, or small ion chambers are used. The tumor vessel or chamber is positioned within the phantom's head form and the radiosurgery head frame is attached to the phantom. Standard protocols are followed to locate the x, y and z coordinates of the patient's tumor through computed tomography or magnetic resonance imaging. The phantom is then mounted in the radiosurgery system and irradiated. Once the irradiation has been completed the tumor vessel is removed from the phantom head form and dose or dose profile is evaluated.

Phantom Construction

The shell of the RSVP Phantom™ is formed from ¼" cellulose acetate butyrate sheet, a transparent material chosen for its strength and low water absorption. The shell is mounted on a polycarbonate end plate. The upper teeth are cast from a bone-simulating urethane and the lower jaw is cast from a clear urethane. The tumor port and cover plate assembly are attached with nylon screws to the end plate. The cover plate is removable for internal access. Before phantoms are shipped to customers all of their seams are tested to ensure a water-tight seal. The Phantom Laboratory provides a wooden storage case for each RSVP Phantom™.

Tumor Assembly

Three tumor vessels are included with the RSVP Phantom™, but only one vessel may be used in the phantom at a time. Each of the vessels has an inside length of 4cm and inside diameter of 2cm, and a radius of 1cm at each end. The two ends of the tumor vessel are threaded together at the center to allow easy access into the vessel. The user may position the tumor vessel anywhere within the head form by manipulating the phantom's external position rod. After the desired position is reached, the cylinder is locked into place by hand-tightening a lock nut on the rotation ball and a lock bolt on the position rod.

Optional Equipment

The optional TLP211 plug holder, which is mounted into the tumor vessel, is designed to hold 5mm plugs for TLDs.

The optional TLP227 two-plane film holder is mounted into the tumor vessel to hold dosimetry film securely in place.

Specially ordered commercially available chambers and scintillation detectors may also be used in the RSVP Phantom™. Contact The Phantom Laboratory for current information on these devices.



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