

**Purpose:** To explore the feasibility of using a pressure sensing technique to monitor head and neck patient position in real time during radiation treatment and to correct for positioning errors.

**Methods:** A pressure sensing technique was applied to assess patient head movement by measuring pressures underneath the head. An anthropomorphic Rando phantom was used to simulate the patient head. A poly foam pad composed of uniformly-distributed pressure sensors (1.1-cm resolution) was placed on top of a neckrest head holder under the phantom. Pressures were recorded as a two-dimensional pattern with magnitudes and spatial information. To test if the pressure patterns are sensitive to phantom position, the phantom was manipulated randomly to simulate various patient head movement (translational shift, rotation, and pitching) and the pressure patterns were evaluated. The phantom was scanned in CT at each manipulated position and the images were co-registered to verify each phantom movement. To test if the pressure information can be used for patient position correction, blind experiment was conducted: the phantom was re-positioned to its original position using only the guidance of the original pressure pattern by adjusting the phantom position to generate a pressure pattern to match the original one.

**Results:** The pressures and pressure patterns were very sensitive to phantom position, showing significant changes in real time with phantom movement. The blind test showed that the re-positioned phantom position (re-positioned with the pressure guidance only) agreed very well with the original phantom position: the differences were 0.1, 0, and 0 degree in three rotation directions, and 0.3, 0.7, and 0.2 mm in three translation directions, respectively.

**Conclusions:** Pressure-sensing is a feasible non-radiation technique for real-time monitoring of patient position during radiation delivery and for correcting positional errors.