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## **Immobilization System for Deep Inhalation Breadth Hold in Radiation Therapy : Feasibility Study**

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**Purpose:** A preliminary hardware system for Deep Inhalation Breadth Hold (DIBH) for lung or liver cancer is developed. **Methods and Materials:** The Immobilization system consists of (1) a commercialized carbon board, which is placed on CT scanner or Linear accelerator treatment couch. (2) arm sup-porter, two arms are supported on the top of a patient head in order to setup a patient comfortably and to be able to scan a patient ion small bore CT scanner. (3) breathing devices: one for mouth breathing, and the second for nose breathing. (4) a patient motion detector, which consists of an Vac Lok (vacuum cushion), a pressure detector, and acrylic supporter. The vacuum cushion is inserted between the patient chest and the acrylic supporter, and its air is sucked out when the patient deeply inhalates and holds the breadth. The electric contacts with the structure of matrix geometry are placed between the Vac Lok and the acrylic supporter. (5) Two micro switches in the tube nose/mouth breathing detectors act as a secondary detector for monitoring “start of breathing-in” phase. (6) Thin aluminum (~100um) foils are used as an electronic wire to detect the contacts caused by pressure from the chest and their contacts are displayed in a series of LED’s. **Results:** The nose/mouth breathing devices are compared and nose breath-ing is a better choice. The Vac lok is a reliable device to main-tain the DIBH of the patient and to monitor breathing out. The micro switches for detecting “breathing in/out” have been proved very effective. **Conclusion:** The nose breathing is very effective and no special training is needed. By utilizing this device, it will reduce the planning margins for target definitions. The pressure detector will be connected to the linear accelerator for gating.

**Keywords :** IGRT, DIBH, Immobilization