Thesis Title Volume Determinations In Phantom From Computed Tomography

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ABSTRACT

In recent years , The Department of Diagnostic Radiology , Srinagarind Hospital , University of Khon Kaen has used computed tomography (CT 9800 QUICK) for clinical problems with associated unresolved questions concerning medical and surgical therapy. The ability of computed tomography to resolve soft tissue permits the visualization of many visceral masses and lesions that are not visible by plain film radiography. This thesis has been designed for quantifying the phantom volume by using computed tomography to visualize the phantom as aseries of sequential contiguous cross-sectional images , each image representing a " slice " of tissue of a specified thickness. The volume of the phantom can be calculate by obtaining the area of each cross-sectional image multiplying the area by the slice thickness to give slice volume , and finally summing the volumes of slices to give phantom volume , comparing the difference between the determined and actual volume. The mean percentage error of volume calculations using the technique was 2.87 % (1.75% for circular and cylindrical phantom volume , 4% for two lobe , three lobe and irrecular

phantom). It was tested on ten patients who had blood clots in epidural and subdural hematoma and on three cadaver organs. The mean precentage error of volume calculations was 3.61% (4.42% for epidural hematoma , 2.8% for subdural hematom) and 2.5% for cadaver organs. For my thesis , accuracy can be affected by (1) Selection of slice thickness ; Smaller CT slice thickness could make further improvements inaccuracy. A reduction in scan thickness would be necessary when estimating the volume but an increase in the number of scans would require , increases the time and dose of ionizing radiation to the patient. (2) Window settings ; Setting window width and window level to window anatomic tissue of interest by assigning to them the full range of black and white available on the CRT monitor. (3) Respiratory motion ; prescanning patient instruction can be extremely important to ensure cooperation during serial scans. (4) Skill of operator ; The operator must understand the apparatus and trainin the technique and control control of it.