

Studies on an IN VIVO Measuring Instrument of Bone Mineral Content

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We have developed an instrument which measures bone mineral content by using monochromatic photon beam. Generally, to eliminate the soft tissue absorption of photon beam, the part of the body of to be measured is to be placed in water bath. However, the feature of our instrument is designed to measure any point of the body in the air by using two photon beams of ^{125}I and ^{241}Am .

The instrument is completely automated and a final digital readout of bone mineral content is promptly produced by analog computation and digital control techniques.

Major components of the instrument are composed of a scanning unit and an electronic measuring unit. In the scanning unit, the collimated photon beam passed through the part of bone is counted by a specially designed scintillation detector. The scanning mechanism is designed to

move the photon beam in vertical direction through the fixed limb in changeable speed.

The electronic measuring unit is composed of a pulse height analyzer, a scaler, a timer, a digital to analog converter, an analog computing module and a power supply.

The essentials of the electronic measuring unit is an analog computing module which contained a hold circuit, a comparator and an integrator. The analog computing formula is:

$$M_B = k_1 \sum \ln(I_{01}/I_1) - k_2 \sum \ln(I_{02}/I_2)$$

M_B : bone mineral content (g/cm).

I_{01} , I_1 , I_{02} : intensities of the two beams with and without a interposed bonen respectively.

k_1 , k_2 : constants.

The instrument has been worked successfully in fundamental experiments and clinical tests.

The Improvement of New Type Auto Well Counter

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In RIA measurement, it usually takes many hours to calculate the hormone concentration from count ratio B/F and calibration curve being plotted manually.

To improve this drawback, we developed new

instrument which can automatically calculate the hormone concentration using desk top type computer.

Followings are the major points of improvement.