

Fundamental and Clinical Studies for the Measurement of Bone Mineral Content

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The bone mineral content (BMC) in subjects with various demineralizing diseases was measured by a photon absorption method. We used ^{241}Am as a radiation source and measured the BMC of the radius in water.

Fundamental Studies

- 1: The accuracy utilizing bone scanner was experimentally 4% level.
- 2: A highly significant correlation ($r=0.99$) was found between the ash weight of standard hydroxyapatite and the BMC.
- 3: The measurement of the BMC was shown to have a significant correlation between two successive examination in 15 normal controls ($\lambda=0.93$).

Clinical Studies

- 1: The BMC of normal males was higher than that of females after the age of twenty. There is a marked decrease in the bone mass in females after the age of forty-five.
- 2: In various conditions such as hyperthyroidism, hyperparathyroidism, chronic renal failure, rheumatoid arthritis, muscular dystrophy and epilepsy with a treatment of anticonvulsants, the BMC showed the following interesting

results.

- 1: In hyperthyroid patients there was increased bone metabolism with the lower BMC than normal controls, and the BMC returned to normal faster than ordinarily (T_4 value) after treatment. In hyperparathyroidism, the BMC was found to be increased after operation compared with the pre-operative value.
- II: There was the lower BMC in patients with chronic renal failure under a long-term dialysis than in patients without dialysis.
- III: In patients with rheumatoid arthritis of muscular dystrophy, the lower BMC was also found than that in normal controls. In the muscular dystrophy, calcitonin or 1α OH D_3 was used for the protection of disuse osteoporosis, and the BMC tended to increase in the course of treatment.

The measurement of BMC with photon absorption is a useful method for the investigation of various metabolic diseases and for the following of the treatment in various demineralizing diseases. Also this technique is simple and easy to perform with the use of a bone mineral analyzer.

The Quantitative Analysis of Bone Scintigram (Around the Spine)

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Quantitative analysis of bone scintigram is used for the evaluation of the grade and differential diagnosis of bone diseases.

In bone congresses of the Japan Orthopaedic Surgery Association (1975) and of the Nuclear Medicine in Kinki District (1975, 1976), our preliminary reports for quantitative analysis were informed about sacroiliac joint and small parts of spine, and it has been proved that the quanti-

tative analysis may be useful for these purposes.

Now, we report the result of quantitative analysis about the spine.

The method is as follows.

- 1) Radioactive technetium-pyrophosphate is injected intravenously in the way of 50 $\mu\text{Ci/kg}$ of RI or 86 $\mu\text{g/kg}$ of pyrophosphate.
- 2) Dynamic scintigram is done on the sacroiliac joint for one hour using computer.