NOTE

Serum Estradiol and Radial Mineral Content in Postmenopausal Females

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Synopsis

The serum estradiol concentration and bone mineral content of the right radius were determined in 34 postmenopausal females. Regression analysis showed a significant positive correlation between the serum estradiol concentration and bone mineral content of the right radius (r=0.477, p<0.01). These results support the view that the decreased level of serum estrogens is one of the major factors involved in the loss of bone mass with age.

Albright et al. (1941) reported the high incidence of spinal osteoporosis with crush fracture among the postmenopausal females and suggested the role of estrogens in the metabolism of bone minerals. This view was further extended by the findings that plasma and urinary calcium in postmenopausal females was raised (Young and Nordin, 1967), and that these raised values of calcium could be reversed by the administration of estrogen (Gallagher and Nordin, 1972; Young et al., 1968). Furthermore, it has been shown by the radiological method that loss of bone density in women starts at the onset of menopause (Nordin et al., 1966; Meema et al., 1965). The exact relationship between estrogen and bone mineral contents, however, remains to be clarified. Contradictory results have been obtained with regard to the relationship between serum estrogen levels and bone mass (Smith, 1967; Johnston, 1970; Riggs et al., 1973). In view of these facts, we have studied the correlation between the bone mineral contents in the right radius and the serum estradiol levels in the aged females.

Materials and Methods

Thirty-four females between 57 and 92 years of age, who had visited Tokyo Metropolitan Geriatric Hospital were studied. None of the subjects had endocrine disorders or received medications which have been known to affect endocrine functions.

The bone mineral content of the right radius, at one-third of forearm length from the styloid process, was determined in vivo by the photon absorption technique originally described by Cameron and Sorrenson (1963), and was expressed in grams of mineral per square centimeter of bone.

Three ml of serum mixed with approximately 1000 cpm of (H)-estradiol (New England Nuclear) was extracted twice with 10 ml ethyl ether, and estradiol concentration was determined by a radioimmunoassay previously described (Murakami et al., 1976).

Results

In Fig. 1, the values of the bone mineral content in the right radii of the postmenopausal females were plotted against the...
serum estadiol levels in the same subjects. Regression analysis showed a significant positive correlation between the bone mineral contents and the serum estradiol levels in the postmenopausal females ($r=0.477$, $p<0.01$).

**Discussion**

The results in this investigation support the view that decreased serum estrogens may be a factor in the development of postmenopausal osteoporosis. Concerning the relationship between estrogens and osteoporosis, Smith (1967) found a higher level of urinary gonadotropin in postmenopausal women with lower vertebral density, and Johnston (1970) reported the higher values of estrogenic activity in the postmenopausal women with higher values for bone densities in the radius assessed by a photon absorption technique. On the other hand, Riggs et al. (1973) reported that serum estrogen levels measured by a radioimmunoassay in the postmenopausal women with vertebral compression fractures were not different from those in the age-matched controls. Our present finding is consistent with that of Smith and Johnston's, but failed to confirm the result of Riggs et al.. This discrepancy might be due to the subject of the study or the difference in the method of estrogen immunoassay. We have studied the correlation between the serum estradiol and the radial mineral content measured by a photon absorption technique. However, Riggs et al. measured the serum estrone plus estradiol levels in the postmenopausal women with or without vertebral compression fractures. Our present results support the view that the decreased level of serum estrogen is intimately related to the loss of bone mass with age.

**References**