

OSTEOPOROSIS — A CALCIUM-DEFICIENCY DISEASE ?

Osteoporosis may be defined as a reduction in the amount of bone without change in its chemical constitution and without qualitative abnormality in histological appearance. The classical concept of generalized osteoporosis is based on the teaching of Albright.<sup>1</sup> He considered that the basic defect is a deficiency of synthesis of the organic matrix of bone, produced either by a paucity of osteoblastic function or by a preponderance of inhibitory over-stimulatory factors. The following can be cited in favour of this hypothesis:

1. The common occurrence of osteoporosis after the menopause, whether natural or artificially induced. In men it is less common and appears at a later age.

2. Its occurrence in Cushing's syndrome, in which there is evidence of general inhibition of protein synthesis.

3. Its occurrence in states of negative nitrogen balance, as in hyperthyroidism.

4. Its occurrence in hypopituitarism or primary hypogonadism, in which there is a deficiency of the stimulatory sex hormones.

5. The absence of any qualitatively abnormal histological appearance of the bone, in keeping with a whole-bone atrophy, and the absence of any characteristic biochemical abnormality in the blood or urine.

6. The improvement in symptoms and calcium balance under the influence of oestrogens and androgens. In 'idiopathic osteoporosis' in young people the only certain benefit is obtained by intravenous infusions of human plasma albumin.

Osteomalacia — in which bone matrix deposition is normal, but calcification of this is deficient — was believed to be caused basically by a calcium deficiency, whether from defective absorption (e.g. in vitamin-D lack) or excessive loss as in hypercalciuria.

Nordin<sup>2</sup> has recently summarized the evidence against these theories and in favour of pure calcium deficiency as the primary cause of osteoporosis. He points out that:

1. Experimental calcium deprivation in animals leads to osteoporosis rather than osteomalacia.

2. Studies using both stable strontium and radioactive calcium and strontium as markers, have indicated that there is no reduction in bone 'accretion rate' in patients suffering from osteoporosis. (These studies, however, are not universally accepted and their interpretation is not simple.)

3. Vitamin D has a direct calcaemic effect, without reference to intestinal absorption, so that vitamin-D deficiency is not synonymous with calcium deficiency. It is probable that this can be accepted.

If osteoporosis is a calcium-deficiency disease, the question that next arises is why some people, usually old, become calcium-deficient while others do not. The actual calcium requirement of the human adult is almost certainly extremely variable, and the evidence suggests that most

people, but not all, can adapt satisfactorily to a reduction in their calcium intake. Plainly, a person may become depleted of calcium in several ways — through deficient intake, defective absorption from the bowel, excessive loss in the urine, or a combination of these. Nordin claims that the occurrence of osteoporosis is frequently related to a reduced intake of calcium, and that where the intake exceeds one gram per day, osteoporosis is seldom seen. However, those persons whose calcium intake is low, are probably also in the low-income group and consume little protein, so that human calcium-intake deficiency is never likely to be a pure state. Defective absorption does not appear to be important, except in clinical malabsorption disorders, although innate efficiency of absorption — the main factor in ability to adapt to low intake — varies considerably among different individuals. The possible part played by urinary loss of calcium is difficult to estimate. Nordin claims to have found that osteoporotics have a 'tendency' to high urinary-calcium output and show little change in this when the intake is changed. This observation, however, cannot be used as evidence, since bone rarefaction of any cause must be accompanied by an increased urinary calcium loss, provided the net intestinal absorption remains unchanged.

The final point in Nordin's thesis is the symptomatic improvement obtained in osteoporotic subjects by giving them additional calcium in the form of glycerophosphate, 6 grams daily. Fraser and his co-workers<sup>3</sup> also claim improvement with calcium therapy (using lactate or gluconate). They report results of calcium-balance studies in 16 'ordinary' osteoporotics, 8 osteoporotics of less common varieties, and 4 normal subjects. 40 mg. of calcium per kilo per day (2.8 G. for a 70-kilo man) were given and many, but not all, patients went into a strongly positive balance in short-term studies. The authors state that some of their patients were re-checked months later and still maintained a good retention of calcium, but unfortunately little data are given regarding these crucial findings. According to the data which are given, the best calcium-retainer apparently increased his body calcium by about 1.5 kilograms in 3 years, which is some 1½ times the total normal amount present in the adult body. Yet no radiological improvement is claimed. Such an absurdity casts doubt on the whole report.

Fraser and his associates suggest that the rarefaction of osteoporosis is really a mild form of secondary hyperparathyroidism. They have found that calcium-deficiency osteoporosis in animals is associated with hypertrophied parathyroid glands, and that the bony rarefaction is reduced by previous parathyroidectomy. They therefore believe that calcium supplements tend to suppress the parathyroid glands and in that way reduce the osteoporosis.

There are some difficulties in the way of accepting the calcium-deficiency theory as a complete explanation of

osteoporosis. The avidity of porotic bones for calcium appears actually to be reduced as judged by the amount of retention of calcium after a single intravenous infusion. Secondly we have the phenomenon of enormous populations of underprivileged people throughout the world whose intake of calcium is apparently very low (200-400 mg. per day) and who yet show little or no evidence of skeletal disease.

This, then is the present position: there are inconclusive arguments favouring the importance of sex hormones and other steroids in the development of osteoporosis; there are arguments favouring the importance of calcium deficiency, in relation to defective intake, poor adaptation, and excessive urinary loss; there are arguments which

involve the parathyroid glands; it is still possible that mild vitamin-D deficiency may play a part in the relatively sunless northern countries; and, finally, there are people who look on osteoporosis as an inescapable physiological accompaniment of the aging process — whatever this may mean. Treatment is as uncertain as before — calcium supplements have yet to prove their worth, and the newer anabolic steroids have not been shown to be superior to the older sex hormones.

1. Albright, F. and Reifenstein, E. C., jr. (1948): *The Parathyroid Glands and Metabolic Bone Disease: Selected Studies*, Baltimore: The Williams and Wilkins Company.
2. Nordin, B. E. C. (1961): *Lancet*, **1**, 1001.
3. Harrison, M., Fraser, R. and Mullan, B. (1961): *Ibid.*, **1**, 1015.

## DIE GENEESHEER EN DIE MEDIESE VERENIGING

Die einde van die jaar kom al weer nader en daarmee ook die toetreding tot die mediese professie van 'n groot aantal nuut-gekwalifiseerde geneeshere. Aangesien die eerste groep studente van die Universiteit van Stellenbosch ook hierdie jaar sal kwalifiseer, beteken dit dat al vyf ons geneeskundige skole in die land nou in volle 'produksie' is. In die lig hiervan sal dit dus paslik wees om weer, soos in die verlede, die belangrikheid te beklemtoon van lidmaatskap van en toewyding aan die Mediese Vereniging van Suid-Afrika — wat die enigste (in die ware sin van die woord) nasionale professionele beroepsorganisasie van geneeshere in ons land is.

Dit het dwarsoor die wêreld 'n gevestigde gebruik geword vir beroepslui om professionele organisasies te vorm waaraan hulle kan behoort en wat as middel kan dien om hulle materiële behoeftes te beskerm en ook om hul kulturele en wetenskaplike ideale te verwesenslik. In die meeste lande van die Westelike wêreld het geneeshere bv. nasionale mediese verenigings gevorm, wat op hulle beurt weer lede is van die Wêreld Mediese Vereniging. So het ons ook in hierdie land die Mediese Vereniging van Suid-Afrika met die uitgesproke doelstelling om die mediese en verwante wetenskappe te bevorder en om die eer en die belange van die mediese professie te behartig.

Sedert die vroegste dae van sy bestaan was dit die doel van die Mediese Vereniging om op te tree as 'n wetenskaplike en kulturele liggaam van professionele mense, wat ten volle bewus is van die groot en belangrike verantwoordelikheid wat op hulle rus om op die hoogte van sake te bly aangaande professionele, wetenskaplike, en kulturele sake.

Dit is wel waar dat die Vereniging gedurende die laaste aantal jare onderhewig was aan besondere ondersoek en kritiek. Daar moet egter in gedagte gehou word dat die Vereniging te staan gekom het voor besondere belangrike probleme, veral op die gebied van die ekonomiese organisasie van die mediese praktyk. Die Vereniging kan slegs voortgaan om hierdie probleme op 'n bevredigende vlak te hanteer as hy kan reken op die heelhartige ondersteuning, nie net van al sy lede nie, maar ook van elke individuele praktiserende geneesheer.

Die Mediese Vereniging en die voordele van lidmaatskap is baie goed bekend by 'n groot aantal geneeshere oral oor die land, maar daar is tog nog baie geneeshere wat nie bewus is van al hierdie voordele nie.

Verder, teen die tyd dat hierdie artikel verskyn, sal daar 'n groot aantal studente wees wat besig is om toe te tree tot die geleedere van die mediese praktisyns in die land. Dit is aan hierdie twee groepe geneeshere — diegene wat reeds al 'n geruime tyd gelede gekwalifiseer het, maar nog nie lede van die Vereniging is nie, en diegene wat nou besig is om te kwalifiseer, dat ons 'n dringende uitnodiging wil rig om lede van die Vereniging te word.

Ons wil veral die aandag van alle geneeshere vestig op die uitstekende artikel: 'The Medical Association of South Africa: its rôle in the past and its ideals for the future', wat in die uitgawe van die *Tydskrif* van 21 Mei 1960 gepubliseer is (34, 423). Hierdie artikel is geskryf deur dr. J. H. Struthers, afgetrede voorsitter van die Federale Raad, en dit handel oor die dienste wat die Vereniging lewer op die gebiede van die ekonomiese organisasie van die mediese praktyk, die druk van die *Tydskrif*, die rol van die Vereniging ten opsigte van die vooruitgang van mediese opvoeding in die wydste sin van die woord, internasionale affiliasie, en die Vereniging se hoop vir die toekoms.

Die volgende is 'n opsomming van die dienste wat deur die Vereniging gelewer word:

1. Geleentheid vir kollegas om mekaar te ontmoet, om wetenskaplike vergaderinge te hou, en om geleentheid om gedagtes te wissel, daar te stel.
2. 'n *Tydskrif* vir die verspreiding van mediese kennis.
3. Fasiliteite om etiese verskille tussen lede te besleg.
4. Fasiliteite om met mediese hulpverenigings te onderhandel en die daarstelling van 'n mate van kontrole oor mediese bystandsfondse.
5. Fasiliteite vir onderhandeling met die Ongevalle-kommissaris.
6. Om die Vereniging te verteenwoordig in alle sake wat mediese praktisyns aangaan, en die feit dat die Vereniging erken word as die amptelike liggaam in verskeie Wette en Ordonnansies.
7. Regskundige beskerming vir individuele praktisyns.
8. Die verkry van verskeie soorte vergunnings insake inkomstebelasting.
9. Die verkry van verskeie soorte voorkeurversekering vir lede.
10. Hulp vir lede deur die agentskapsafdelings.
11. Geriewe vir lede wat in oorsese lande reis deur wederkerigheid met die Britse Mediese Vereniging en die

Kanadese Mediese Vereniging, en deur lidmaatskap van die Wêreld Mediese Vereniging.

12. Die verbetering van salarisskale vir voltydse personeel.

13. Die invloed op mediese skole en mediese opvoeding in die algemeen, bv. ondersteuning van die stigting van die Kollege vir Interniste, Chirurge en Ginekoloë van Suid-Afrika.

14. Nagraadse kursusse wat direk deur die mediese skole aangebied word.

15. Biblioteek-fasiliteite deur toekennings aan die biblioteke van mediese skole.

16. Hulp aan behoeftige afhanklikes van lede deur middel van die Liefdadigheidsfonds.

17. Optrede as 'n saambindende faktor deur Takke en Afdelings.

18. Skakeling met ander professionele liggame en die publiek.

Die Vereniging kan slegs daarin slaag om 'n bevredigende en waardige rol te speel in die mediese professionele beroepslewe in ons land as hy kan reken op die heelhartige ondersteuning van al die geneeshere in die land.