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Effect of PTH (1-34) on trabecular bone of rat vertebral body in induced-biochemical osteoporosis by calcium-deprived diet

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Rats fed calcium-deprived diet were used as experimental model for studying bone modelling alterations during biochemical osteoporosis and recovery of bone loss. Such model is suitable to evaluate the possible effects exerted by PTH(1-34) in preventing as well as in recovering metabolic osteoporosis. Three-month-old Sprague Dawley male rats were divided in different groups: some fed normal diet or calcium-deprived diet with/without 40 μ g/Kg/day PTH(1-34), provided by Eli Lilly-USA, for 4 weeks and some with restoration of normal diet with/without PTH (1-34) for further 4 weeks. To evaluate the occurrence of osteogenesis during the first 4 weeks of the experimental period, rats received three labels of bone deposition at 1st, 20th and 27th day (and then were sacrificed); during the successive 4 weeks (in which those rats previously fed with calcium-deprived diet had restoration of normal diet), animals received three labels of bone deposition at 1st, 7th and 14th day. Histomorphometrical analyses were performed on cortical and trabecular bone taken from the central level of the 5th lumbar vertebral body, transversely sectioned. The results showed that differences among the groups were observed mainly in trabecular bone with respect to cortical one, thus underlining the different role of the two types of bone architecture in mineral and skeletal homeostasis. Concerning trabecular bone, the observations showed that administration of PTH (1-34) during calcium-deprived diet and/or during the restoration of normal diet induces higher deposition of trabecular bone with respect to that recorded in rats that never received PTH(1-34), neither during calcium-deprived diet nor during restoration of normal diet. Since increments of trabecular bone are detectable only after the period of diet restoration (but not before), the authors suggest that a chronic administration of PTH (1-34) is necessary to achieve appreciable results on bone mass recovery.

Keywords

PTH (1-34), biochemical osteoporosis, rat, vertebral body, calcium-deprived diet.