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Studies of Incurable Rickets. I. Respective Rôle of the Local Factor and Vitamin D in Healing.

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This communication reports a type of incurable rickets caused by the substitution of 3% $SrCO_3$ for 3% $CaCO_3$ in a rickets-producing diet.

Rats were divided into 2 groups. To the control group the rickets-producing diet containing 3% $CaCO_3$ was fed while the other group received 3% $SrCO_3$ instead of the calcium salt. The initial weight of the animals varied between 43-60 gm. At the end of 21 days both groups of animals showed severe rickets. The control group gained 25-45 gm. each while the strontium group gained 0-5 gm. An analysis of the serum of the control rachitic animals showed a Ca X P product of 15-24, while the strontium fed animals gave a product of 30 made up of Ca = 10.6 mg. % and Inorganic P = 2.8 mg. %.* The average ash content of the fat-free femurs was 33.23%. The flame test was negative for strontium in these bones.

To calcify the endochondral cartilage of the tibiae of each group, artificial serum solutions having a Ca X P product which varied from 30-60 were incubated. The technique of Shipley, Kramer and Howland[1] was used. The control group showed satisfactory calcification at products of 40, 50 and 60 while the tibiae from the strontium animals showed no fresh deposition.

The remaining animals of both groups were given 300 Steenbock units of vitamin D in the form of viosterol during a period of 9 days. All of the control rachitic animals healed and the serum Ca X P product rose to between 60 and 80. The untreated group still showed a Ca X P product between 15 and 25. The strontium animals failed to respond, the rickets being even more severe at the end of the 9 days of treatment than before therapy was begun. Nevertheless, the Ca X P product of the serum rose to 62. This value was due to a Ca of 12.1 mg. % and a serum inorganic P value of 5.1 mg. %.* The average ash content of the fat-free femurs was 29.4%, therefore decalcification of the bones progressed. The flame test was negative for strontium.

* The possibility that both calcium and strontium were precipitated by oxalate has been considered. The quantitative separation of these elements is now being undertaken.

[1] Shipley, P. G., Kramer, B., and Howland, J., *Biochem. J.*, 1926, **20**, 379.

The results of *in vitro* calcification studies were the same as of above, the control group calcified at Ca X P of 60 while the strontium treated rats failed to heal.

Ten animals were used for strontium rickets and 10 for the control rickets. Six animals of each group were examined at the end of 21 days, 4 animals of each group at the end of 30 days. The strontium group received 300 Steenbock units of vitamin D while the controls examined did not.

Conclusions. The substitution of strontium for calcium in the rickets-producing diet produces a form of rickets which fails to respond to the very large amounts of vitamin D. The endochondral cartilage of strontium-fed animals both treated and untreated fails to calcify when incubated in artificial serum solution even with a Ca X P product of 60 which produces marked calcification in the endochondral cartilage of control rachitic rats. These observations strongly suggest an injurious effect of strontium upon the "local factor" in the hypertrophic cartilage of the provisional zone of calcification which brings about calcification at this area when conditions in the serum are favorable. The ability of vitamin D to cause an increase of the Ca X P even when healing does not take place, implies that this raising of the product is the function of the antirachitic vitamin in the cure of rickets.

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Effect of Ascorbic Acid on Thyroid and Suprarenals of Guinea Pigs.*

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In previous publications from this laboratory[1-5] it has been shown that fresh plant and fruit juices contain an antigoitrous agent when

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