Demonstration of a Hypocalcemic Factor (Calcitonin) in Commercial Parathyroid Extract

Abstract. Intravenous injection of commercial parathyroid extract into fasted dogs resulted in a transient hypocalcemia. The plasma calcium fell 0.40 to 0.65 mg/100 ml within 20 minutes and then rose in the characteristic response to the parathyroid hormone. The hypocalcemic response was similar to that ascribed to the recently reported hormone "calcitonin," and the data suggest that the extract may contain both.

In 1925, Collip (*1*) prepared a relatively crude acid extract of beef parathyroid which was physiologically active and raised the level of blood calcium in parathyroidectomized dogs. The parathyroid hormone responsible for this action has recently been isolated as a pure protein (*2*). In studies on humoral control of parathyroid function (*3*), evidence was obtained of another hormone in the parathyroids, "calcitonin" (*4*), which causes a prompt but transient fall in plasma calcium. It is apparently released from the glands when they are perfused with blood containing higher than normal concentrations of calcium.

The experiment reported here was carried out to determine whether similar activity might be demonstrated in the relatively crude commercial parathyroid extract. The dogs used were fed a low calcium diet for at least 4 days before the test and were fasted overnight. Under Nembutal anesthesia, blood samples were collected at 15-minute intervals for a 2-hour control period, and at 10-minute intervals for the first half hour after injection of the commercial parathyroid extract (*5*). A dose of 300 to 1000 international units was given to the dogs by intravenous injection over a period of less than a minute. Plasma calcium was determined by photometric titration with ethylenediaminetetraacetic acid. Duplicate samples checked within ±0.05 mg/100 ml, and the plasma calcium level during the control periods was remarkably constant. In seven dogs, the plasma calcium fell promptly after injection of the extract, the greatest fall (—0.40 to —0.65 mg/100 ml) being observed after 20 minutes. This was followed by the usual rise in plasma calcium characteristic of the action of parathyroid hormone. A typical response is shown in Fig. 1, where it is compared to the response obtained after injection of plasma from a high calcium parathyroid perfusate which presumably contains calcitonin (*6*). It will be noted that the two are very similar. The data suggest that commercial parathyroid extract may contain both parathyroid hormone and calcitonin activity.

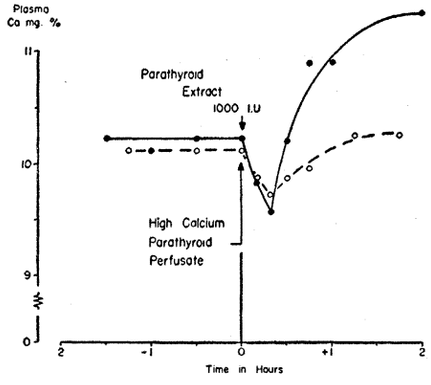

Fig. 1. Change in plasma calcium after intravenous injection of 1000 international units (I.U.) of extract (solid line) compared with that after intravenous injection of 50 ml of plasma from perfusion of the isolated parathyroid with high calcium blood (dashed line) (*6*).

It is interesting to recall that the relatively crude early preparations of insulin gave a transient hyperglycemic effect which was later found to be caused by glucagon, a short-acting hormone from the pancreatic islets with the opposite effect on blood sugar to that of insulin (*7*).

It is not surprising that this transient hypocalcemic effect has been previously overlooked. Until recently, parathyroid extract was usually given subcutaneously or intramuscularly; blood calcium was determined hourly; and calcitonin was unsuspected. Its presence in commercial parathyroid extract should facilitate the isolation of the new hormone (*8*).

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References and Notes

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8. This research was supported by a grant from the Medical Research Council of Canada. Special thanks are due Barbara Cheney and Kurt Henze for valuable technical assistance.

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A Pollen Profile from the Grassland Province

Abstract. Hackberry Lake near Valentine, Nebraska, has deposited about 5 meters of sediment in little more than 5000 years. Its mass pollen spectrum shows over 50 percent grass and about 12 percent tree pollen, but the mass spectrum for the lowest meter shows less than 30 percent grass and over 20 percent tree pollen. This suggests a cooler and more humid climate at inception of the lake than later, and raises interesting questions requiring further research.

In January 1959 William N. Irving, Lee G. Madison, and I visited a number of places in the Nebraska Sandhills and took cores through the ice in three lakes for pollen analysis. My two companions were from the Lincoln office of the Missouri Basin Studies of the Smithsonian Institution (*1*).

The purpose of our collecting was to investigate the sedimentary record of vegetation change in the area. The Sandhills (*2*), some 20,000 square miles, lie mostly north of the 41st parallel and west of the 100th meridian, although extending east to the 98th. Thus they are well inside the grassland formation (which has been called the most extensive and varied climax in the United States (*3*). Although the "origin" of the grasslands has long been a subject of lively discussion (*4*), their history is little known as compared with that of the northeastern forests and southwestern deserts. Yet lying as they do between these two extremes, athwart the major Pleistocene climatic gradient, the North American grasslands must have responded sensitively to climatic changes in the past, as they still do to changes of lesser magnitude (*5*).

A record of these responses would have value not only for biology, but for archeology, geology, climatology, and other fields. Lane's excellent study (*6*) of a bog in northern Iowa shows a rapid shift from early postglacial conifer forest to savanna and/or prairie, twice interrupted by xeric conditions. Voss's work (*7*) in Lake County, Illinois, meeting place of conifer, deciduous, and prairie vegetation, shows only the early shift from coniferous to deciduous forest and no change thereafter. But he reports no herbaceous pollen, a circumstance we are now prepared to investigate from recent collections in the area.

Between these two sites and the arid basins of New Mexico there is a hiatus