teen of the 46 were associated with biting episodes that involved human beings although the biting in only two cases (Cases 22 and 24) was an outright aggressive act unprovoked in any way by the victim. During the 11-year period, the laboratory tested a total of 1072 bats; 520 of these were collected from natural habitats during 1962 and 1964 for study purposes.[2] The remainder (552) were submitted to the state laboratory for routine rabies diagnostic testing over the 11-year period. The overall frequency of positive rabies observed among all bats tested – biting, nonbiting, routine submissions and presumably normal, collected bats – was 4.3 per cent (i.e., 46/1072 × 100). This compares closely with the 4.9 per cent overall rate observed by the New Jersey Department of Health,[3] and appears to reflect the average prevailing rates of infection among such bats in the Northeastern region of the United States.

Spillover of rabies from the bat reservoir to "four-footed" animals was not observed during this period. Despite the continuing presence of the infection in bats, and sporadic reports of rabies in foxes and skunks in neighboring out-of-state areas, rabies in Massachusetts apparently remains confined to the bat population. Nevertheless, animal bites, particularly in Massachusetts areas bordering on New Hampshire, continue to deserve individual evaluation. For example, a rabies-positive fox was reported by the New Hampshire Department of Health Laboratories in October, 1971, in the Town of Peterborough, about 19 km from the Massachusetts border. However, no additional cases have been identified from this area up to the present.

During the past two years, approximately 10 per cent of the animals tested by the State laboratory have been bats (Table 1).

Table 1. Animals Tested by the Laboratory.

Fiscal Yr	Total Specimens Tested	No. of Bats Tested	No. Positive	% Positive
1971	591	50	4 (bats)	8.0
1972	598	60	8 (bats)	13.0

The eight positive tests (13.4 per cent) reported for fiscal year 1972 represent the highest total for a single year observed during the 11-year period. Of the remaining specimens negative for all rabies, the following have been the average rates in recent years: dogs and cats, 45 per cent; rodent and pet-type animals (squirrels, chipmunks, mice, rats, hamsters, guinea pigs, etc.), 30 per cent; miscellaneous (horses, cows, monkeys, opossums, woodchucks, etc.), 10 per cent; and foxes, raccoons and skunks, 5 per cent. Whether the above figures indicate a real and important increase in rabies infection among Massachusetts bats is uncertain, but the situation is serious enough to advise cautioning all persons to avoid any unnecessary contact with, or handling of, bats, especially those exhibiting abnormal behavior. People should be particularly wary of the bat flying by daylight, bumping into objects, falling from trees or out from under the eaves of a house, or attacking animals or human beings, and even of an apparently dead, grounded bat. Unfortunately, it is necessary, in some cases, to attempt to capture a bat as the lesser of two evils. Once a bat is grounded, a person should take precautions to avoid being bitten. He can greatly reduce the chances by using leather gloves and forceps, and by teasing or placing the bat into a suitable container, such as a coffee can. Several holes should be punched in the lid, and the can and its contents placed under refrigeration (not frozen) pending delivery to the State Diagnostic Laboratories for examination. In many areas this can be done through the local boards of health. It is essential in all cases to include a statement explaining how the specimen was collected *and whether anyone has been bitten*. Massachusetts physicians may obtain assistance from either the Division of Communicable Diseases (727-2686, or 727-2688) or the State Laboratory Institute (522-3700) of the Massachusetts Department of Public Health. For persons bitten by bats, an immediate, complete course of post-exposure prophylactic treatment is usually recommended[4] regardless of the laboratory test results. This precaution is advised because of the occasional false-negative fluorescent-antibody test that may be encountered in actual practice.

Massachusetts bats are insectivorous in nature and have a very important role in the control of insects. It is neither feasible nor practical to attempt to control rabies in bats by area-wide programs to reduce the bat population. However, bats should be eliminated from dwellings and surrounding structures to diminish the likelihood of human exposures to bites. Such structures should then be made bat-proof by sealing of entrance routes with screens or by other means.[5]

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CORRESPONDENCE

Letters to the Editor are welcomed and will be published, if found suitable, as space permits. Like other material submitted for publication, they must be typewritten *double spaced* (including references), must not exceed 1½ pages in length and will be subject to editing and possible abridgment.

DEFECTIVE RELEASE OF GROWTH HORMONE IN PARKINSONISM IMPROVED BY LEVODOPA

To the Editor: Boyd et al. discovered that levodopa can induce rises far above the basal serum levels of growth hormone, by giving single oral doses to fasting patients with Parkinsonism.[1] Similar tests conducted by others before and after long-term treatment of Parkinsonism with levodopa evoked warnings concerning possible iatrogenic acromegaly.[2] To our knowledge, however, repetitive determinations of this hormone through the day have not been done either in untreated patients or in those treated diurnally with levodopa. Since some of the normally occurring rises of serum growth hormone are linked to sleep and to exercise[3,4] they might be abnormal in Parkinsonism, in which the tremor disappears during sleep while hypokinesia interferes with exercise.

We have determined, in three untreated patients with Parkinsonism, serum growth hormone levels every 30 minutes for two separate 24-hour periods, using a radioimmunoassay (Abbott Laboratories). The basal levels, ranging between 2 and 5 ng per milliliter of serum, were similar to those reported for normal subjects. However, the records from all six runs were flat, except for a total of five short-lived rises averaging 7 ng above the basal levels. These contrasted to

normal records, each of which had shown several rises of hormone levels, and at least three of which surpassed 20 ng per milliliter and lasted for two hours or longer.[5]

The rises found in six different runs among three patients receiving 500 to 700 mg of levodopa six times a day were similar to normal records. The records on these patients, however, were made only during the hours of 8 a.m. to 4 p.m. and not as yet for the remainder of a 24-hour day. In these nonfasting patients, as in fasting ones described by others,[1,2] the first morning dose of levodopa increased the levels of growth hormone 10 to 50 ng above the basal ones. Several subsequent doses also evoked rises, but these were always smaller than the first one. Although their timing was drug dependent, their duration and numbers were often similar to those reported for normal subjects.[5]

These differences between untreated and levodopa-treated patients with Parkinsonism were also reflected in the following calculations: the sum of all measurements conducted each 30 minutes for eight hours, which showed for the untreated versus the treated patients a mean and standard error 67 ± 10 versus 117 ± 11 ng per eight hours ($p < 0.01$); and the sum of all measurements remaining after subtracting the basal levels to reflect only the rises that showed respectively 7 ± 1.7 versus 62 ± 9 ng per eight hours ($p < 0.001$).

These findings suggest the existence of a defective output of growth hormone in patients with Parkinsonism, which levodopa appeared to correct. Growth hormone is now being studied as a therapeutic agent for osteoporosis,[6] which frequently affects patients with Parkinsonism. The consequences of levodopa administration, therefore, might transcend the control of neurologic symptoms in Parkinsonism.

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IS THERE MORE THAN ONE PARATHYROID HORMONE?

To the Editor: The idea of more than one parathyroid hormone, put forward 10 years ago by Dent,[1] was based on the assumption of two different diseases of hyperparathyroidism. Recently, immunoassay studies on human parathyroid hormone showed that endogenous plasma parathyroid hormone was immunochemically different from extracts of parathyroid glands, and that both species were immunochemically heterogenous.[2,3] Gel-filtration studies revealed three species of parathyroid hormone with different molecular weights and amino acid compositions. The finding was explained by the existence of a glandular precursor ("pro-parathyroid hormone") and a secreted hormone similar to the well established existence of the proinsulin-insulin system. It is well known that insulin secretion takes place in only one of the cell types of the islets of Langerhans, whereas we are still kept in the dark about the importance of the presence of three histologically well defined cell types of the parathyroid glands. The following few observations indicate a relation between gland histology and hormone physiology — i.e., that the cell composition of the diseased parathyroid gland determines some effects of the hormone secreted:

To begin with, in 15 hyperparathyroid patients, a difference in the renal handling of phosphate was observed: two patients with primary hyperplasia had normal tubular reabsorptive capacity for phosphate, whereas 13 patients with parathyroid adenomas had low values for phosphate reabsorptive capacity.[4]

Secondly, endogenous or exogenous excess of parathyroid hormone increased tubular reabsorptive capacity for glucose in man.[5] Patients with water-clear cell hyperplasia in whose parathyroid glands no or few oxyphil cells could be detected had low values for glucose reabsorptive capacity.[6] In children, glucose reabsorptive capacity is low,[7] and in the parathyroid glands of children oxyphil cells are absent. Electron microscopy of oxyphil cells has demonstrated organelles and membrane-limited secretory granules suggesting secretory function.[8]

The finding of a certain correlation of one effect of the hormone to one particular cell type of the gland consisting of three different secreting cell types supports the assumption of the existence of more than one parathyroid hormone as indicated by the immunochemical heterogeneity of plasma parathyroid hormone.

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OAT-CELL CARCINOMA AND SEVERE HYPOURICEMIA

To the Editor: Severe hypouricemia (values below 1 mg per 100 ml) is rarely found in persons who have not ingested drugs that enhance uric acid excretion or reduce its synthesis. The following case is therefore of interest.

A 52-year-old woman had a one-month history of malaise and progressive dyspnea. She had taken digoxin for five months and had smoked 20 cigarettes per day for 20 years. A chest film disclosed infiltrates of the right middle and lower lobes that failed to clear with ampicillin therapy. The serum sodium was 133 to 139 mEq, and the chloride 96 to 107 mEq per liter, uric acid 0.6 and 0.8 mg, calcium 9.8 mg, phosphate 2.8 mg, and creatinine 0.8 mg per 100 ml. Twenty-four-hour urinary uric acid values were 300, 400 and 490 mg per 100 ml, with a uric acid clearance of 26 ml per minute and a creatinine clearance of 100 ml per minute. On a diet containing 600 mg of phosphate, tubular reabsorption of phosphate was 81 per cent of normal. Twenty-four-hour oxypurine excretion was 13.7 mg, and 24-hour urinary uric acid excretion was normal. There was no glycosuria. Bronchoscopy showed chronic inflammation of the right main-stem bronchus, with negative cytologic findings. Exploratory thoracotomy disclosed an oat-cell carcinoma of the right main-stem bronchus.

The patient had not received uricosuric drugs or allopurinol. Although she had taken 9 aspirin tablets in the three days before admission, such a dose is probably not large enough to have a notable uricosuric effect.[1] In addition, the serum uric acid remained very low in the hospital period, during which she ingested no salicylates. A generalized tubular defect was deemed unlikely, since urinary amino acids were normal, and there was neither phosphaturia nor glycosuria. Xanthine oxidase deficiency[2] can also be excluded by the normal oxypurine and uric acid excretions. There was no clinical evidence of Wilson's disease[3] or hemochromatosis.[4]

Perhaps the severe hypouricemia was related in some way to the pulmonary tumor. Weinstein et al.[5] described two such patients, who, in addition to hypouricemia, also had aminoaciduria. In their report, increased uric acid clearance was postulated as the mechanism, perhaps mediated by a toxic metabolite. Mees et al.[6] discuss Weinstein's patients and present two additional cases. They hypothesize that hypervolemia secondary to inappropriate antidiuretic-hormone secretion was the mechanism, and were able to increase uric acid clearance and decrease serum uric acid levels in controls by