Thymus hormone is isolated

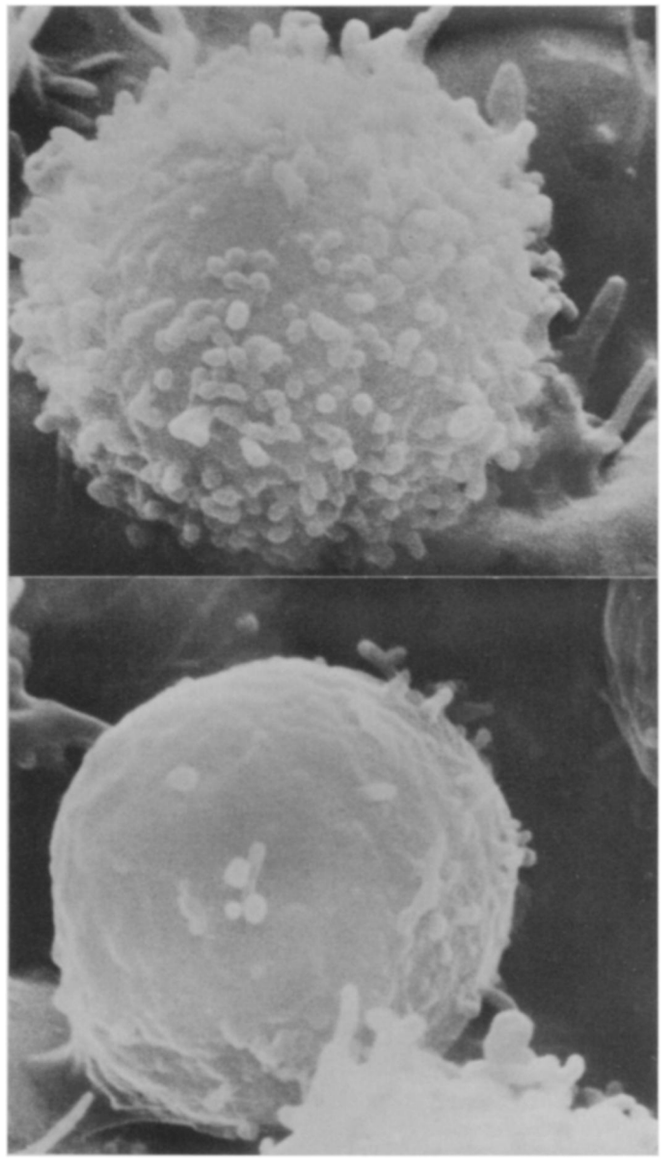
Achievement has enormous implications for immunological research

Our immune systems are strikingly aggressive, defending us against bacteria, viruses and foreign body tissues. Sometimes our immunological defenders get confused and try to defend us against our own tissues. Because immune defenses are involved in medical problems as diverse as acute infections, autoimmune diseases, organ transplant rejection and cancer, they are the subject of one of the most active areas of biomedical research.

Recently the body's two main types of immune cells were visually identified by investigators at the Memorial Sloan-Kettering Cancer Center and Rockefeller University. Using the scanning electron microscope, they found that B cells (B lymphocytes) look like complex balls, studded with lots of fingers, and that T cells (T lymphocytes) look like relatively smooth balls. B cells are made in bone marrow. In turn they produce antibodies against invaders. T cells are made by a tiny organ at the base of the throat, the thymus. They respond directly to "the enemy."

Now immunologist Gideon Goldstein and his team at the New York University School of Medicine have isolated two closely related chemicals that appear to play hormonal roles in the thymus—specifically, to help the thymus make T cells. Several other investigators have made similar claims, but the New York University team's evidence appears to be the strongest so far. They report their isolation in the Jan. 4 NATURE. A report on the effects of their hormonal substances is in press with the PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

If these claims for a thymic hormone indeed prove to be correct, it will be the first evidence for an implication of a hormone in immunity. The only related hormone that has been identified is erthropoietin. It switches on red blood cells, which are made by bone marrow. Whether a hormone turns on B cells in mammals or not is uncertain.



Under the scanning electron microscope, immune cells appear spectacularly beautiful. They are also easily distinguished. The B lymphocyte (above) looks like a ball of fluff, the T lymphocyte (below) like a scoop of ice cream.

Memorial Sloan-Kettering and Rockefeller Univ.

Goldstein and his colleagues approached their isolation challenge by a rather circuitous route. For some time investigators had known that a human neuromuscular disease, myasthenia gravis, is characterized by some abnormality in the thymus. Studying the features of the disease, Goldstein came to believe that it is caused by an abnormal secretion of some thymic substance. He then developed laboratory animal models for the disease and found that a substance released from the thymus of the animals blocked their neuromuscular activity. Subsequently he injected normal thymus extracts into other animals and found that the extracts impaired the animals' neuromuscular action. Then he and his co-workers set about trying to isolate from the thymuses of cows whatever chemical is capable of blocking neuromuscular action if present sufficiently in large enough amounts.

They have now isolated such a chemical, or rather two closely related polypeptides, which they call thymin I and thymin II. When a mouse is given a single injection of thymin, its neuromuscular activity is impaired. More striking, the thymin causes bone marrow cells to become T cells, suggesting that thymin probably also causes the thymus to make T cells. And the thymin shows both these biological activities at one-thousandth the dose it takes the several other purported thymic hormones to achieve any biological activity. Activity in such small concentrations is one of the strongest arguments that thymin is truly a thymic hormone.

However intriguing thymin's effects on neuromuscular action, Goldstein views it as fortuitous. What is really exciting, he believes, is the impact of an isolated thymic hormone on immunological research. "It opens the possibility of controlling T cell production and response," he says. "There is a spate of human diseases where we would like to potentiate T cells." □