



Electron Microscope

and the Golgi substance

see overleaf

The Electron Microscope and the Golgi Substance

Proof that an organized structure called the Golgi substance may be visualized inside the living cells of animals was found with the help of the electron microscope. Study of the substance may add fundamental knowledge of the makeup of cancer cells.

The first to describe this substance was Camillo Golgi, an Italian neurologist, who in 1898 discovered it in nerve cells of the barn owl and called it the "internal reticular apparatus." Since that time scientists interested in the structure and function of cells have done many experiments in unsuccessful attempts to isolate the Golgi substance or to prove its existence. Investigators using the classical methods of staining with osmic acid and silver have identified the substance in numerous multicellular organisms, observing it in functioning resting cells but not in dividing cells. It has not been identified in viruses, bacteria, or single-celled animals such as protozoa.

In recent years the reality of the substance has been the subject of controversy since it had not been satisfactorily demonstrated in living body cells. Now that Public Health Service cytologists of the National Cancer Institute have demonstrated the Golgi substance in the living state, more can be learned about its functions and chemical nature. Chemical analyses of the substance in normal and in

cancer cells have been started by these scientists at the National Institutes of Health.

The Golgi substance was identified in fresh unstained body cells isolated from mice and rats. It was then photographed in the living state for the first time. After identification, the substance was isolated by high-speed centrifugation.

In photographs of isolated cells magnified several thousand times, the Golgi substance appeared as dark strands forming a cylindrical network in the cytoplasm between the nucleus and the outside border of the cell.

The presence of the substance with a characteristic position and distribution is evidence for the view that it plays some important role in the life of the cell. The most generally accepted theory on the function of the substance is that it serves as an area for the segregation and accumulation of secretory and excretory products of the cell.

Study of the Golgi substance may introduce new criteria useful in distinguishing a malignant cell from a normal one. Distinct differences between the substance in normal and in malignant human tissues have been observed.

The electron microscope will continue its usefulness in the future research on the Golgi substance.

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