MEDICINE

Find Points to New Drugs

➤ NEW DRUGS that will be better than present drugs because they are specially designed to have specific effects in the body are expected as a result of a discovery by scientists at the National Heart Institute in Bethesda, Md.

The discovery is that the body has systems of "counter agents" that attack and inactivate drugs and other foreign compounds. These counter agents are contained in liver microsomes, tiny particles of the body's cells too small to be seen even with a microscope.

The research team which made the discovery includes Dr. Bernard B. Brodie, Julius Axelrod, Jack Cooper, Leo Gaudette, Dr. Bert La Du, Dr. Chozo Mitoma and Dr. Sydney Udenfriend.

Before the discovery of this function of liver microsomes, it was assumed that drugs were inactivated by becoming "enmeshed" in biochemical mechanisms which did not distinguish between drugs or other foreign compounds and substances used in the body's normal economy.

The discovery came from an earlier study of a then new compound, SKF 525-A. This compound, which lacks any activity of its own, was known to possess a remarkable ability to prolong or "potentiate" the effects of other drugs in the body. Rats tested, for example, slept ten times as long with a barbiturate when its use was accompanied by SKF 525-A than without it. This potentiating effect was seen not only with barbiturates but also with an unrelated variety of compounds such as narcotics, muscle relaxing drugs, and even stimulants.

That SKF 525-A could slow the breakdown of such unrelated compounds was surprising and interesting to Heart Institute investigators. It suggested the possible existence of a common denominator which ties together in some way all of the body's different pathways of drug breakdown and makes them all open to the action of SKF 525-A. This common denominator was the liver microsome which was found to contain nearly all of the enzyme systems responsible for drug breakdown.

Liver microsomes, however, will not work to break down drugs without help. Oxygen and reduced TPN (triphosphopyridine nucleotide), an "enzyme helper" present in various kinds of chemical systems in nature, are also necessary common denominators. With the use of all three, microsomes, oxygen, and reduced TPN, many drugs are now being made to undergo in the test tube the same kind of metabolic distintegration as they would undergo naturally in the body.

Science News Letter, May 28, 1955

MEDICINE

Cocoon Phase for Virus?

➤ PARTICLES OF the virus that causes breast cancer in mice get themselves imbedded in a "sort of cocoon." Maybe this mouse cancer virus and all other viruses have life cycles, spending one part of the cycle in cocoons.

Discovery of the mouse breast cancer virus particles in what looked like a cocoon was made by Dr. Leon Dmochowski of Baylor University College of Medicine and M. D. Anderson Hospital in Houston, Tex. Dr. Dmochowski's research was begun with Dr. Cushman D. Haagensen of Columbia University, New York.

Dr. Dmochowski has made pictures of these cocoons intact and being disrupted.

If the viruses have a definite life cycle, science for the first time has pictorial proof of a great mystery: how the virus reproduces inside the tumor cell.

It appears from pictures so far made that the cancer viruses do not break up the cell which houses and nurtures them. They appear to use the cell as a virus factory and escape from it one at a time, presumably to infect other cells.

Whether they ever exhaust the cell and leave it to disintegrate is still an open question.

While Dr. Dmochowski feels that still further tests must be made before he can be absolutely sure that he is dealing with a virus, some other scientists concede that the particles are indeed the long-sought-for mouse breast cancer virus. Dr. Dmochowski readily produces cancer by injecting the core or central part of these particles (and not cancer cells) into mice.

The particles, which are the central parts of larger size particles, are spheroid in shape; and the basic units may have the peculiar property of coming together to form giant viruses. Some are 30 or more times the size of the smallest particles. Oddly enough, the small particles are much more infective than the larger ones.

The large particle has a dark center. This is interpreted to represent RNA or ribose nucleic acid, which contains the hereditary traits of the virus.

Dr. Dmochowski finds these particles only in the outer cytoplasm of the mouse breast cancer cells, never in their nuclei. They are found particularly associated with what is known as the endoplasmic reticulum, the cell's principal chemical factory, he said.

Science News Letter, May 28, 1955

BIOCHEMISTRY

Four Steps to Germ Destruction in Body

➤ FOUR STEPS in the body's complicated process for destroying invading disease germs and, perhaps, other alien cells such as cancer, have been found by scientists at Johns Hopkins University in Baltimore.

Production of antibodies, familiar to everyone who has followed the polio vaccine story, constitutes only one requirement for successful destruction of alien cells. Equally important is complement, which works with the antibodies.

Complement is a mixture of four proteins. It abounds in normal blood. Complement acts in the following four steps, the cancer society report states:

1. Two of complement's four protein components, utilizing the electrostatic double charge of calcium, are bound to chemicals on the surface of the invading cell. If charged calcium is not there, this initial reaction cannot take place, and the body cannot defend itself.

2. With doubly charged magnesium present, a third complement component further reacts with the complement-cell combination. If magnesium is not present, this defensive chemical step cannot take place.

3. The remaining complement component then reacts with the complement-cell combination, whcih now has gone through the calcium and magnesium-induced steps, and this final blow damages the cell.

4. The damaged cell dies and becomes a ghost, releasing the contents which had endowed it with life and function.

The studies which showed this were made by Dr. Manfred M. Mayer assisted in various parts of it by Drs. Lawrence Levin, Herbert J. Rapp, A. Alvin Marucci, Kenneth M. Cowan and Abraham G. Osler. The research was supported by the American Cancer Society, the National Science Foundation, the Office of Naval Research and the Sidney M. Cone Foundation.

Science News Letter, May 28, 1955

MEDICINE

Lima Beans May Give Stuff for Blood Typing

➤ BLOOD GROUPINGS for transfusions may be done more cheaply in the future by using substances extracted from lima bean plants. Proteins from these and other plants will combine with certain red blood cells and make them stick together, which may lead to use of the substance for blood grouping.

If the lima bean chemicals can be made to work on a practical scale, they will replace human blood serum, which is expensive and sometimes hard to get.

Studies on the lima bean serum substitute will be continued by Dr. William C. Boyd of Boston University under a three-year grant of $20,000 from the National Science Foundation.

Science News Letter, May 28, 1955