IMMUNOLOGY

Jet-Injection Inoculation

MASS IMMUNIZATION against disease by jet injections may provide a breakthrough in the elimination of epidemics that have plagued underdeveloped areas of the world for centuries.

Results obtained with jet vaccine administration in Pakistan give promise of "a new horizon in the field of mass inoculation," Richard L. Towle reports. He is field sanitarian adviser with the International Cooperation Administration's U.S. Operations Mission to Pakistan, Dacca, East Pakistan.

Cholera and typhoid vaccines were administered to the civilian population by means of a "hypospray multidose injector," a compact instrument developed several years ago by the U. S. Army and used with great success for large-scale immunization of military personnel.

Vaccine is forced through a minute opening under high pressure, producing a jet stream that penetrates the surface tissue of the skin.

The vaccine remains in a closed, sterile system, thus eliminating the necessity for sterilization required with the ordinary syringe and needle method of inoculation.

Springs supply pressure for injection, and power is supplied by an electric-motor-driven hydraulic system.

The entire process of loading and firing the injector into the patients requires only a few seconds, Mr. Towle reports in Public Health Reports, 75:471, 1960.

The machine's capability is demonstrated by the fact that thousands of Pakistanis were inoculated against cholera daily with two injectors.

As many as 6,759 men, women and children were treated by two technicans in one day by hypospray injection, contrasted to a maximum of 100 inoculations per inoculator working with needle and syringe. Thus one injector does the work of 25 to 30 men.

East Pakistan is one of the few remaining endemic areas of cholera in the world, with a reported death rate from this cause of 10,000 annually.

The actual figure is believed considerably higher since infectious diseases are inadequately reported.

The population of East Pakistan is 46,000,000. Its immunization programs are carried on by the limited staff of their Directorate of Health Services which can provide only one vaccinator and inoculator for about every 40,000 persons.

Added to this obstacle of insufficient trained personnel is the psychological aspect of the fear of the needle among the comparatively uneducated masses in the area.

Even the educated classes have reason to fear needle immunization since untrained assistants often neglect the sterilization required and it has not been uncommon for malaria, syphilis and hepatitis to be transmitted by vaccination against cholera and typhoid.

The fact that no needle was used "seemed to impress the people more than any other factor," according to observations made by Mr. Towle and his staff.

They have set up classes to train sanitary inspectors and doctors in Pakistan to both operate and maintain the injectors. Plans are underway to supply sufficient instruments to enable those now in training to take over the burden of mass inoculation in the area.

In the limited period of nine months in which this method was used by the ICA team, 52.7% of the population of the entire union of Pakistan were inoculated.

Mr. Towle believes the achievement in Pakistan demonstrates that the jet injectors "can be used effectively . . . in the prevention of disease in any situation which calls for mass inoculation."

Science News Letter, July 2, 1960

MEDICINE

Inflammation in Arthritis

A THEORY as to the cause of inflammation associated with rheumatoid arthritis was proposed at Hollywood, Fla., by Dr. Charley J. Smyth, president of the American Rheumatism Association.

He pointed an accusing finger at "mast cells." These are cells that tend to cluster outside the capillaries, small veins and small arteries.

They are also found in skin, heart, lungs, gastro-intestinal tract and membranes surrounding joints, all tissues that undergo changes in connective tissue diseases such as rheumatoid arthritis.

Mast cells are also known to secrete or contain three powerful chemical substances: heparin, which prevents blood clotting; histamine, which dilates capillaries, and serotonin, which acts like a hormone and helps transmit nerve impulses across brain tissue.

It is also believed that cortisone, which temporarily suppresses joint swelling but may cause increased inflammation of blood vessels, acts by stimulating mast cells.

Dr. Smyth, an associate professor of medicine at the University of Colorado, suggested that a chain of events leads to chronic joint inflammation and formation of scar tissue around blood vessels.

First, some mechanical, chemical or allergic damage occurs near a blood vessel. Mast cells then release their granules into the jelly-like matrix into which connective tissue fibers are imbedded.

If steroids, such as cortisone, are given, the mast cells may be stimulated into releasing heparin.

An arthritic patient who receives a minor skin injury while he is taking the cortisone may thus develop an ineffective blood clotting mechanism. This actually shows up as vascular skin lesions or hemorrhages on the hands and forearms in many arthritic patients.

Because of the presence of mast cells and histamine, capillaries may be dilated, fluid accumulate and edema result.

Finally, granules released by the mast cells would form scar tissue from collagen fibers. In chronic inflammation, mast cells increase in numbers and eventually a scar tissue composed largely of collagen fibers is formed.

Serotonin may enter the picture by stimulating the production of fine fibers.

Dr. Smyth said "mast cells can be looked upon as prime movers in the chain of events we know as the inflammatory reaction."

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