

and for cooling and dehumidification in hot weather. A high ventilation rate, between 15 and 25 air changes, is desirable to remove odors and maintain uniformity of temperatures in extremes of weather. Recirculation is not used extensively in these wards owing to odors and the possibility of infection.

FEVER THERAPY

Artificial production of fever in man is an imitation of nature's way of overcoming invading pathogenic organisms. The action may be direct and specific by destruction of the invading organism within the safe limit of human temperatures, or indirect in the case of heat resistant organisms, by general mobilization of the defensive mechanisms of the body, which retard or neutralize the activity of pathogenic bacteria and their toxins.

The limits of induced systemic fever are usually between 104 and 107 F (rectal), and the duration from 3 to 8 hours at a time. The total period of fever treatment varies with the type of the organism involved from a few hours to 50 or more.

The diseases which respond favorably to artificial fever therapy are gonorrhea and its complications, (which include arthritis, pelvic infections in women, and involvement of the eye), syphilis, chorea, infectious arthritis (non-gonorrheal), encephalitis, and some forms of asthma. There are other conditions which show promise under this treatment; but the most striking results are seen in gonorrhea and syphilis, since the causative organisms can be destroyed at temperatures compatible with human life⁸.

Equipment for Production of Fever

Various means have been tried for producing artificial fever, including injections of various crystalloid or colloid substances, bacterial products of typhoid and malarial organisms; a number of physical methods, such as hot baths, radiant heat, diathermy, radiothermy, and in the last few years, air conditioned chambers. The relative advantages and disadvantages of various methods have been discussed in a recent paper⁹. The results by the use of air conditioned cabinets have not been fully explored, and it is therefore difficult to determine all the advantages and disadvantages of the value of air conditioning at this time.

In the earlier studies of the Society¹⁰, temperatures were elevated more easily using saturated atmospheres. A fever therapy apparatus¹¹ using these same principles has proved efficient as a means of inducing and maintaining fever in a body with small likelihood of burns because of the comparatively low dry-bulb temperatures. This saturation factor is in great use today where fever is created by induction currents by placing the body in an electrical field. When the optimum body tem-

⁸Report of the First Year of Fever Therapy Research by the Department of Industrial Hygiene, School of Medicine, University of Pittsburgh, 1938.

⁹Fever Therapy by Physical Means, by Frank H. Krusen and E. C. Elkins (*Journal American Medical Association*, 112: 1689-1696, April 29, 1939).

¹⁰A.S.H.V.E. RESEARCH REPORT No. 654—Some Physiological Reactions of High Temperatures and Humidities, by W. J. McConnell and F. C. Houghton (A.S.H.V.E. TRANSACTIONS, Vol. 29, 1923, p. 129).

¹¹A.S.H.V.E. RESEARCH REPORT No. 1054—Fever Therapy Induced by Conditioned Air, by F. C. Houghton, M. B. Ferderber and Carl Gutberlet (A.S.H.V.E. TRANSACTIONS, Vol. 43, 1937, p. 131).

perature has been reached by electrical induction, the atmosphere of the enclosure is kept at saturation to prevent heat loss, thus maintaining the patient's temperature at the desired point. Other apparatus¹² which use electric heaters, centrifugal fans, and a water container for humidification have been used in the past, but the more recent trend is toward saturation with a lower dry-bulb temperature.

When heat is necessary in treating legs or arms, such medium as short or long wave diathermy, infra-red, water baths, etc. have been used extensively. A recent development, a saturated atmosphere heating unit, similar to one previously described¹³ has proven satisfactory, because heat may be administered over longer periods which render deep heating possible without fear of burns or shocks¹⁴. Local heating has been somewhat satisfactory in relieving the painful symptoms of peripheral vascular disease.

The final criteria for the use of fever therapy may be changed because of the introduction of certain drugs which appear prominent in the experimental treatment of some diseases for which fever therapy has been efficacious.

High Temperature Hazards

Heat disease is now classified as heat exhaustion, heat cramps, and heat stroke¹⁵. The last was formerly thought to be the result of high temperatures, but in the light of present knowledge, is considered a neurologic defect. This inability to control temperature is most frequently seen in diseases of the nervous system, and heat stroke, therefore, is not so much a result of environmental temperatures as it is some intrinsic defect in the mechanism itself. The hazards of high temperatures are not easily understood. It is difficult to say whether a repeated rise of 1 or 2 deg of body temperature is dangerous or whether short exposures at high temperatures are more harmful than longer exposures at lower temperatures. A new concept is evident in finding an increase in leucocytes (white cells) of the blood in workers subjected to high temperatures. These leucocytes are defensive factors which are increased when infection invades a body. A rise in temperature and leucocyte count indicates body defense in the presence of disease. Since a recent study¹⁶ showed that both temperature and cell count were increased, the question arises whether long exposures to very high temperatures might not cause exhaustion of these defense mechanisms.

ALLERGIC DISORDERS

Although there is some division of opinion over the ultimate cause of allergy, the prevailing belief is that it is due to an inherited or acquired hypersensitiveness to pollen or other foreign proteins in certain indivi-

¹²Artificial Fever Therapy of Syphilis, by W. M. Simpson (*Journal American Medical Association*, 105: 2132, 1935).

¹³Loc. Cit. Note 11.

¹⁴Saturated Atmospheres in the Treatment of Injuries, by M. B. Ferderber (*Industrial Medicine*, 8: 256-259, June, 1939).

¹⁵Heat Disease: Clinical and Laboratory Studies, by M. W. Heilman and E. S. Montgomery (*Journal of Industrial Hygiene and Toxicology*, 18: 651-666, November, 1936).

¹⁶Air Conditioning in Industry, by W. L. Fleisher, A. E. Stacey, Jr., F. C. Houghton and M. B. Ferderber (A.S.H.V.E. JOURNAL SECTION, *Heating, Piping and Air Conditioning*, February, 1939, p. 107).