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Medical Observations at High Altitudes

By Hirokichi Tatsunuma

To learn the bodily effects in the abnormal environment at the high altitudes, the following examinations were conducted :

Environmental tests—Temperature, humidity, radiant heat, ultra-violet rays and Kata cooling power :

Physiological tests—fluctuation of pulse when burdened, respiration count, pace, white cell percentage, plasma protein volume, eosinophils, saliva-ph and induction value of the retina, Flicker Test, Oxymeter, body heat, Symptoms, Aschner's test ;

Psychological tests—modification of character, will-temperament test, Kraepelin-Uchida test, Rorschach test and the Bender-Visual test.

Through these investigations it was found that;

1) A pronounced physical change occurs between 4,500 and 6,600 meters. A rational acclimatization procedure is to climb to this height, spend one or two nights and descend.

A single climb of not more than 500 meters would not show marked reactions, but a sudden 1,400 meters ascent is liable to cause dehydration in which mineral has made extraordinary movement. For one staying over eight days at such high altitude one's body must receive at all times at least a little stimulation.

2) Supply of oxygen is most essential for maintaining body strength at high altitudes. At Manaslu the belt between 5,800 and 6,600 meters is the first stage for use of oxygen equipment, and the 7,200 meters level, considering the lowering of mental faculties and reduction in oxygen debt at the altitude, the second stage. To regulate metabolism (protein) and recuperate from fatigue, oxygen supply during sleep is vitally important.

3) A lack of oxygen will make the heart rate and the pulmonary blood volume increase, and also will make the lung artery and the capillary vessels shrink, causing the lung artery pressure to become high. Accordingly the capillary vessels will have

their permeability increased, which will cause a lung dropsy. In these conditions, it is very difficult for the lung to inspire further oxygen. Therefore the heart, reinforcing anoxia, will have to labor, and dilation of the right ventricle occurs. In other words, it will sooner or later get into acute cardiac failure, and very often will make the turn for the worst.

4) In determining the fitness of climbers it was learned an expedition should be comprised of men between the ages of 22 and 25 who are the most suitable from the functional standpoint since their autonomic nervous and internal secretion system's behavior function suitably, and men in the 40's who possess superior mental ability, experience, knowledge and judgement.

The Manaslu expeditions consisted of a blending of essentially the epilephtyme type of character and the shizothyme type of character.