

### OUR PRIZE COMPETITION.

EXPLAIN THE EFFECT HIGH ALTITUDES (e.g., THE ALPS) WOULD HAVE ON A PATIENT WITH A WEAK HEART.

We have pleasure in awarding the prize this week to Miss Rachel Dodd, Woolwich Home for Ailing Babies, Plumstead, S.E.

#### PRIZE PAPER.

Persons suffering from a weak heart need more oxygen than healthy persons because of imperfect aëration of the blood. At high altitudes one breathes rarefied air which is deficient in oxygen, and influences the blood pressure, causing increased breathing and heart beats, which may result in immediate death.

It chiefly affects the breathing, causing dyspnœa (difficult breathing), which is the consequence of any impediment to the free ingress and egress of air from the lungs.

Aëration may be completely interfered with, death by asphyxia (breathlessness) resulting.

Asphyxia is generally taken to cover the entire series of events from the moment when aëration is interfered with to the cessation of all respiratory and cardiac movements.

This series of events is divided into three stages:—

1. That of increasing dyspnœa, culminating in
2. The convulsive stage, which gives way to
3. The period of exhaustion.

During the first stage, which lasts about a minute, the respiratory movements become stronger and longer, therefore less frequent, the prolongation being chiefly expiratory; the heart beats with increased force and frequency; the blood pressure rises, and the lips become a bluish purple.

During the second stage, which also lasts about a minute, the respiratory movements become violent and convulsive, the convulsions being chiefly expiratory; the heart beats forcibly, but less frequently; the blood pressure keeps high, the dusky colour (cyanosis) of the mucous membranes is increased. The raised blood pressure is caused by vaso-constriction rather than by increased heart's force, and is proved by the fact that the blood current is, at the same time, much slower than normal.

The third stage, which lasts two or three minutes, movements ebb; pupils dilate; convulsions cease; respirations become less frequent and more shallow, finally ceasing in expiration; heart beats feebly and infrequently, or feebly and rapidly, and finally stops; blood pressure falls, and the dusky mucous membranes become pale and anæmic.

Anæmia of the brain, caused by fainting, is brought on by weakness of the heart's action.

The symptoms are headache, giddiness, ringing in the ears, sickness (nausea), and vomiting. In laboured respirations the chief varying factor is the exaggerated intrapulmonary pressure, which entails a corresponding alteration of the pleural pressure. The forcible inspiration entails a greater negative pressure in the air passages and in the pleural cavity; a forcible expiration entails a greater positive pressure in the air, and the pleural pressure is now positive instead of negative.

These effects are marked in excess in persons with a weak heart, when the respiration is exaggerated.

The great veins at the root of the neck shrink and swell visibly with inspiration and expiration. Diminished urine. There is the danger of paraplegia, due to embolism by a disengagement of gases within the blood.

The blood being deficient in oxygen, the spinal bulb is stimulated, the vasomotor centre and nerves are excited, and the blood pressure rises. This excitation of the bulbar vasomotor centre by a deficiency of oxygenated blood cannot endure for any long period, the excitability of its grey matter is soon exhausted if oxygenated blood is permanently withheld; when this occurs the arterioles begin to relax, this being the cause of the fall in the blood pressure.

The violent expiratory efforts are apt to damage the air vesicles; the pressure within them may be made so great that they become over-distended and rupture, giving rise to the condition known as emphysema.

The great difference between the day and night, and between the sun and shade temperatures, would also throw a terrific strain on the patient and have similar effects. These patients need a restful climate, such as Nauheim.

Post-mortem the right side of the heart, the large veins, and the lungs are gorged with thick blood; the left side of the heart is empty and contracted.

#### HONOURABLE MENTION.

The following competitors receive honourable mention:—Miss Jane Tomkins, and Miss Ada Jones.

Our readers greatly appreciate these Papers, written from a practical point of view, and now that the holidays are over we may hope for a larger number of competitors. Such work is of real value to those who send in Papers as well as to those who read them.

#### QUESTION FOR NEXT WEEK.

What are the causes, symptoms, and treatment of surgical shock?

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