

## FIRST AID DURING AND AFTER THE RESCUE

All first aid measures aim at avoiding the secondary death of the victims rescued from an avalanche.

Keeping free the respiratory tracts, avoiding unnecessary body movements and the further cooling of the body after the rescue are the primary measures the alpine rescue team - nurse - emergency doctor have to take.

While rescuing the victim, the blocked respiratory tracts must be opened as soon as possible. If the heart-blood system is blocked, it is necessary to immediately start the basic resuscitation procedures (BLS = Basic Life Support (4)) and keep on doing it till the rescue team or the emergency doctor arrives. All treatments should be effected in a wind-sheltered area in the rescue hole or in a first aid tent, in order to prevent cooling resulting from low outside temperatures and wind conditions.

If the victim rescued is still alive, the anti-hypothermia measures are the initial first aid procedures (tab. 2). With respect to pre-hospital treatment at the site of the accident, the classification of hypothermia in stages by the Swiss Rescue Flight Guard REGA (5) can be utilized also by non-medical rescue personnel, since measuring the core temperature is not compulsory. (tab. 1). Moreover, the core temperature can be measured by the non-medical rescue personnel using a tympanic membrane (measurement with a soft probe inside the external hearing duct).

REGA - The stages of hypothermia

Table 1: Classification of hypothermia in stages. REGA = Swiss Flight Rescue Guard.

<b>Stage I:</b> the patient reacts and is shivering (core temperature 35° - 32°C)
<b>Stage II:</b> the patient reacts slightly without shivering (core temperature 32° - 28°C)
<b>Stage III:</b> the patient does not react (core temperature 28° - 24°C)
<b>Stage IV:</b> respiratory and cardio-circulatory arrest (core temperature 24° - 15°C)

Table 2: First Aid Measures to treat hypothermia

<b>Hypothermia I - II</b> (patient conscious) Avoid moving the body excessively. Protection from wind. Thermal wrapping. Warm non-alcoholic beverages.
<b>Hypothermia III</b> (patient unconscious) Avoid moving the body excessively. Protection from wind. Thermal wrapping in a stable position on one side (if the victim is not intubated). Continuous observation of the patient, check heart beat and breathing. Measure the core temperature (epitympanic thermometer). Oxygen inhalation. Transport by helicopter to hospital equipped to deal with hypothermia cases.
<b>Hypothermia IV</b> (cardio- circulatory arrest)Continuous heart-lung resuscitation. Transport by helicopter to a hospital equipped with cardiopulmonary circulation machine

Table 2: First Aid for avalanche victims suffering from hypothermia - depending on the seriousness (REGA - stage I - IV): the three basic rules for all stages of the pre-hospital treatment of hypothermia are: 1. rescue and positioning of the buried victim without moving the body, 2. protection from wind, 3. insulation. If the victim can swallow easily (stage I, II), it is recommended to give warm non-alcoholic and high-sugar beverages. The unconscious patient suffering from hypothermia (stage III) must be kept in a stable position on his side, if not intubated by the emergency doctor. Oxygen inhalation and insulation are a further counter-measure to cooling. In the USA there are special instruments on the market to inhale pre- warmed and humidified oxygen allowing both injection through mask and mechanical artificial respiration. When there is no pulse (stage IV), resuscitation procedures must be continued until the patient reaches a hospital equipped with a cardiopulmonary circulation machine. The untrained rescuer must continue resuscitating the buried victim till the rescue team or the emergency doctor arrives. If there is no pulse and the patient is suffering from hypothermia but there is an air pocket, it is necessary to continue the resuscitation till the hospital can take the required measures.