

(Ca²⁺) from the cells into the intercellular medium against a great concentration gradient. The accumulation of Ca²⁺ in the cytosol is the primary cause of the cold paralysis of cell functions.

We removed a portion of Ca²⁺ from the blood, thereby decreasing this gradient, and thus, decreased the cold threshold for the arrest of ventilation, circulation, and thermoregulation, e.g., renewed intensive firing rate of the neurons even at the skin temperature of 0°C, at which temperature they never were noted to function.

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Key-words: brain function; brain temperature; calcium fluxes; cooling; hypothermia; retention of function

The Work System of the Air Ambulance in the Arkhangelsk Region

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The Arkhangelsk region is situated in the northwest of Russia. It has a territory of 578,000 square km. The population is 1,527,700 people: 75% of them live in 13 towns and 38 villages. In the region, there are 4,000 settlements with populations of 3,000–5,000 people each and these comprise 26% of the total number of persons in the region. The majority of these small settlements especially on the seaside of the White Sea and the Karsky Sea, are not connected to the big centres by highways.

In order to provide this part of population with the first aid, the air ambulance is used (plane AN-2, 12 people aboard, speed 180 kph; plane L-410, 15 people aboard, speed 350 kph; helicopter MI-8, 12 people aboard, speed 200 kph). Air ambulance bases are in Arkhangelsk, Kotlas, and Narjan-Mar where there are large hospitals. To provide this medical aid, they use different teams. At the central base in Arkhangelsk, four teams are on duty: 1) traumatologic; 2) adult surgical; 3) children surgical; and 4) therapeutic. Each team consists of 2–3 specialists. The teams have the portable equipment, sterile instruments, and medicines specific to accomplish their respective tasks.

Annually, these teams make nearly 500 flights, they perform 300–350 surgical operations, and evacuate about 800 sick or injured people from the detached districts of the region to the larger centres.

Key words: air ambulances; air-medical transportation; emergency medical services; medical aid; pediatrics; teams; trauma

The System of Medical Provision of Safety Operations on Technological Catastrophes and Disasters in the European North of Russia

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The system for the provision of medical care for the population in cases of emergency includes the combination of scientifically based principles of safety measures coupled with the evacuation of the population and forces and the means for the provision of the first medical aid. The essence of this system is in the organisation of the first medical aid given at the proper time and in strict sequence, and in the treatment of the affected people during their rescue with immediate transportation from the site of the disaster to medical institutions in accordance with the type of injuries sustained by the victims.

In Russia, a two-staged system for the provision of medical care during a disaster was adopted. Taking into consideration the main principles for the provision of first medical aid to mass casualties, some important questions must be solved: 1) medical investigation for the cause of the injuries; and 2) sorting of the affected people. The principal rules in the system for the provision of medical care to those affected are:

- 1) Provision of first aid and qualified medical help as soon as possible;
- 2) Definition of preventive measures according to the situation with thorough medical sorting between those who need first aid and those who can wait for help;
- 3) Composition of groups of medical services that correspond to the main needs as relate to the source of the injuries; and
- 4) Organization of the evacuation of the victims away from the site of the event in preparation for the second stage of medical evacuation.

The system for the provision of medical care is one of the main and most difficult activities of health care during the post-disaster, medical relief operations.

Key words: disaster; emergency; evacuation; first-aid; medical care; rescue; safety; transportation

A New Type of Disaster

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In 1997, uncontrolled man-made forest fires in Indonesia (Kalimantan and Sumatra) involved about 310,000 hectares of forest and estates that produced a haze. In all, about 500 houses were destroyed by the fires, especially those built on pit soil. This difficult situation was probably an El Niño phenomenon. The haze period lasted from mid-July to October 1997.

Apart from Indonesian fire fighters, firefighters from Malaysia also were involved. Also, support (helicopters

and aeroplanes) from other countries such as Singapore, Australia, and the USA were provided. One tried in vain to produce artificial rain. Due to the fires in the pit soil, the fires did not stop until it had rained for several days.

The fires produced a very intense haze that was transported enormous distances; thus, it affected not only Indonesia, but also parts of Malaysia and Singapore. The main problem from the haze was exposure of the population to airborne particles, especially particles smaller than 5 microns in diameter. There were no direct effects detected from toxic gases. Visibility was an indicator of the severity of the haze.

Exposure of people to such a haze for a prolonged period was a new phenomenon. It is not possible to determine the actual number of people exposed, but probably approximately 40 million people were exposed in one way or another. At least 40 deaths have been related directly to the smoke exposure. People with pre-existing respiratory and cardiac problems, very young children, and the elderly were the most severely affected. Symptoms predominating were eye irritation, conjunctivitis, bronchial asthma, bronchitis, and superimposed acute respiratory infections. There were no skin problems.

Key words: contamination; exposure; fires; particulates; smoke; toxic exposure

Duration of Reversible Clinical Death

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Research by the Brukhonenko and Sirotnin School revealed erroneous concepts of the impossibility of complete reanimation of higher animals and a human after the clinical death that lasted for more than 5–6 minutes. While performing reanimation research using dogs with an artificial blood circulation method, researchers have proved that successful organism reanimation is possible after clinical death lasting 25 minutes. In addition, the dynamics of basic vital functions of organisms, reanimated after acute blood loss, electrotrauma, mechanical asphyxia, radial acceleration, sharp decompression, or drowning in salt water were studied in detail. Complex research of brain functions of the reanimated animals allowed us to conclude that the resistance of neurons of cortex to anoxia is greater than it generally was thought previously. Taking into account the methodological point of view, there is no proof for the formation of irreversible changes in brain during the periods of death sampled during the post-reanimation period. Considering the development of terminal states and legitimacies of exchange processes common both for animals and a human, the results of fundamental research by the followers of Brukhonenko and Sirotnin, are considered to be the

essential proof and grounding of the possibility of complete reanimation of humans after prolonged clinical death.

Key words: anoxia; brain function, clinical death, morphology; reanimation; resistance to anoxia; resuscitation

Analgesic and Local Anesthetic Effects of Ketamine

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In-field medical care and Disaster Medicine differ substantially from the medical practices used in the normal hospital settings. In these settings, the number of emergency drugs available must be limited for practical reasons. In this respect, ketamine seems to be an exceptionally useful drug: it is a drug with multiple characteristics and indications that make it suitable for use in these circumstances. It possesses amnestic, sedative, anticonvulsant, and bronchodilatory properties, and it has a stimulatory effect on circulation.

Ketamine is accepted widely as the first choice for field anesthesia. It can be administered either intravenously or intramuscularly. It also is a potent analgesic agent, and even can be used to produce local anesthesia. It only is a question of time before it will be able to be administered transdermally. Furthermore, all of its effects are dose-dependent. Thus, local anesthesia or analgesia being provided in the field can be advanced to anesthesia simply by increasing the dosage. These advantages have not yet been fully exploited.

Key words: local anesthetic agents; ketamine; local anesthesia; pharmacology

A New Approach—The World-Wide Air-Medical Transport Service Network

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Background: The Emergency Medical Assistance (EMA) Group Ltd and Euro-Flite Air Ambulance Ltd have promoted the creation of an unbroken chain of world-wide, air-medical services. This network enables both a cost-effective as well as a time-saving solution for cases requiring long distance, air-medical transport.

Demand for the service: Strongly increasing tourism, business travelling, and great number of expatriates in risk zones such as emergency and conflict areas or other locations with considerable health risks have increased the need for repatriation and medical evacuations to the