Developments by DRDO

Acclimitisation to High Altitude and Tenure of Posting

DIPAS, Delhi

Ascent to High Altitude (HA) is associated with several metabolic and adaptive changes in lowlanders and acclimatisation to the hypoxic environment is necessary for keeping troops healthy and fighting fit at mountains. A three staged acclimatization procedure has been induction of troops from sea level to high and extreme altitude (EA) based on physiological, psychological, biochemical and hormonal profiles of soldiers during gradual or rapid induction to high altitude. The tenure of posting to HA and EA was determined using longitudinal and cross-sectional study designs following prolonged residency in the hypoxic environment and on return to sea level. This has helped the army in drastic reduction of altitude related maladies such as acute mountain sickness (AMS), high altitude pulmonary edema (HAPE), and high altitude cerebral edema (HACE) etc.

Salient Features

Staging of acclimatization

- First Stage: 2700 m and up to 3600 m (6 days)
- Second Stage: 3600 m to 4500 m (4 days)
- Third Stage: Above 4500 m (4 days)

Tenure of Posting

- 2700-4500m : Two Years
- More than 4500m: Three Months

Biowaste Digester

DRDE, Gwalior

Biodigester is a cylindrical structure of mild steel or fiber reinforced plastic with provision of inlet for human waste and outlet for effluent and biogas. Night soil degradation occurs through microbial reaction which converts it into biogas.

This is an eco-friendly technology for disposal of human waste at glaciers, other low temperature areas and soil bound cold regions. The process culminated into treated effluent which is free from pathogens and is also environmentally acceptable. During waste treatment , inflammable is generated as a by product which can be used for various energy intensive activities like cooking, water and room heating.

Salient Features

- Suitable for subzero temperature of Himalayan region as well as glaciers.
- No dependence on the limited and costly conventional energy sources.
- Easy to transport and install in hilly terrains.
- Maintenance –free, continuous biological process.
- Elimination of pathogens.
- Generation of odourless and inflammable biogas.
- Economically viable.

Diagnobact,

INMAS, Delhi

Diagnobact, a single vial ready to use cold kit of ciprofloxacin drug for detection and location of suspected bone or soft tissue bacterial infectious lesions using nuclear medicine techniques. Ciprofloxacin is the most potent first generation fluoroquinolone, active against a broad spectrum of bacteria. The most prominent feature of the ciprofloxacin is its high tissue penetrability concentration in lungs, sputum, muscle, bone, prostrate and higher phagocytes in plasma, but CSF and aqueous levels are lower. Urinary and biliary concentrations are 10-5- folds higher than plasma. Ciprofloxacin after radiocomplexation with 99mTc retains its property of specifically inhibiting live bacterial DNA gyrase. This enables the clinicians to detect and locate the bacterial infectious lesion as a hot-spot on gamma imaging.

Salient Features

- A single dose, single component kit
- Low reticulo-endothelial system uptake
- Capable of differentiating bacterial infection from sterile lesion
- Bone: Sensitivity: 95% (91-100) ; Specificity: 87% (80-100)
- Soft Tissue: Sensitivity: 72% (65-95); Specificity: 78% (65-100)

Retort Pouch Processing Technology

DFRL, Mysore

The 750kg/batch capacity system is completely automated based on PLC and has provision of pressure compensation and ensures heating, cooling and uniform heat distribution. Processing protocols for various foods such as homogenous, heterogeneous, liquid, semi-solid, and solid foods have been standardized. Ready-To-Eat (RTE) flexible pouched foods developed by retort processing technology do not require re-hydrationor cooking as in the case of foods processed by other technologies. It can be consumed straight from the pouch with/without pre-warming depending upon the requirement of the users/weather conditions. MRE based on the retort pouch processed foods meets the specific needs of troops in terms of convenience, nutritional adequacy, shelf stability, storage and distribution.

Salient Features

- Cost-effective and amenable for India food industries.
- Long shelf life of retort pouch processed foods.

Source: Life Sciences Compendium 2008, Directorate of Life Sciences, Defence Research and Development Organisation (DRDO), Ministry of Defence.