

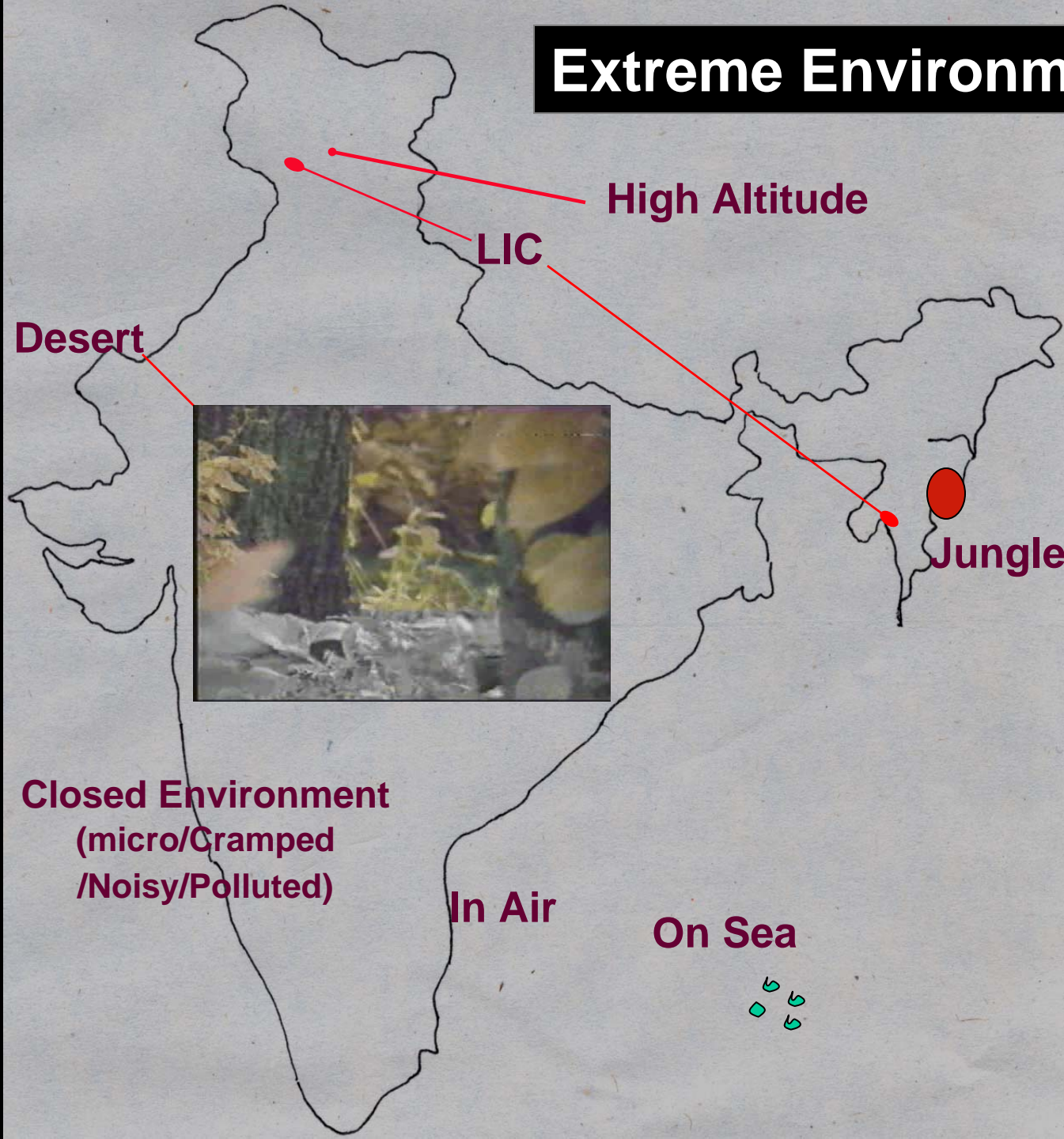
LIFE SCIENCES IN SERVICE OF THE SOLDIER



बलस्य मूलं विज्ञानम्

Dr. W.Selvamurthy
Distinguished Scientist
Chief Controller R&D, DRDO

Extreme Environments



High Altitude

LIC

Desert



Jungle

Closed Environment
(micro/Gramped
/Noisy/Polluted)

In Air

On Sea



Mission of Life Sciences Labs

To enhance the ability of soldiers for

Lethality



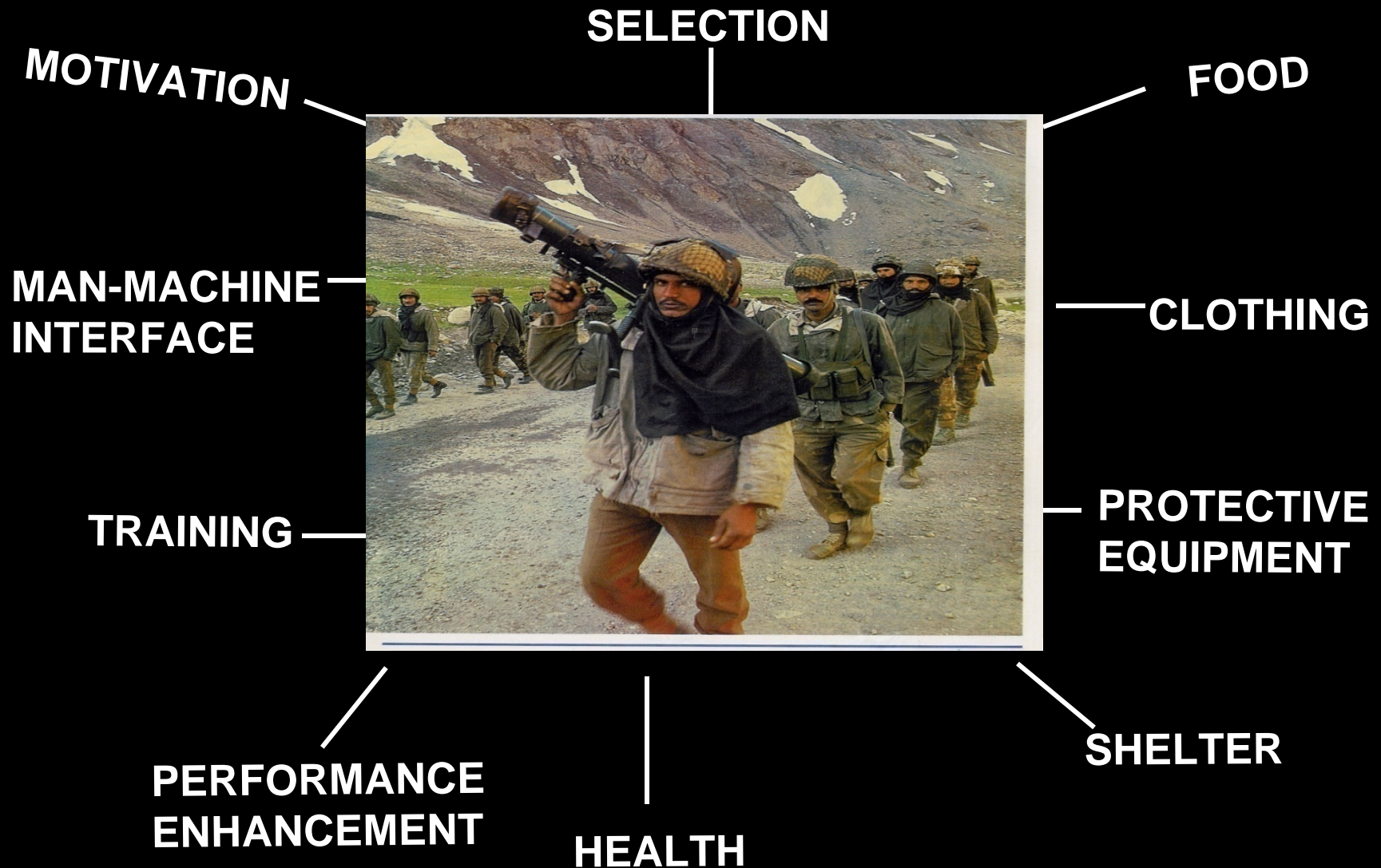
Survivability

Efficiency

Sustainability



CANVAS OF LIFE SCIENCES R&D



Personnel Selection

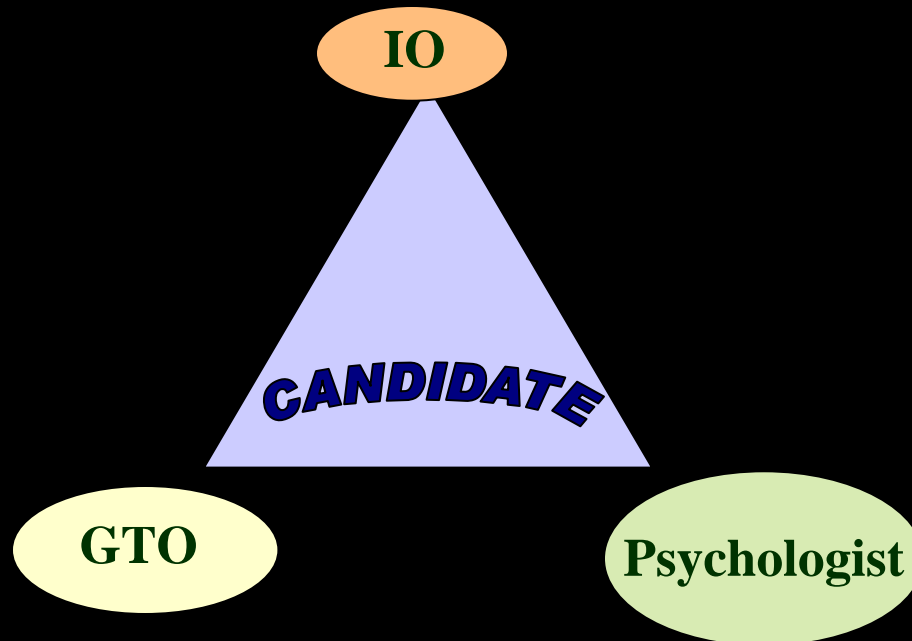
Selection Standards

Physical
Physiology
Psychology

Officer Like Quality (OLQ)

Test

- Intelligence
- Personality
- Aptitude



PERSONNEL SELECTION

- Selection Procedure
- Trade Allocation



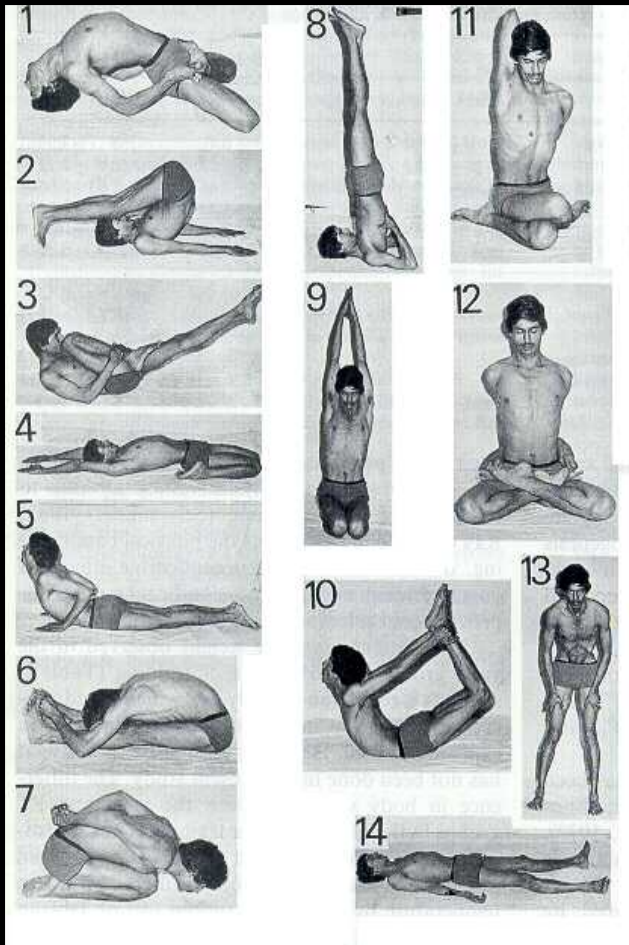
HIGH ALTITUDE OPERATIONS

DRDO Developed Procedures in use

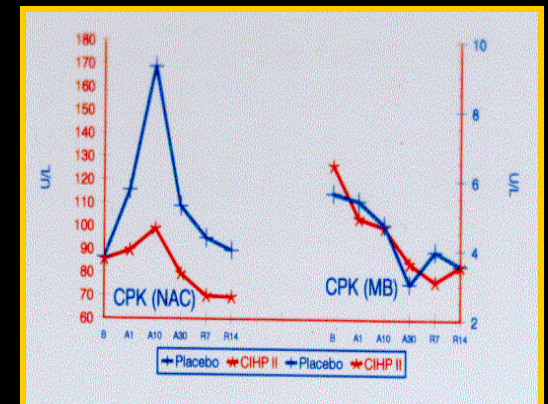
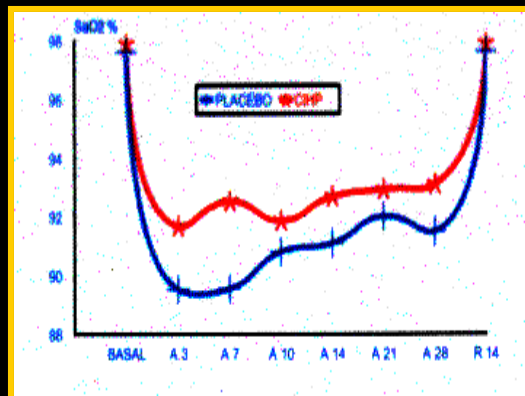
- **Staging of acclimatisation**
- **Tenure of posting**
- **Physical Efficiency & Load Carriage**
- **Nutrition & Clothing**
- **Enhancing performance**

INDIAN SYSTEMS FOR SOLDIERS

Yoga



CIHP



PROTECTIVE EQUIPMENT

LIFE SUPPORT SYSTEM



HAPO Bag



Improved HAPO Bag

Future-Fuel Cell Driven

NITRIC OXIDE – OXYGEN THERAPY FOR HAPO



ITAD



Pre-therapy Scan

Post-therapy Scan

HEATING GLOVES AND SOCKS



Biodigester



60 Units functional at Siachen Sector

**Combat Free Fall
LIVE JUMP TRIALS FROM 30,000 FT**



DESERT OPERATIONS

PELTIER Effect



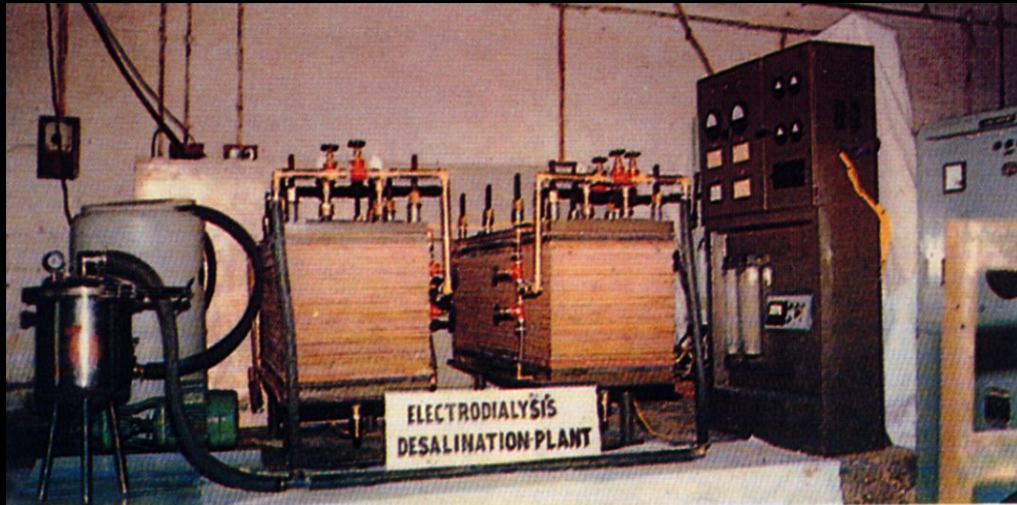
Thermoelectric Cooling Suit

- **Work-Rest Schedule**
- **Ergogenic drink**



VORTEX TUBE TECHNOLOGY

Provision of Potable water



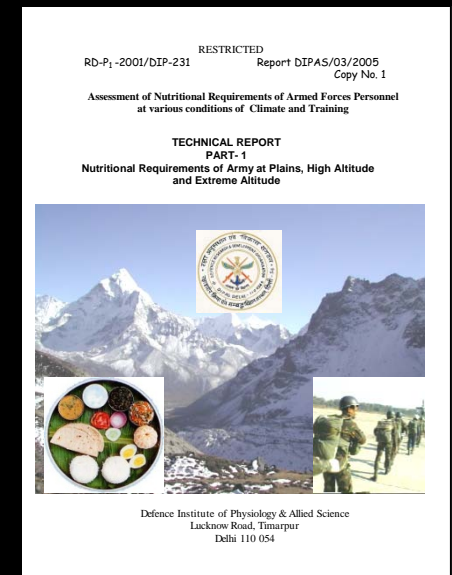
**Water De-salination
Plant**



Iron Removal Unit

NUTRITIONAL REQUIREMENTS OF INDIAN ARMED FORCES

- DIFFERENT CLIMATIC & OPERATIONAL CONDITIONS
- Calorific Requirements
- Ration Scales (N=18) Formulated by DRDO is in Vogue
- Composition
- Food Supplements



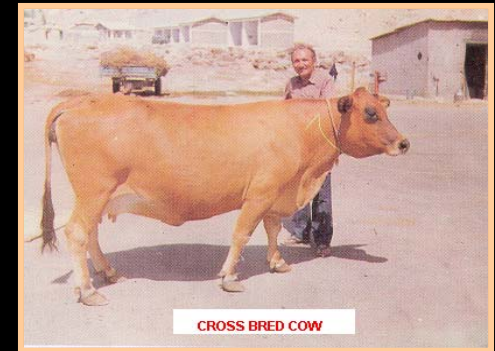
FRESH FOOD

52% of Vegetables requirement in Ladakh region met by local cultivation based on DRDO Agro-technologies

Fruit - New varieties

Cultivation of Medicinal plants

Dairy- Breed improvement for yield of milk
- Suitable breed of sheep - Broiler Sheep.



CROSS BRED COW

Embryo Transfer Technology

Transgenics - Vegetables

- Resistance to cold
- Osmotin gene integration



PROCESSED FOOD

Ready to Cook & Reconstitute
Preserved fresh fruits & vegetables
One Man Compo Pack
Mini Compo Pack

Ready to Eat
Emergency Survival Ration
Emergency Flying Ration



Appetizers for high altitude
Nutraceuticals & Functional foods

Self heating food containers
Active/Smart/High barrier
package



CARBOGEN – PROTECTION AGAINST NOISE

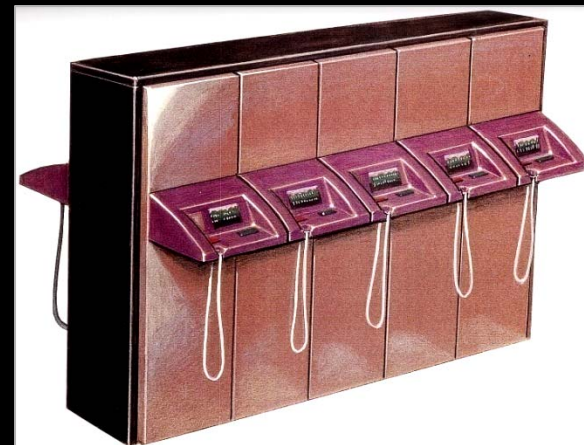
CARBOGEN

*A prophylactic and therapeutic approach
against noise induced hearing loss*



Conceptualised by
Defence Institute of Physiology &
Allied Sciences, Delhi

System designed by
Industrial Design Centre of
Indian Institute of Technology,
Powai, Mumbai



Man-Machine Interface



PROTECTIVE EQUIPMENT



Haemodynamically Activated Anti G Suit



RVD



Autoinjector



NBC Suit

Mk IV



PDK



Portable GC

NBC Protective Technology



NBC Canister



First Aid Kit



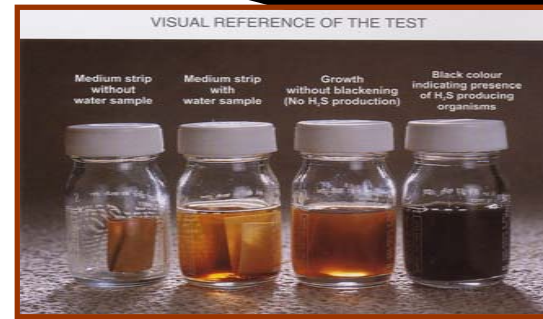
Recce Vehicle



Shudika



Infection Imaging



Water Testing



Malaria

HEALTH CARE



Typhoid



Plague



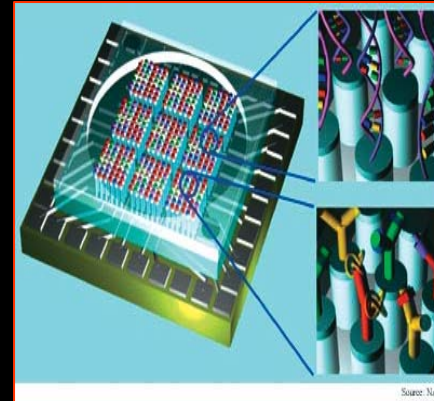
Leptospirosis



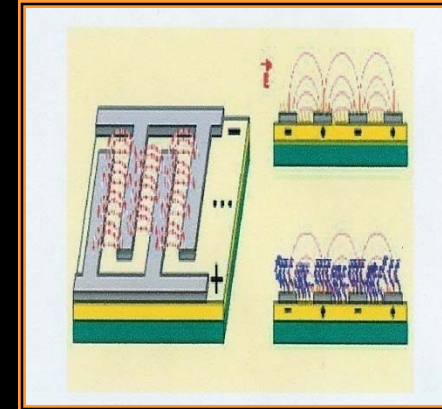
Dengue

BIOLOGICAL AGENT ISOLATION & DETECTION

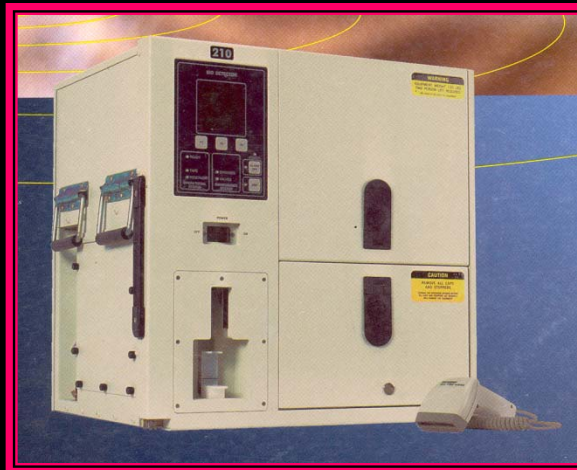
- Repository of BTW Agents
- CNT Based Biosensor
- Laser Based Detection System
- Microarray Based Detection



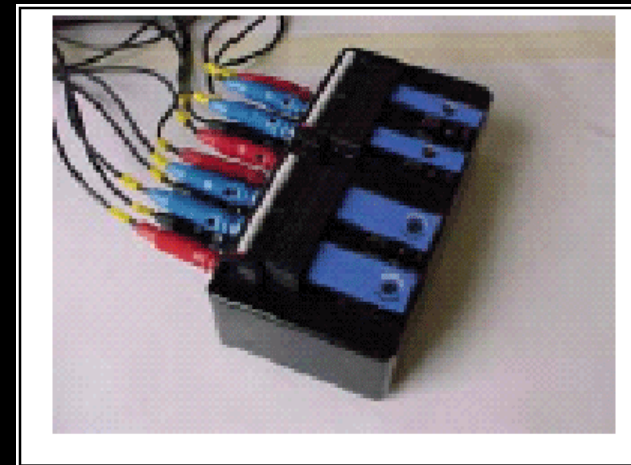
CNT ARRAY BIOSENSOR



NEMS Based Bio-sensors



IMMUNOASSAY BASED BW DETECTOR



IMMUNO ASSAY SENSOR ARRAY

**Cloth impregnated with repellent
against Leech**

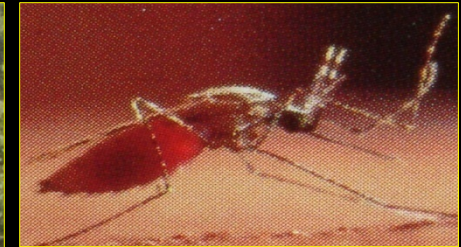
Synthetic & Herbal

Timur Oil & Bottle Brush Oil

Protection against simuliids

Repellents DEET & DEPA

Yellow Garments - Least attracted



Herbal medicine

- Skin Diseases

- Poisoning

Malaria Control

Personal protection

- Herbal Repellents, Vaporizer

Herbal medicine against P. falciparum

Mobile Clinic & Vaccine

Supplied to Army

HYPERBARIC OXYGEN CHAMBER





Indident

Dental Implant System



Institute of Nuclear Medicine & Allied Sciences,
DRDO, Min. of Defence, Delhi
&



Indident Medical Devices
(A Health Care Unit of GEPL)
Faridabad, India



Psychological Warfare

Motivation

Intrinsic

Extrinsic

- Propaganda
- Counter
- Ideology

- Psychokinesis
- ESP

Indoctrination

Doctrine

Motivators

Combat Stress Management



JATROPHA FOR BIODISEL

AT MILITARY FARM SECUNDERABAD



JATROPHA NURSERY JATROPHA PLANTATION

Global Soldier

Future War

- **Low intensity conflict**
- **Terrorism**
- **Extra-territorial warfare**
- **Biological & Chemical warfare**
- **Natural & Technological disaster**
- **Economy & Trade**
- **Energy & Water**
- **Peace keeping (overseas) & Joint exercises**

Global Soldier

S&T Initiative

- **EW – IW – PW Defence**
- **Non-lethal weapon system**
- **Warrior support (Soldier-as-a-System)**
- **Micro and Nano-technology**
- **Surveillance & Reconnaissance**
- **NBC Radar**
- **Sensor mounted platform**

Global Soldier

Human Capital Perspectives

- **Profiling & Selection**
- **Training & Trade allocation**
- **Nutrition & Life support**
- **Organizational & Cultural adaptation**

Global Soldier

- **Global initiative**
- **Consortium approach**
- **Networking**
- **Resource & Knowledge sharing**

“AFTER ALL,



IT IS THE MAN WHO MATTERS”



Defence Research and Development Organisation (DRDO)

***Shaping technology for tomorrow
while securing the frontiers of today***