7.1 Research

The research projects will focus on technical research, experimental research and clinical research

7.1.1 Technical research

- Development of accident reconstruction in situ by simulation and modelisation;
- Radiation assessment by new methods of radiometry and dosimetry specially for person exposures by ionizing radiation (photons, protons, neutrons) and for environmental fields for non-ionizing radiation (UV, radiofrequencies, electromagnetic fields);
- Radioactivity assessment in developing new mobile equipments for the triage of a great number of people in case of terrorist actions.

7.1.2 Experimental research

The main projects concern the acute radiation syndrome, the organ radiation injuries, the radioactive contamination and the non-ionizing radiation injuries.

- Immunohematology after whole body irradiation
  The major trends concern:

  - the pathophysiology of Apoptosis of lymphocytes;
  - the biological indicators: cytokines, HLA class II antigens, detection of residual stem cells by RT-PCR;
  - the improvement of allogenic bone marrow transplantation specially for major histocompatibility complex (MHC) antigen, disparity between donor and recipient.

- Organ radiation injuries
  The main trend is the development of new methods of diagnosis, prevention and treatment of alteration of connective and vascular tissues in various organs, specially the skin and the brain.

  Skin

  - gene expression changes in skin fibroblast;
  - use of Super Oxyde Dismutyase (SOD) on acute skin changes (rabbit) and late fibrosis (pig);
  - testings of the different types of skin grafts in relation with sub-cutaneous tissues.

  Brain

  - pathophysiology of supporting cells in the nervous system (astrocytes, oligoendrocytes and glial progenitor cells);
  - effects of growth factors and interleukines on various classes of glial cells;
  - role of SOD and other potential modifiers of oxydative injuries.

- Radioactive contamination
  Studies on new medical drugs for urgent and long-term treatment.

- Non-ionizing radiation injuries
  The main trends are:

  - laser effects on the eye of rabbits;

- experimental studies on the different effects of UVA and UVB on the induction of skin cancer (melanoma).

7.1.3 Clinical research

The main trends concern the total body irradiation, the skinburns, the central nervous system, the lung and the effects of NIR.

- Total body irradiation (TBI)

  - clinical uses of the various hematopoietic growth factors to test their respective effectiveness;
  - uses of the different types of stem cell transplantation (bone marrow, cord blood, allogenic bone marrow);
  - establishment of a national registry of TBI as a data base including both dosimetric and clinical information (between 3000 and 4000 patients) from 26 French centres.

- Skinburns

  - development of new methods of diagnosis by nuclear magnetic resonance (NMR), imaging and spectrometry;
  - effectiveness of medical treatment by SOD and other enzymes;
  - therapeutical use for the grafts of different types of artificial and human skin.

- Central nervous system

  - nuclear magnetic resonance, spectroscopy and imaging to evaluate the effects of nicotinamide combined with carbogen breathing;
  - use of Gd-DTPA imaging to measure vascular perfusion diffusion,
  - first investigation on the induced dementia after cranial radiotherapy.

- Lung

  - semeiology of radiation induced fibrosis;
  - prevention of fibrosis by SOD,
  - testing of treatment of lung fibrosis by SOD and other drugs.

- Non-ionizing radiation injuries

  - eye: treatment of laser damages;
  - skin: studies on diagnosis and treatment of UV burns after cosmetic uses.

7 2 Education

The main trends of education concern the general information, the medical education and the nursing training.

7.2.1 General information

Our programme for the next four years is to organize series of courses meant for administrative regulators and irradiation accident managers.

- The administrative regulators belong to the local and regional offices of the Health and Labour Department The courses intend to give them general information on the accident scenarios, the effects of ionizing and non-ionizing radiation and on the assessment of the radiation detriment as well as on the preparation of the emergency plans.

- The radiation accident managers belong to various ministries and cooperate with the person locally, regionally or nationally responsible in case of accident. The courses deal with the accidents due to IR and NIR and to radioactive contamination, with the assessment of exposures and of detriment as well as with the application of the emergency plans.

7.2.2 Medical education

The medical education programme is intended for the medical community and includes two types of courses:

a) General courses on the radiation accident scenarios, health and medical preparedness and general investigations in radiopathology. They are organized with the universities.

b) Specialised courses: they are meant for practitioners taking care of the radiological accident victims. The courses deal with the various types of accidents, the exposures and the damages, on the methods of diagnosis, prognosis and treatment, and in particular for total irradiation with aplasia, radiological burns of the skin and the hands, the internal and external radioactive contamination and the damages due to non-ionizing radiation (UV, lasers, radiofrequencies). These courses are held once a year at the Institut des Sciences et Techniques Nucléaires in Saclay.

7.2 3 Nursing training

It has seemed useful to us to organize courses for the directors of nursing and for the nurses. These courses deal with the general aspects concerning the victims of radiological accidents, the particular problems of radioactive contamination, the medical preparedness and the health care protocols.

7.3 Intervention

In accordance with the reference terms of the WHO Collaborating Centre, the programme of the next fours years aim at developing, completing and specifying in concrete terms the existing arrangements.

1. As a focal point for advice and possible medical care, the existing expert groups will be reinforced and specialized for the various radiological accident scenarios and for the various categories of victims.

2. The establishment of the network is in progression and will be carried on. Presently, the Centre is linked with official conventions to the major civil and military hospitals (Paris, Lyon, Marseille, etc) In the near future a fast programme is planned in order to establish protocols of practical application of the conventions concerning:

   - the watch and warning procedures;
   - the number of beds (day 0 to day 7);
   - the investigation methods for diagnosis and prognosis;
   - the treatment protocols,
   - the paramedical health care protocols.

3. During the coming years, the programme includes to help in the establishment of medical emergency plans in the event of large scale radiation accidents. This concerns nuclear accidents (Chernobyl or radiological accidents Goïana). The emergency plans are based on triage procedures (<10, 10 to 100; >100) and on the time organization pattern for emergency cases and no emergency cases. The medical preparedness concerns external decontamination, internal decorporation, partial body irradiation and total body irradiation.

4. In case of a real radiation accident, the ICR was able in past years to give assistance or to take care of the victims. During the following years our effort will focus on:

   - the new special mobile equipment for the survey teams for rapid external radiation and contamination surveys;
   - the development of specialized teams for on-site emergency treatment;
   - the rational and efficient possibilities of using the network of investigation laboratories and of hospital services for medical investigation and treatment.

7.3 International Cooperation

Our programme for the next four years includes a section on practical cooperation concerning:

- advice in case of accident;
- preparedness for emergency plans;
- intervention for diagnosis and treatment;
- follow-up of victims;
- education and training;
- research (technical, experimental, clinical and epidemiological).

7.3 1 Cooperation within the framework of WHO

As a Collaborating Centre, the ICR plans to collaborate more closely with the other collaborating centres in radiopathology on the above-mentioned subjects. The meeting of the REMPAN was held in December 1994 in Paris and was organized by the ICR, with a programme on scientific and medical radiopathology. Specialized symposia are also planned in the following years.

7.3.2 Collaborating with the organizations of the United Nations

The ICR is involved within the framework of the International Conventions on Notification and Assistance in Case of Nuclear Accident and Radiation Emergency. Thus, its programme includes a cooperation with IAEA in technical fields. Another cooperation is also considered for the information of the International Labour Organization when workers are among the radiation victims.

7.3.3 European Community

The ICR has relationship for assistance with the General Directorate XI and for research with the General Directorate XII. During the next four years it will take part in the corresponding programmes. In particular, the ICR is planned to be one of the partners of the European Union and of the Commonwealth of the Independent States for the Joint Study Project 3 on the treatment of accident victims for:

- evaluation of patients after Chernobyl accident;
- hematopoïetic damages;
- skin injuries.

7.3.4 Cooperation in radiopathology for the non-ionizing radiation

During the next years, the major trends are to develop the relationship with the most competent national organisms. This concerns the evaluation of exposures and detriment as well as the methods of diagnosis and treatment of non-ionizing radiation victims. Our priorities focus on UV, lasers, radiofrequencies and electric and magnetic fields.

The points of contact are:

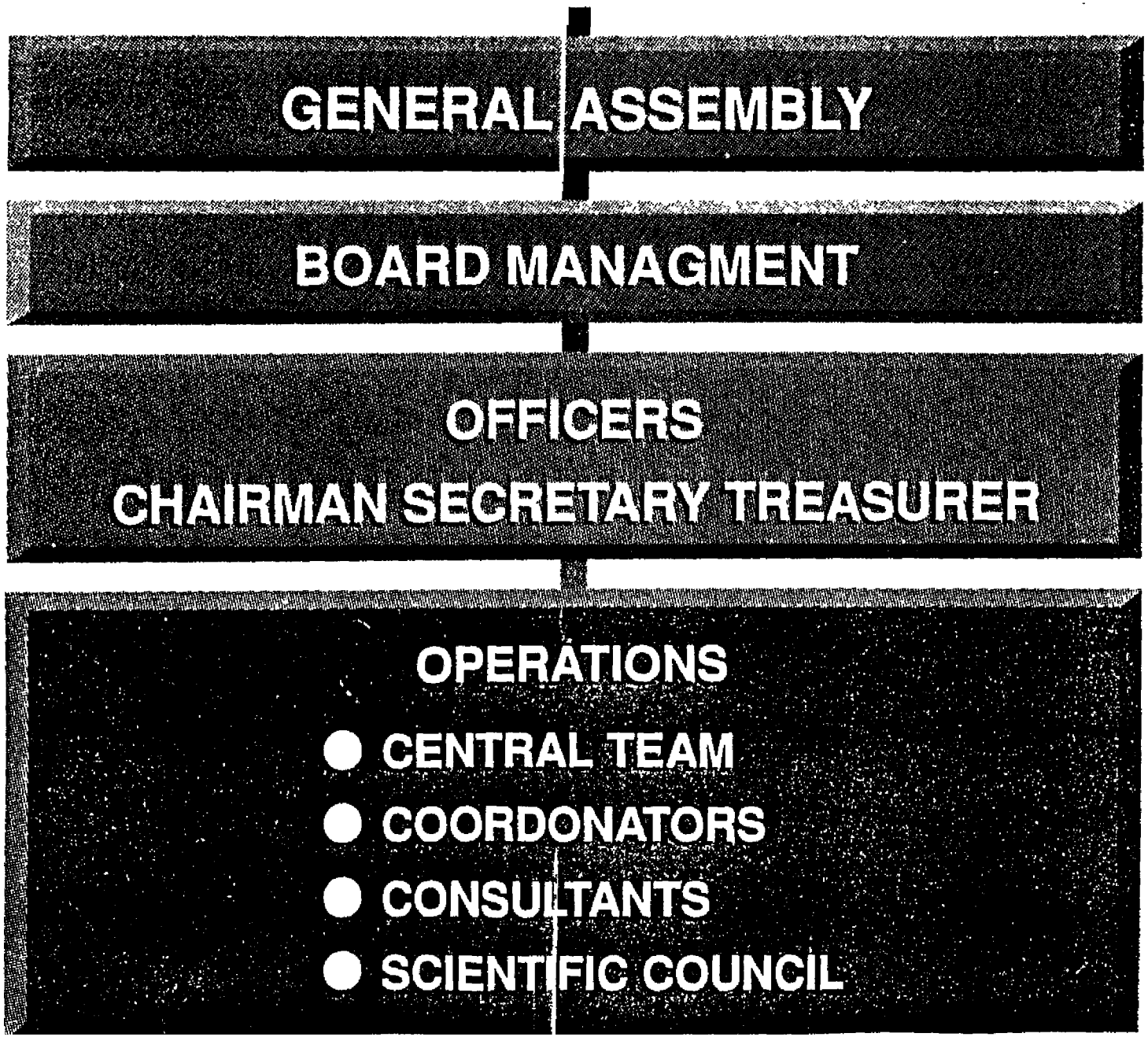
For general matters:

Dr H. Jammet	-	President of the ICR	Tel: 33 1 46 54 72 66 Fax. 33 1 46 38 24 45

In case of accident for assistance:

Dr R. Masse	-	President of OPRI	Tel: 33 1 30 15 52 00 Fax: 33 1 39 76 08 96

ICR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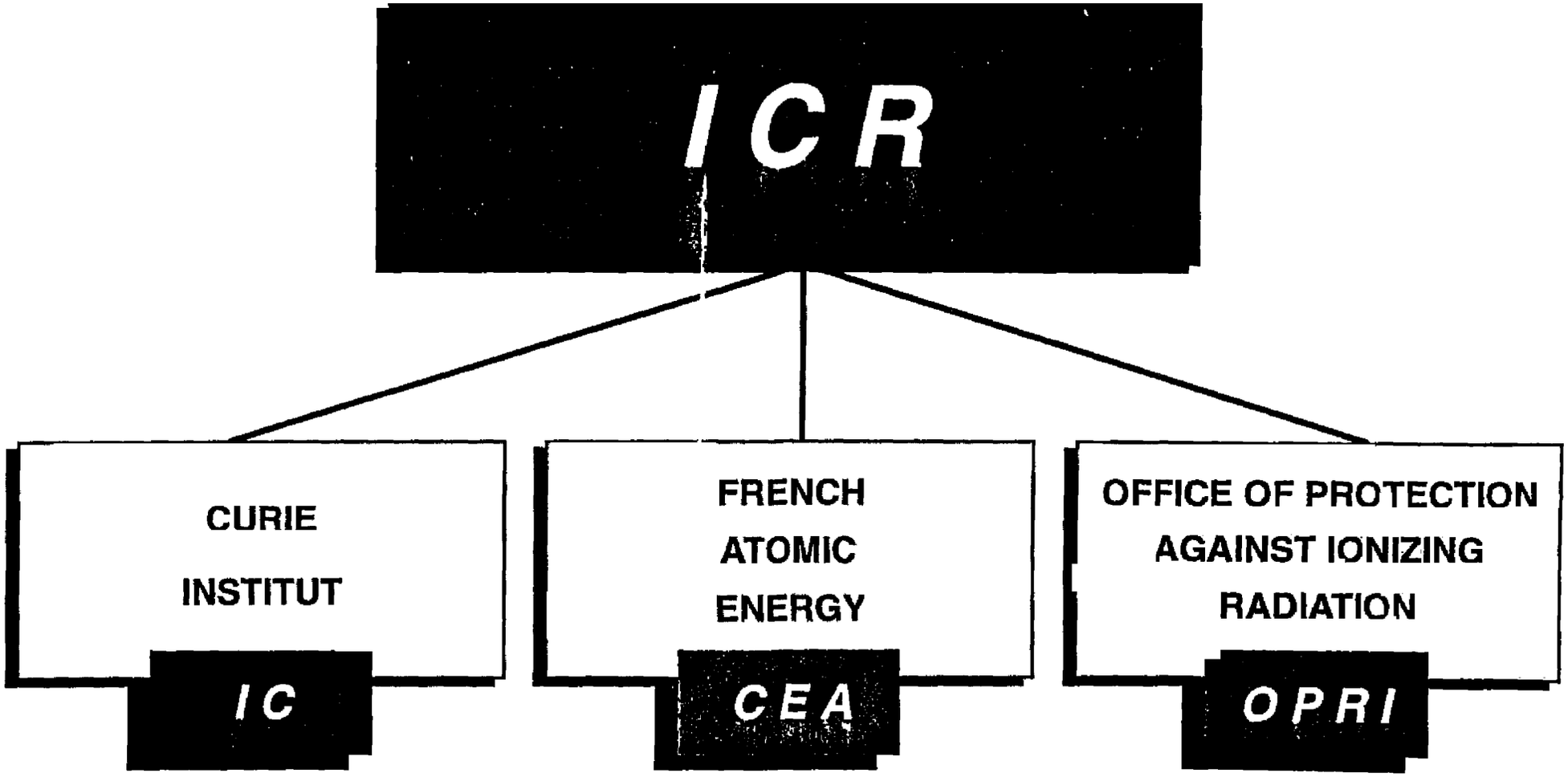
BOARD MANAGMENT
OFFICERS
CHAIRMAN SECRETARY TREASURER
OPERATIONS
CENTRAL TEAM
COORDONATORS
CONSULTANTS
SCIENTIFIC COUNCIL

ICR ORGANIZATION

- **MANAGEMENT**
- **PARTNERSHIPS**
  - CURIE INSTITUT
  - FRENCH ATOMIQUE ENERGY
  - OFFICE OF RADIATION PROTECTION
- **NETWORK**
  - CIVIL HOSPITALS
  - MILITARY HOSPITALS
  - SPECIAL OCCUPATIONAL MEDECINE SERVICES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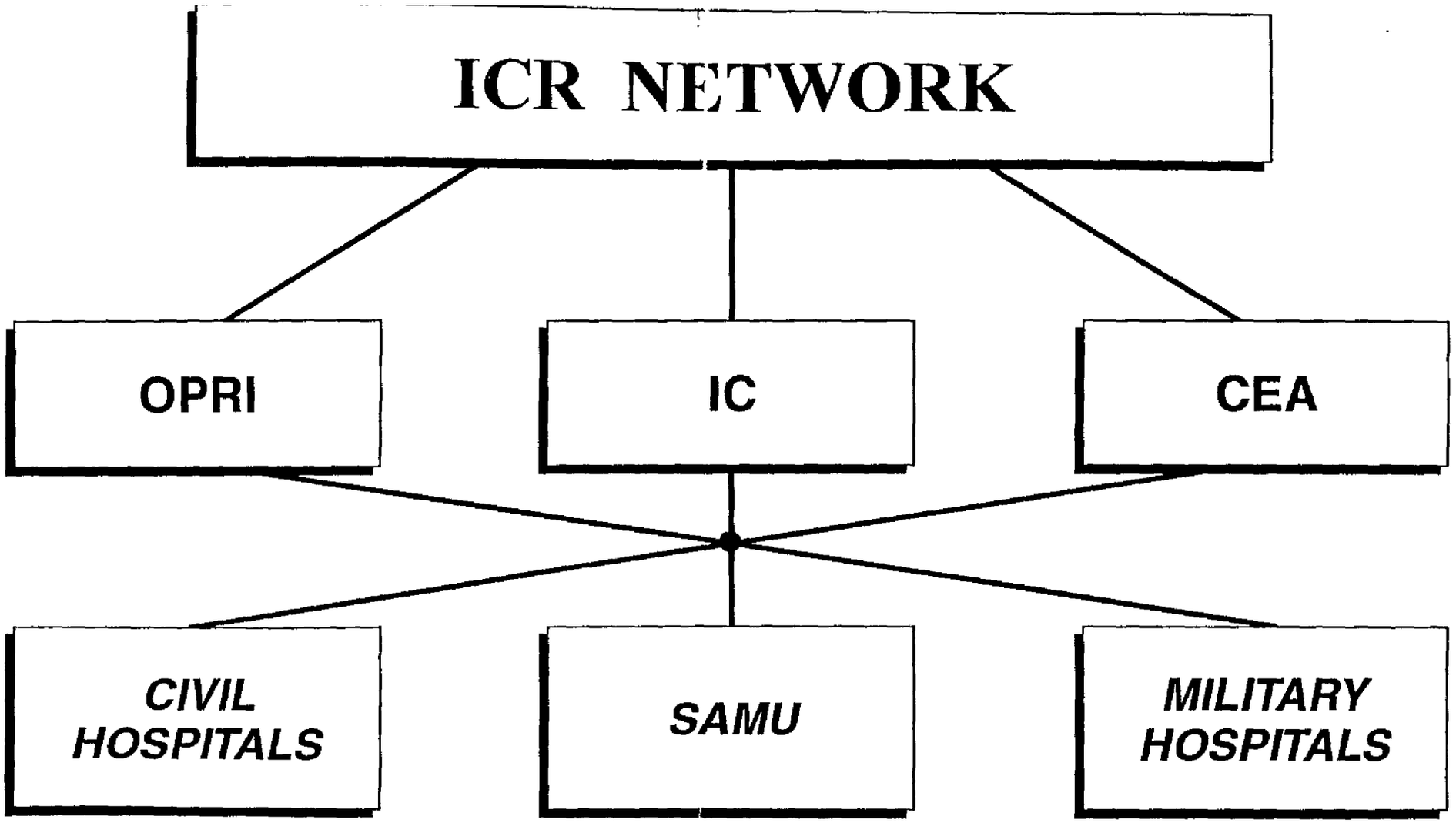
ICR NETWORK
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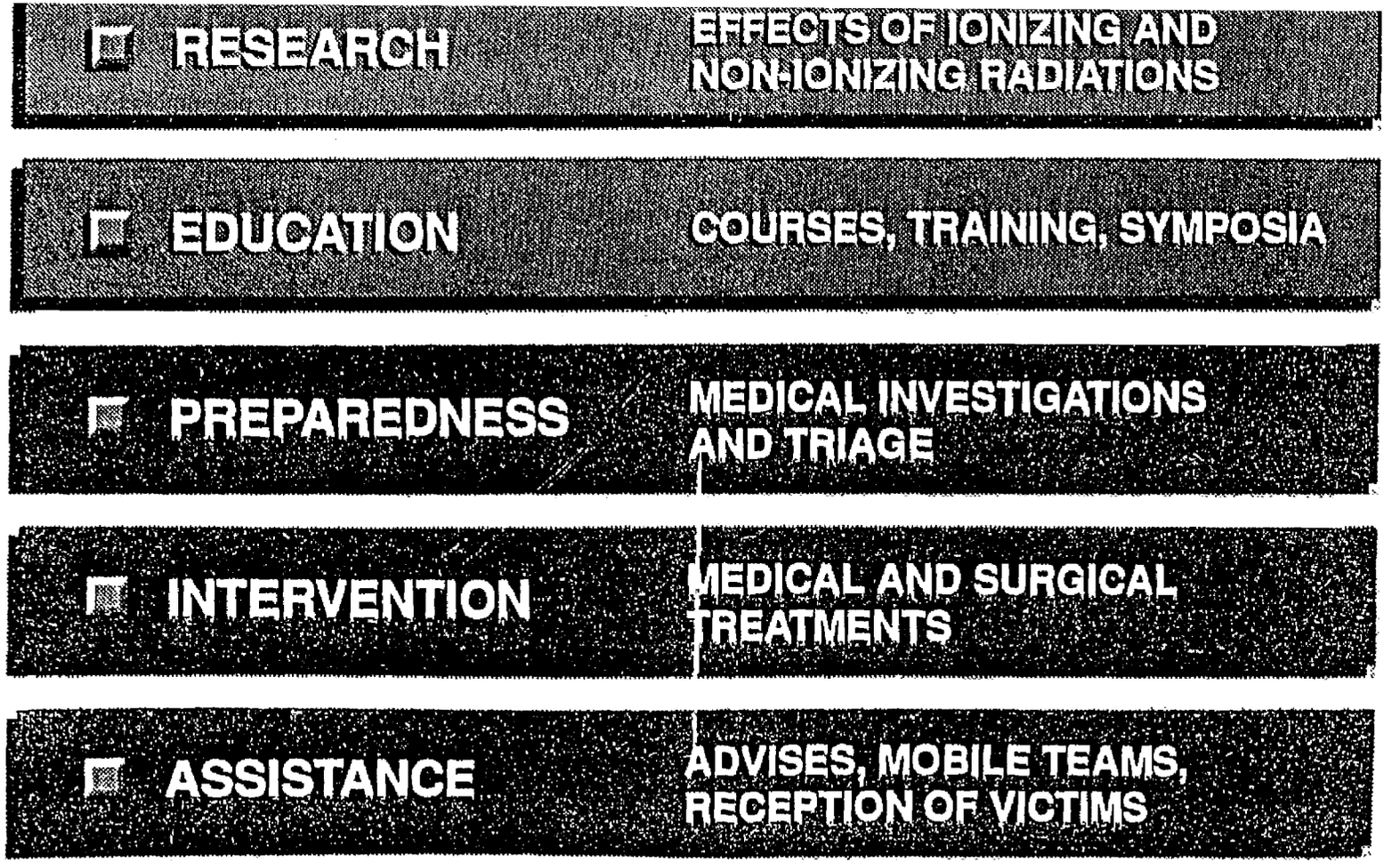
MILITARY HOSPITALS

ICR MISSIONS



TECHNICAL RESEARCH RADIOPATHOLOGY

ACCIDENT RECONSTRUCTION	IN SITU RECONSTRUCTION RECONSTRUCTION BY SIMULATION (FANTOMS) RECONSTRUCTION BY MODELISATION (ISODOSES CURVES)
RADIATION ASSESSMENT	QUANTITIES AND UNITS RADIOMETRY AND DOSIMETRY SOURCES EMISSION ENVIRONMENT FIELDS PERSONS EXPOSURES
RADIOACTIVE ASSESSMENT	QUANTITIES AND UNITS RADIOACTIVE ANALYSIS SOURCE RELEASES ENVIRONMENT CONTAMINATION { SPECIAL LABORATORIES INDIVIDUAL CONTAMINATION { MOBILE EQUIPMENTS

EXPERIMENTAL RESEARCH RADIOPATHOLOGY

ACUTE RADIATION SYNDROME	IMMUNO-HEMATOLOGY	PHYSIOPATHOLOGY OF LYMPHOCYTES (APOPTOSIS) STUDIES ON STEM CELLS AND STROMA TESTS ON COMBINATION OF GROWTH FACTORS NEW METHODS FOR HLA TYPING NEW METHODS FOR BONE MARROW TRANSPLANT
	GASTRO-INTESTINAL	STUDIES ON FUNCTIONAL DISORDERS STUDIES ON APPROPRIATE TREATMENTS
	CENTRAL NERVOUS SYSTEM	PROGRESS IN ELECTROENCEPHALOGRAPHY STUDIES ON PHARMACOLOGY
TISSUES-ORGANS RADIATION INJURIES	CONNECTIVE-VASCULAR	STUDIES ON FIBROBLASTS TESTS ON USES OF GROWTH FACTORS ENZYMOTHERAPY AGAINST LATE EFFECTS
	SKIN BURNS	NEW METHODS OF DIAGNOSIS AND PROGNOSIS MEDICAL TREATMENT BY ENZYMES STUDIES ON BEST SURGICAL INTERVENTION
	LUNG	ENZYMOTHERAPY : FIBROSIS PREVENTION - TREATMENT STUDIES ON VARIOUS CELL MODIFICATIONS
	BRAIN	BEHAVIOURIAL CHANGES AFTER IRRADIATION
	EYE	STUDIES ON UV AND LASER EFFECTS
RADIOACTIVE CONTAMINATION	EXTERNAL INTERNAL	STUDIES ON NEW MEDICAL AND SURGICAL DECONTAMINATION NEW FIRST URGENT TREATMENTS TESTS ON NEW LONGTERM DECORPORATION

CLINICAL RESEARCH — RADIOPATHOLOGY

RADIATION INJURIES	TOTAL BODY IRRADIATION (HOMOGENOUS HETEROGENOUS) (ACUTE-PROTRACTED)	DIAGNOSIS : HEMATOLOGY. BIOLOGY, CHROMOSOMES TREATMENT : HEMATOPOIETIC GROWTH FACTORS BONE MARROW. CORD BLOOD TRANSPLANT
	PARTIAL BODY IRRADIATION (SKIN BURNS) (CENTRAL NERVOUS SYSTEM) (EYE LESIONS)	DIAGNOSIS : THERMOGRAPHY (IR, MW) MAGNETIC RESONANCE ELECTROENCEPHALOGRAPHY OPHTALMOLOGY TREATMENT : MEDICAL : ENZYMOTHERAPY SURGICAL : SKIN GRAFT OPHTLAMOLOGY
RADIOACTIVE CONTAMINATION	EXTERNAL POLLUTION INTERNAL INCORPORATION	DECONTAMINATION TECHNIQUES DIAGNOSIS : ANTHROPOGAMMAMETRY RADIOTOXICOLOGY ANALYSIS TREATMENT : NEW METHODS OF DECORPORATION
LATE EFFECTS FOLLOW UP	CONNECTIVE -VASCULAR INDUCED CANCERS	FIBROSIS, SCLEROSIS, NECROSIS ENZYMOTHERAPY : SOD NEW GROWTH FACTORS ANATOMOPATHOLOGY : NEW CLASSES STUDIES ON HUMAN GENOME

GENERAL EDUCATION RADIOPATHOLOGY

ADMINISTRATIVE REGULATORS

- NATURAL EXPOSURES
- ARTIFICIAL EXPOSURES

- QUANTITIES-UNITS
- RADIOMETRY-DOSIMETRY

- DAMAGES RISKS DETRIMENTS
- DETERMINISTIC, STOCHAST C

- RADIATION HYGIENE
- DAMAGES DIAGNOSIS TREATMENT

IONIZING RADIATIONS

RADIOACTIVITY

NON IONIZING RADIATIONS

MANAGERS RADIATION ACCIDENTS

IONIZING NON-IONIZING RADIATIONS RADIOACTIVITY
SCENARIOS RADIOLOGICAL NUCLEAR ACCIDENTS
RADIOMETRY - DOSIMETRY - ANALYSIS
TECHNICAL HEALTH AND MEDICAL PREPAREDNESS
MANAGEMENT RADIATION EMERGENCIES
MANAGEMENT NON EMERGENCY CONSEQUENCES
ENVIRONMENT CONTAMINATION AND RELOCATION
ASSESSMENT OF EFFECTIVENESS OF INTERVENTION

MEDICAL EDUCATION RADIOPATHOLOGY

GENERAL PRACTITIONERS (UNIVERSITY)

IONIZING NON-IONIZING RADIATIONS RADIOACTIVITY
RADIATIONS ACCIDENTS SCENARIOS
HEALTH AND MEDICAL PREPAREDNESS
GENERAL INVESTIGATIONS IN RADIOPATHOLOGY
ORIENTATION TO APPROPRIATE HOSPITALS

SPECIALIZED PRACTITIONERS (CIR/INSTN)

IONIZING NON-IONIZING RADIATIONS RADIOACTIVITY
QUANTITIES AND UNITS : RADIOMETRY
RADIOLOGICAL AND NUCLEAR SCENARIOS
TECHNICAL RECONSTRUCTION OF ACCIDENTS
PHYSICAL, RADIOACTIVE, DOSIMETRY
BIOLOGICAL DOSIMETRY : CYTOGENETICS
MAGNETIC RESONANCE
ELECTROGRAPHY

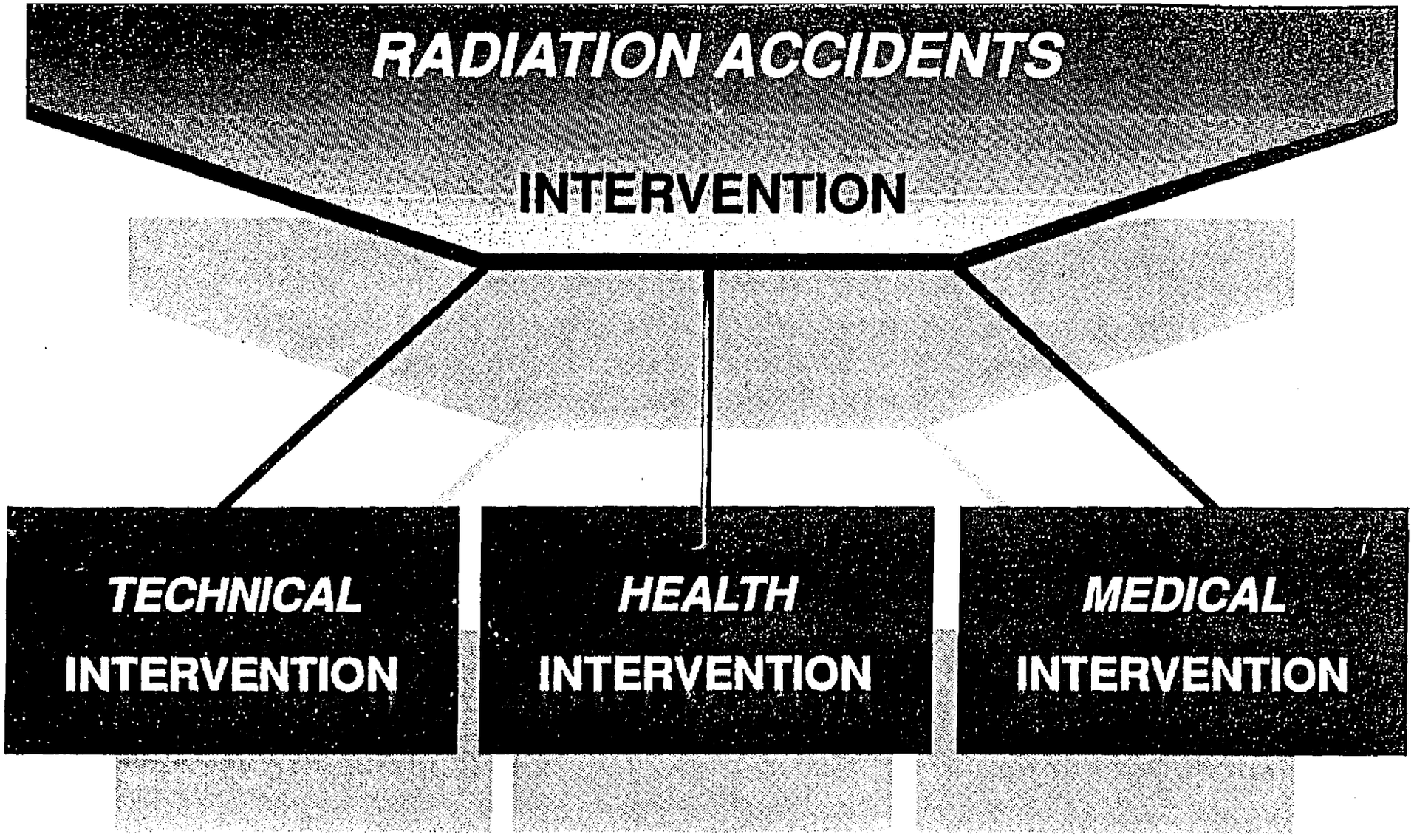
DIAGNOSIS AND PROGNOSIS

TREATMENT (MEDICAL SURGICAL)

RADIATION APLASIA | GROWTH FACTORS
TRANSPLANTATIONS

RADIATION BURNS | SKIN
EYES
HANDS

RADIOACTIVE DECONTAMINATION AND DECORPORATION


RADIATION ACCIDENTS
INTERVENTION
TECHNICAL
INTERVENTION
HEALTH
INTERVENTION
MEDICAL
INTERVENTION