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The National Research Centre

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NRC in Brief



Contents

- The NRC major activity
- Future Plans
- Suggestions to strengthen collaboration between member states



Man Power

-  Research Staff : **3893**
-  Scientific Assistance : **954**
-  Administrative Staff : **2555**



Major Activities

Research
plan
2010 – 2013



Research Groups

Renewable Energy

Water

Nanotechnology and
New Materials

Biotechnology

Agriculture

Waste
Management

Stem Cells

HCV

Obesity

Cancer

Diabetes

Human Genetics

Functional Foods

Polymers



1- Renewable Energy

A- Solar Energy

- Using and development of solar energy equipments
- Design of solar cell system
- Fabrication of solar cells

B- Biofuel

- Biodiesel
- Bioethanol
- Biobutanol
- Hydrogen





2- Water Research Group

- Secondary treated **water reuse**
Technology evaluation and optimization
- Water **Desalination** Using Nano-filtration Membranes Based on Cellulosic Derivatives
- Novel Techniques for **Algal Removal** from Surface Water



3- Nanotechnology and Advanced Materials Research Group

- Gelatin/ PVA fiber mats containing silver nanoparticles for **antibacterial wound healing**
- Application of Nanotechnology for Modification of **Synthetic Fibres**
- High Performance **Cotton Products** Using Nanotechnology

- Some Medical and Environmental Applications of Carbon-nanotube Screen Printed **Bio-sensors**
- Utilization of nano- bio- and other novel technologies in **textile coloration**
- Synthesis and characterization of different poly(amide) nanocomposites based on montmorillonite/kaolinite via in-situ interfacial polycondensation and possible use as membranes



- Preparation of new formulations of nano-hydroxyapatite with antibacterial agents for treatment of periapical and alveolar **bone lesions**
- Advanced and Nano-Materials for Renewable Energy (**Wind Turbine applications**)
- Advanced nanotechnology approaches for **drug delivery**



4- Biotechnology

- Plant Biotechnology
- Animal Biotechnology
- Bioactive Materials



5- Agriculture

- **Abiotic Stress**
- **Biocontrol**
- **Increased oil crops productivity**
- **Increased productivity of horticultural crops**
- **Animal production**



6- Waste Management

- Removal of **phosphate salts** from waste waters by using some Egyptian rocks.
- Preparation and Characterization of **Nanometric Porous Carbon** and its Application in Environmental Remediation
- **Recycling wastes** of marble and granite quarrying and processing
- Evaluation of recycling and/ or reuse of some **polymer wastes** and improvement their applications in various technological fields
- Bio-removal of dye industrial wastewaters for reuse as **alternative water in irrigation**



7- Stem Cells

Human Stem Cells and Bone Repair:

Human stem cells activated to repair spinal injuries and Mandibulofacial deformities by Efficient Differentiation into bone forming cells



8- Hepatitis C Virus

- Medicinal plants as a **hepatocurative** and **hepatoprotective** agents
- Preparation of Chitosan Nanoparticles and its Derivatives as Delivery System for Epitope **Vaccine in Hepatitis C Virus**
- A study of the **interaction** between hepatitis C virus infection, pulmonary disorders and the response to treatment
- "New Approach Drugs from **Algal Polysaccharide** for Treatment of Hepatic Diseases"



9- Obesity

- Role of **metformin** in breaking the link between obesity and its associated health conditions
- Role of **Acupuncture** in management of obesity
- **Visceral and Central Obesity** as an Early Estimator for Obesity Health Risk: Management and Intervention
- The impact of **maternal overweight and obesity** on pregnancy outcomes



10- Cancer

- Fighting Cancer: A Multidisciplinary Approach for the Synthesis and Evaluation of Potential Novel Anticancer Candidates
- **Novel Biomarkers** as Promising Diagnostic Options for Solid Malignant Tumors
- **Novel bionanocomposites** based on carbon nanotubes and gelatin as new cancer therapeutics

- Environmental assessment of suspected **carcinogenic pollutants** in Egypt
- **Fungi causing cancer** as an environmental health problem in occupations at risk
- A novel understanding of Human Cancer in impact of **Drosophila Tumor suppressor genes model**



11- Diabetes

- Biomarkers and Genetic risk factors for type 2 **diabetic nephropathy**
- Association between **polymorphisms** in TCF7L2 and KCNJ11 genes and type 2 diabetes and its complication in the Egyptian population
- Role of Cell Membrane Fatty Acids in **Insulin Sensitivity** in Streptozotocine Induced Diabetic Rats



12- Human Genetics

- The use of **recent advances in molecular cytogenetics** for the prevention of mental retardation
- **Biochemical Genetics studies** for prevention of Mental Retardation
- Early noninvasive **prenatal diagnosis** and pregnancy care for the prevention of mental retardation



13- Functional Foods

- Development and evaluation of recent advances in specific nutritional therapy for **management of metabolic syndrome** among Egyptian adults
- Prevention and Management of Some **Chronic Diseases** (Renal and hepatic) by Nutraceuticals and Functional Foods.
- Therapeutic Effect of Gluten Free Diet on **Psoriatic Patients** with Gluten Sensitive Enteropathy.



14- Polymers

- Advanced technological preparation methods in **upgrading of Egyptian Kaolin** required for different industrial applications
- Organic **photoconducting and photodynamic** materials
- High Performance Polymers, Pigments and Polymer nanocomposites for **Industrial and biological applications**
- Utilization of **MMT clay** in pharmaceuticals as drug delivery
- Industrial Applications for **Lignocellulosic Materials**



Future Plan



The future plans of NRC are established in accordance with the national priority and Strategy by the Ministry of Higher Education and Scientific Research and Technology.

Consequently, the main research areas at NRC will focus on the **renewable energy; especially the solar energy, in which the NRC has made progressive steps.**



Water issues, like desalination, in which also the NRC has great experience either by producing new materials used as filters from textile materials, by staff from the Textile Research Division, or from new polymers, manufactured by Polymer Department staff. **Irrigation problems** are also solved by many researchers to be utilized on small scale for the new communities in the desert.



Thirdly, we are focusing on **Agriculture** to increase the productivity of various crops; especially oil crops.

Moreover, many research is running to overcome the soil problems of cultivation in the desert.



Suggestion for South – South Scientific Collaboration



- NRC is the interim hub of the COMSATS Network of Agricultural Biotechnology.
- NRC is looking forward to enhance south-south scientific cooperation through:
 - 1- Joint research work
 - 2- The training facility
 - 3- Technology transfer



First: Joint Research Work

- **NRC welcome fruitful collaboration with the analogous institutions in the member states in almost all scientific fields; especially those of maximum priority for Egypt and related to the aforementioned topics.**



Second: Training Facility

- **The Training centre** at NRC has a great experience in the arrangement of training courses almost in all fields related to the different industrial and environmental sectors since 1983. The centre has arranged hundreds of national and international training courses in scientific as well as non-scientific topics.
- Special training courses are regularly organized in the fourteen Research Divisions; e.g. Textile, Polymer, Engineering, Food and Nutrition, Pharmacology, Agriculture, Ecology, ...etc.



Third: Technology Transfer

- NRC has entered its 55th year of providing technology transfer services for our nation. Our work has provided clients with technical and market research expertise dedicated to meeting the complex needs of technology transfer organizations, while providing close support focusing on customer service.
- NRC is inspired by the patents and technologies developed at our labs, and is proud of our innovation for better national economy.



Thank You