



Multiple and emerging contaminants of drinking water in rural India: Understanding the dynamic relationships in protecting groundwater resources

Speaker :

Dr.Ashok Ghosh

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Information on Organisation



- **Your name** : Dr.Ashok Ghosh
- **Organisation** :
Mahavir Cancer Sansthan and
Research Centre ,Patna
- **Country which your organization would represent** - India
- **Nature of organization** : Cancer Hospital and Research institute recognized and registered with DSIR, DST to receive grant from Gol.
- **Department within the organisation** : Research Department
- **Expertise relevant to the call topic(s)** : We are working on water quality since last 14 years, specifically arsenic and fluoride contamination.
- **Current Projects** :We are working on four projects related to safe drinking water:
 - 1.**Project DELTAP** supported by *NWO Wotro* of The Netherlands
 - 2.**Project INNOWATER** supported by DST, Government of India
 - 3.**Project Nutri- SAM** supported by DST- UKIERI ,Gol and UK Government
 - 4.**Project FAR-GANGA** supported by DST-NERC, Gol and UK Gov.

Information on...

- Mahavir Cancer Sansthan & Research Centre (MCSRC) is a charitable organization which was started 19 years ago exclusively for treatment of cancer patients and related research.
- Financially supported by both Government of Bihar and Government of India.
- Second largest cancer hospital of India after TMH in terms of number of patients treated/year (**26 K approx newpatients in 2016-17**)
- The 450 bedded indoor facility hospital has full -fledged departments like Surgical Oncology, Medical Oncology, Radiation Oncology, Nuclear Medicine, Pathology, Radiology, Outdoor Units, Intensive Care Unit, Critical Care Unit, Palliative Care Unit, Blood Bank, Dental Clinic, Pharmacy, Patient Counselling Facility and **Research Centre**.
- The hospital has established the Nuclear Medicine Department very recently with sponsorship from Government of Bihar with advanced PET-CT. This instrument is the only PET-CT in Bihar which is being used for the Patient's diagnosis on 50% subsidized rate.

INSTRUMENTS AVAILABLE IN THE RESEARCH DEPARTMENT



AAS



HPLC



Rota Vapour



RT- PCR



Biosafety Cabinet



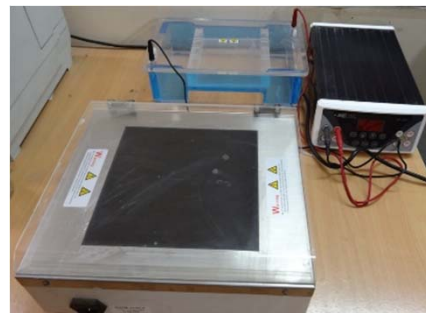
U.V. Vis Spectrophotometer



Cooling Centrifuge



Digital Microtome



Electrophoresis



Deep Freezer (-80⁰ C)



Animal House



Linear Accelerator

PET- CT



Past experience on bi-and/or multilateral cooperation (including ongoing consortia). Yes, we have worked on the following bi-and/or multilateral cooperation (including ongoing consortia)

- **Project DELTAP** – A collaborative project with A N College, Patna, India; Technical University of Delft, The Netherlands; Dhaka University ,Bangla Desh supported by **NWO Wotro**, The Netherlands (Running)
- **Project Nutri-SAM** - A collaborative project with A N College, Patna, India; University of Salford, UK: and University of Manchester ,UK supported by **DST-UKIERI** (Running)
- **Project FAR-Ganga** – A collaborative project with IIT-Kharagpur; IIT-Roorkee ; NIH-Roorkee; BGS-UK; Salford University-UK and Manchester University-UK (Granted by **DST-NERC in October,2017**)
- **Project Low Cost Solution for Safe Drinking Water in Rural Bihar** - A collaborative project with A N College, Patna, India; and Lehigh University Pennsylvania, USA supported by **Tagore-Sengupta Foundation** (Completed in 2017)

Profile of partners sought (type, skills, role, etc.)

- **Experts in Water purification technologies** – To develop state of art ,robust, and user friendly technology to supply safe drinking water in rural area based on our findings related to established and emerging contaminants like Manganese, pharmaceuticals and personal care products (PPCPs).(SMEs, Universities, Research Institutes)
- **Experts in sensor technology for detection of Water Contaminants** – For quick screening of water quality in vast rural area of India and other developing countries (SMEs, Universities, Research Institutes)
- **Experts in Social Integration of Technology** - To study socio-economic background of targeted population and also cost benefit analysis of the technologies developed through this project (International/National NGOs working in water Sector)

Contact Details and Web url

- **Contact details**

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- **web url**

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2.Personal : <https://ghosh51.page4.me/>

Research Idea - Emerging Water Contaminants

- Sometimes chemicals that had not previously been detected (or were previously found in far lesser concentrations) are discovered in the water supply. These chemicals are known as “contaminants of emerging concern” or simply "emerging contaminants."
- Emerging contaminants are important because the risk they pose to human health and the environment is not yet fully understood.
- Pharmaceuticals, personal care products(PCPs) and endocrine disrupting compounds (EDCs) are among the prime examples of emerging contaminants. Up to 90% of oral drugs pass through the human body and end up in the water supply. Personal care products (soaps, cosmetics, fragrances, etc.) also find their way into our water.
- Endocrine disruptors are substances that may interfere with the function of hormones in the body.
- Trace amounts of these contaminants are being discovered in water throughout the world. Our study will improve understanding of several emerging contaminants, including perchlorate, pharmaceuticals, PCPs and EDCs.

Topic of interest/scientific capacity related to topic

- **Emerging Challenges facing Water Security** : Micro-contaminants, micro-plastics, water reuse, resource recovery, real-time monitoring of pathogens, dynamic sampling are very much discussed and cost-effective solutions are required.
- **Motivation:** Contaminants of emerging concern (**CECs**), including pharmaceuticals and personal care products (**PPCPs**), are increasingly being detected at low levels in surface water, and there is concern that these compounds may have an impact on drinking water as well as aquatic life. This project will be able to evaluate the potential impact of CECs and PPCPs on aquatic life and have an approach for determining protective levels for human consumption and aquatic organisms.
- **The Aim of our project** is to improve water quality in India while especially looking at newly emerging contaminants such as pharmaceuticals and resistant microbes and searching for strategies to avoid such waters (groundwater usage) or treat it with simple and energy independent technologies
- **Deliverable of Project** :This project will determine the key parameters for the assessment of overall drinking water quality and the interplay among existing and emerging contaminants on drinking water quality in order to provide solutions to secure safe drinking water for the rural population of over 800 million in India.

Project Description

- **Objective 1:** To determine the physico-chemical, emerging, and bacteriological contaminants in drinking water supplies and to assess the prevalence of different contaminants and their concentrations against national and international benchmarks. To date, no such study has been performed in India to evaluate the suite of contaminants in a specific drinking water source and hence provide a genuine estimation of the overall quality of such source.
- **Objective 2:** To determine the correlation and interaction between contaminants to examine the potential synergistic and antagonistic effects of the presence of one on the other.
- **Objective 3:** To determine the relationship between both established (e.g. heavy metals vs. pesticides) and emerging contaminants (e.g. heavy metals vs. presence of microbes and the development of their antimicrobial resistance; pharmaceuticals and personal care products vs. other organic contaminants such as pesticides)
- **Objective 4:** To develop energy efficient, low cost, robust, area specific and sustainable technology to supply safe drinking water in rural India

Beneficiaries

- **Stakeholder Communities Beneficiaries of this research include:**
 - a) Water managers, public health practitioners, risk assessors and policy makers in both Governmental and Non-Governmental Organizations (NGOs) operating in India;
 - b) Local and national NGOs working towards the provision of safe drinking water to the rural population of India and beyond (for example, those in LMICs with responsibilities for water, health and the environment); and, most fundamentally,
 - c) Those living in arsenic- or any other water pollutant affected communities
- **Water managers and public health practitioners include those working in the following Governmental and NGOs operating in India:**
 - i. Public Health engineering department (<http://phed.bih.nic.in/>)
 - ii. Central Ground Water Board (<http://www.cgwb.gov.in/>)
 - iii. Central Pollution Control Board (<http://cpcb.nic.in/>)
 - iv. Department of Science and Technology (DST) (<http://dst.gov.in/water>)
 - v. Department of Health and Child Welfare
 - vi. UNICEF
 - vi. WaterAid

YES

Water resource matters

**because survival of
this civilization
matters !**

THANKS

