

Protecting Workers from the Known and Emerging Health Risks of Non-ionizing Radiation – Presentation to NORA Town Hall Meeting

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- Definition on non-ionizing radiation (NIR) – electric and magnetic fields (EMF) which are weaker than X-rays and gamma rays that ionize molecules, but can still have biological effects at higher intensities.
- Although UV, visible light, lasers, and IR all have well-known health risks, NIOSH research has focused on radio frequency (RF)/microwave radiation (300 gigahertz – 10 megahertz) and EMF at power frequencies (50/60 Hz).
 - As a rule, NIR toxicity increases with frequency. So RF radiation is more toxic, but power frequency EMF is more prevalent.
- Known health risks from high intensity EMF:
 - tissue heating from RF (e.g broadcast antenna construction and maintenance, plastic heat sealers)
 - electrostimulation of nerves from power-frequency EMF (e.g. high-voltage transmission line workers and induction metal furnaces)
 - exposure limits exist for these health effects, so DART’s research agenda has concentrated on control technologies:

Research priorities on NIR control technologies -- from “NORA at Nine”:

- Improve instrumentation and techniques to address measurement and control of exposures in the near-field.
- Improve engineering controls, personal protective equipment (PPE), and monitoring instruments for dealing with NIR exposures in the workplace.
- Encourage participation of both industrial hygienists and management to address NIR workplace hazards effectively.
- Improve worker and safety professionals= awareness of NIR issues through training.

- Possible health risks from EMF exposures below the exposure limits.
 - Power-frequency magnetic fields are a *Possible Human Carcinogen*, according to the International Agency for Research on Cancer (IARC) and NIEHS. These evaluations are based on epidemiologic studies of cancer and neurodegenerative diseases at levels less than 1/1,000th of the exposure standards.
 - New epidemiologic evidence of acoustic neuromas and brain cancer from long-term use of cell phones.
 - DART research has concentrated on improved methods of exposure assessment for occupational epidemiologic studies conducted with partners at IARC, NCI, and the Electric Power Research Institute. The goal is to determine whether

these low-level EMF are truly a health hazard, and therefore the present paradigm for setting health standards needs to be re-examined.

- DART and EID also starting risk assessment research on how to manage workplace exposures to these “possible” health risks.
- Surveillance of emerging wireless technologies.
 - Cell phones are an example of potential public health impact of any unforeseen health effects from the new wireless technologies.
 - 65% of the US population are cell phone subscribers
 - Cell phones at maximum power can expose the brain to radiation up to 97% of the current US health standard.
 - New wireless technologies are coming out constantly for communication, surveillance, tracking inventory, data transfer, and computing. An implantable chip has just come on the market.
- NIR and NORA
 - NIR is a multi-faceted health hazard that fits into many of the present NORA categories, but is currently recognized only by Engineering Controls. Below are all the places where NIR might fit within the new NORA Program Portfolio.
 - Sectors:
 - Manufacturing
 - Transportation, Warehousing & Utilities
 - Public & Private Services
 - Cross-sector Programs:
 - Cancer, reproductive, cardiovascular, neurologic & renal diseases
 - Global collaboration
 - Health hazard evaluations
 - Coordinated Emphasis Areas:
 - Exposure assessment
 - Engineering controls
 - Surveillance
 - **Suggested NIR Research Priorities**
 - Maintain NIOSH’s expertise in NIR research.
 - An epidemiologic study of occupational RF and chronic health effects (cancer, neurologic, etc.) – collaboration with IARC
 - RF protective suits
 - Epidemiologic studies of power-frequency magnetic fields with the new exposure assessment tools developed by DART
 - Interventions to reduce occupational exposures to power-frequency EMF
 - Health Hazard Evaluations and surveillance on new NIR technologies.

