

# Research and Policy Needs for Environmental Health

January 23-26, 2017

The Israel Institute for Advanced Studies  
and Environmental Health Trust  
Jerusalem

*"It pays far more to prevent than to treat"*  
Bernardino Ramazzini, physician  
Carpì 1633 - Padova 1714



*Cesare Maltoni Cancer Research Center*

*Recent findings on wireless  
radiation and health from the  
Ramazzini Institute could  
reinforce the NTP results*

**Fiorella Belpoggi**

Director

Research Department

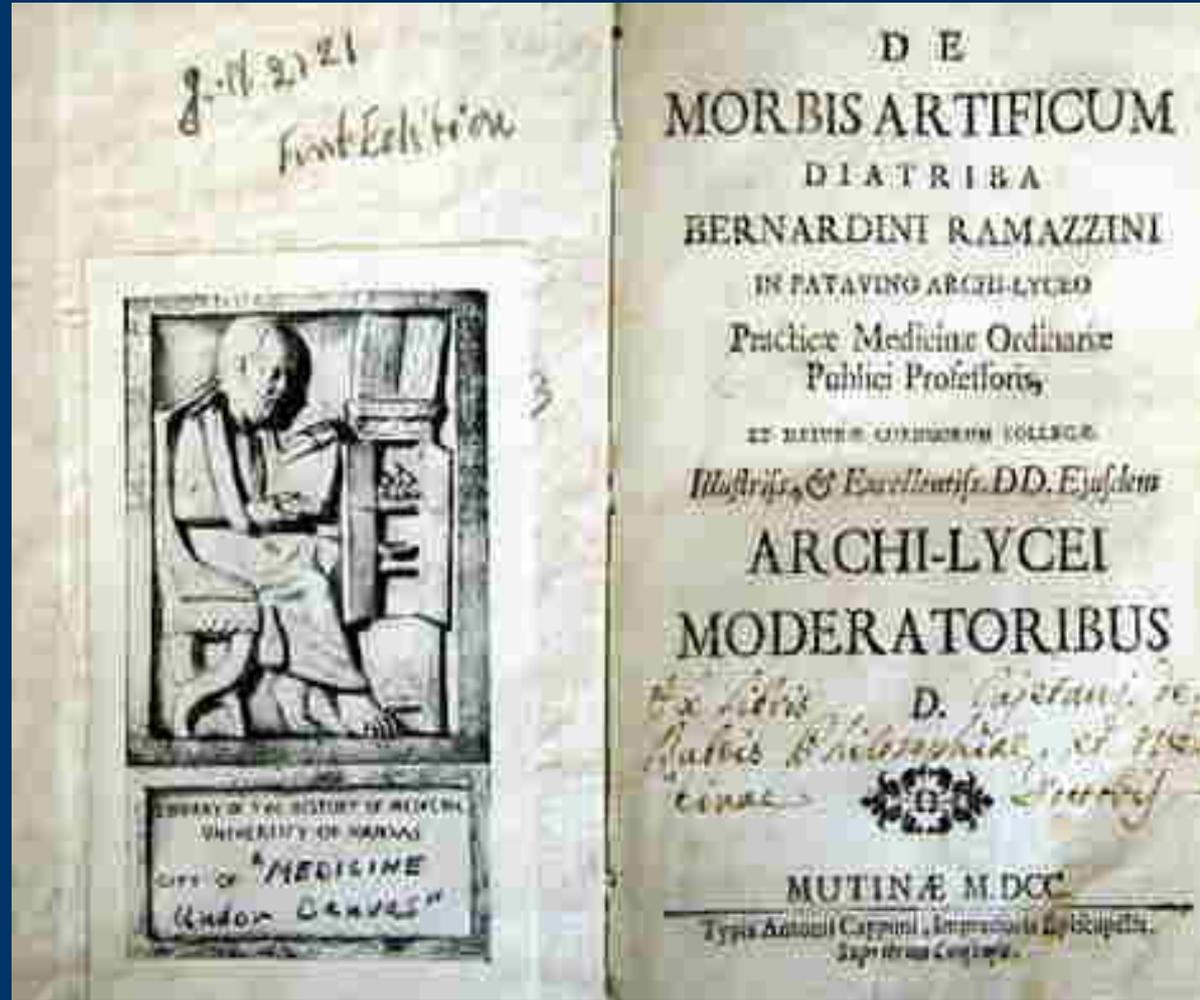
Ramazzini institute

Bologna Italy

# Bernardino Ramazzini



Carpi, 1633 – Padua, 1714



De morbis artificum diatriba, (1700)

# The CMCRC (1969)

## HISTORY...



Cesare Maltoni  
(1930-2001)



Castle built in 1475  
*Domus Jucunditatis*  
of Bentivoglio family



# ...and science



# Ramazzini Institute

- The **Ramazzini Institute (RI)** is a **non-profit independent cooperative**; it is located in Bologna, Italy
- Our work principally involves strategies based on prevention of **environmental diseases**, in particular cancer
- The RI depends on support from more than **27,000 associates**, each year covering 30% of the RI budget
- The budget is annually published on our website and incomes include funds from national and international public institutions, liberal donations and contributions from private citizens and NGOs such as Environmental Health Trust



# Radio Frequencies *in vivo* studies

Observational data collected in earlier, large-scale population-based studies, together with case-control studies, have found some evidence of an increased risk for developing cancer from cell phone use

From early 2000, both NTP and RI started programs to perform experimental studies on radiofrequency (RF)

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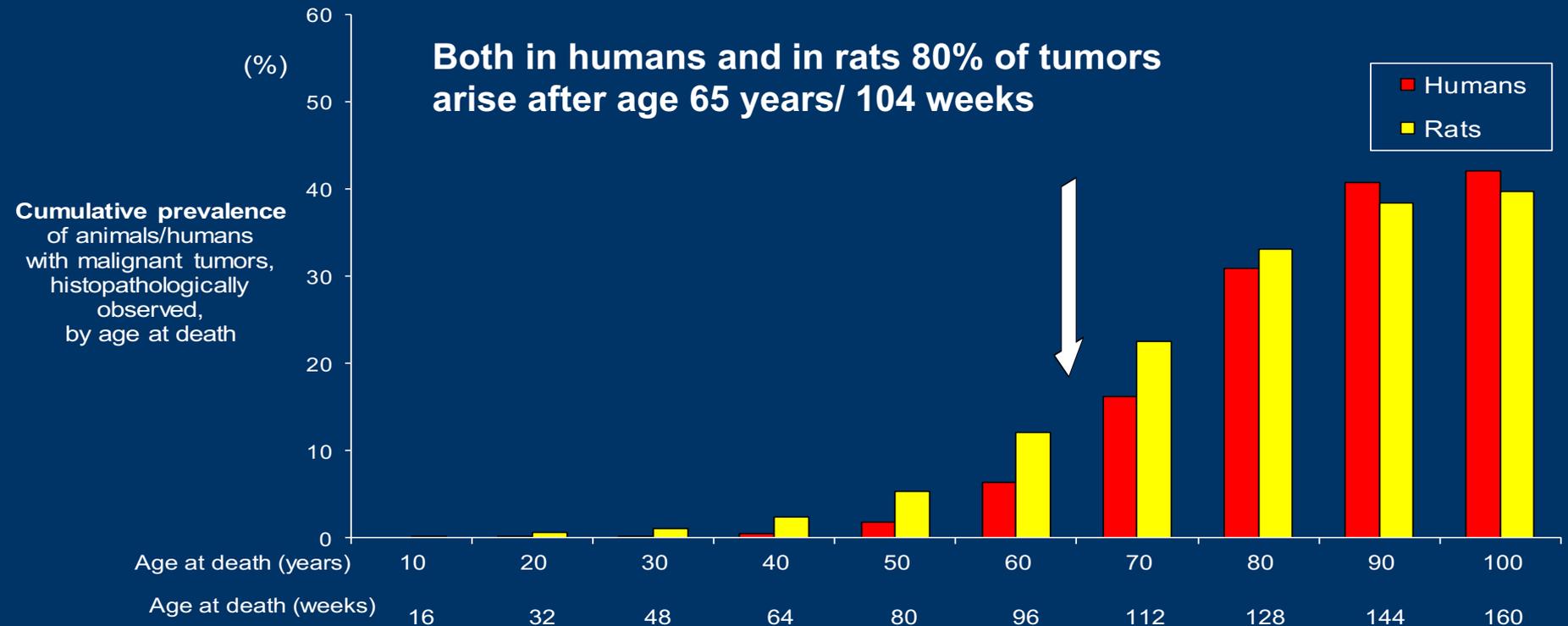
Why do we test animals (rats or mice)?

Because we use a human equivalent model!

We have studied this model for 40 years,  
to create drugs,  
to predict effects in humans,  
and ultimately to prevent harm.....

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# A human-equivalent model



Age: 16 weeks of age in Sprague Dawley rats are considered equivalent to 10 years in humans

Data from the Hospital of Trieste were kindly made at our disposal by Professor Luigi Giarelli

# Radio Frequencies *in vivo* studies

## AIM OF THE STUDY



The nomination for NTP to study cell phone RF radiation was made by the U.S. Food and Drug Administration

Animals were exposed to frequencies and modulations currently used in cellular communications in the United States



The nomination for the RI study was performed on the basis of the number of people exposed and the inadequacy of information on the possible hazards

Animals were exposed to frequencies and modulations that mimic the common human population exposure to radiobase-station antennas in the world

# Radio Frequencies *in vivo* studies



**NTP**  
National Toxicology Program  
U.S. Department of Health and Human Services



**GSM (Global System for Mobile Communication)  
& CDMA (Code Division Multiple Access)  
for both mice and rats  
≈ Near Field**



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**GSM (Global System for Mobile  
Communication)**

***Far Field***

# Radio Frequencies *in vivo* studies



# Radio Frequencies *in vivo* studies – Results



**NTP**  
National Toxicology Program  
U.S. Department of Health and Human Services

## **BRAIN**

### **MALIGNANT GLIOMA:**

- Significant increased incidence occurred in GSM and CDMA exposed male rats, none in controls.

### **GLIAL CELL HYPERPLASIA:**

- Significant incidences occurred in GSM and CDMA exposed male rats, none in controls.



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## **BRAIN**

- BRAIN SLIDES of 3 groups out of 4 are up to now examined
- COMPLETE EVALUATION is programmed within a few months and an external PWG should be performed in September

# Radio Frequencies *in vivo* studies – Results



**NTP**  
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U.S. Department of Health and Human Services

## HEART

### SCHWANNOMA:

- Statistically significant positive trends in male rats exposed to GSM- or CDMA-modulations ( $p < 0.05$ ).

### SCHWANN CELL HYPERPLASIA:

- Increased incidence in male rats exposed to either GSM- or CDMA-modulation, and in female rats exposed to CDMA-modulation.



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## HEART

- HEART SLIDES of 2 groups out of 4 are up to now examined
- A COMPLETE EVALUATION of slides is programmed within a few months and an external PWG should be performed in September

# Radio Frequencies *in vivo* studies – Results



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## IN ADDITION..

- Litter weights tended to be lower in GSM and CDMA RFR-exposed groups compared to controls
  - Early in the lactation phase, body weights of pups were lower in GSM- and CDMA-modulated RFR groups at 6 W/kg compared to controls
- Litter weights tended to be lower in RFR-exposed pups compared to controls. The difference in individual mean body weight at the higher dose (50 V/m  $\approx$  0.1 W/Kg) is statistically significant
  - In the lactation phase, body weights of pups tended to be lower in the 50V/m RFR exposed pups

# Radio Frequencies *in vivo* studies – Results



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National Toxicology Program  
U.S. Department of Health and Human Services



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## RESULTS

- *Up to now, complete results of brain and heart show significant increases in rare malignancies in rats*
- *COMPLETE RESULTS from all the rat and mice tissues for all studies will be available for peer review and public comment by the end of 2017*



*The evaluation of data is now ongoing and the first COMPLETE RESULTS of the study will be available by the end of 2017-early 2018*

# What are the next steps?

- Complete histopathology
- Perform an external PWG
- Study molecular events induced by ELFMF and RFR (e.g. oxidative stress)
- Study genetic toxicity assays (DNA repair processes of particular interest) in both ELFMF and RFR
- Share our biological materials with the NTP to examine early molecular changes and compare results

# In memoriam of our Founder, 15 years on



*"The high costs [human and economic] probably represent the reason why, in the field of experimental and environmental carcinogenesis, words overlap facts, opinions overlap data, and meetings and commission reports submerge good laboratory work."*

Cesare Maltoni

A handwritten signature in black ink, which appears to be 'C. Maltoni'.

From:  
Maltoni, C., Lefemine, G., Ciliberti, A.  
*Carcinogenicity bioassays of vinyl chloride monomer: A model of risk assessment on an experimental basis*(1981)  
*Environmental Health Perspectives*, Vol. 41, pp. 3-29.