

# RF fields and Health

## A WHO Perspective



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## ITU Workshop on "5G, EMF & Health"

Warsaw, Poland, 5 December 2017

# OUTLINE

**Introduction**

**Assessing the health risks**

**Discussion**



# World Health Organization



**Function:** act as the UN directing and coordinating authority on international health work

**Objective:** "the attainment by all peoples of the highest possible level of health"





## HEALTH

a state of COMPLETE  
physical, mental and social  
well-being and not merely  
the ABSENCE of disease or  
infirmity"

(Constitution, 1948)

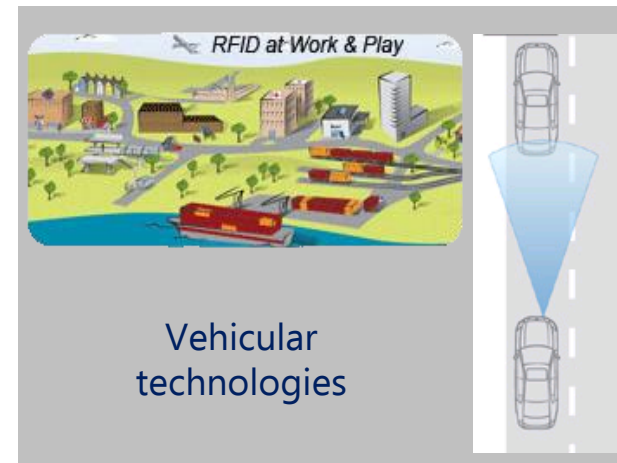


## The Present EMF Context

- Increasing EMF human exposure due to electricity demand, medical technologies and wireless devices
- Concern from the public



# Applications using radiofrequency fields (100 kHz – 300 GHz)





# Mobiles 'boost cancer'

## Radiation may make tumours grow faster

use are still unclear.  
The biggest British study, led by Sir William Stewart two years ago, could find no evidence of a risk to health. But Sir William still recommended a precautionary approach, particularly in children.  
The World Health Organisation has called for more research and has urged people to limit mobile use.  
Now Italian scientists believe they could be closer to the truth.  
Dr Fiorenzo Marinelli, of the National Research Council in

Cancer develops when control signals in a normal cell go wrong and an abnormal cell results. Instead of destroying itself the mutant cell keeps on dividing and forms a lump or tumour.  
The results of the Italian study support the belief of some scientists who say radiation can damage DNA and destroy the cell repair system - making tumours more deadly.  
Dr Peter de Pomerai of the University of Nottingham, who studied effects on the body of



## Stop Smart Meters!

*Fighting for health, privacy, and safety*



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# Applications using radiofrequency fields (100 kHz – 300 GHz)



**5G**





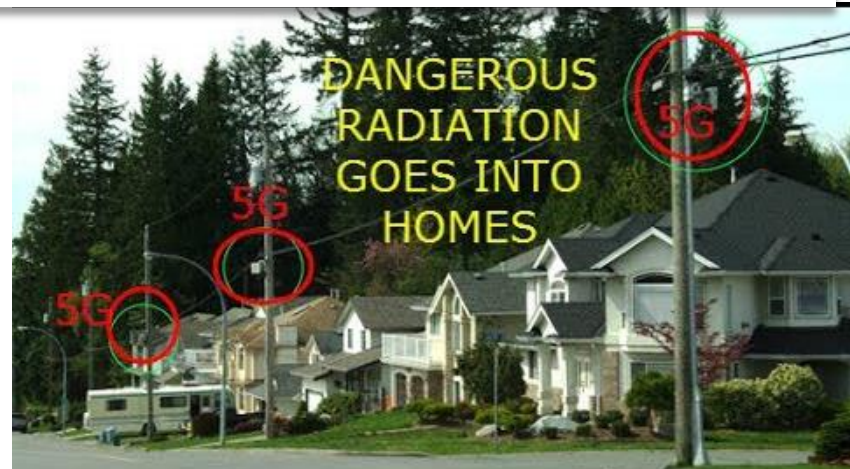
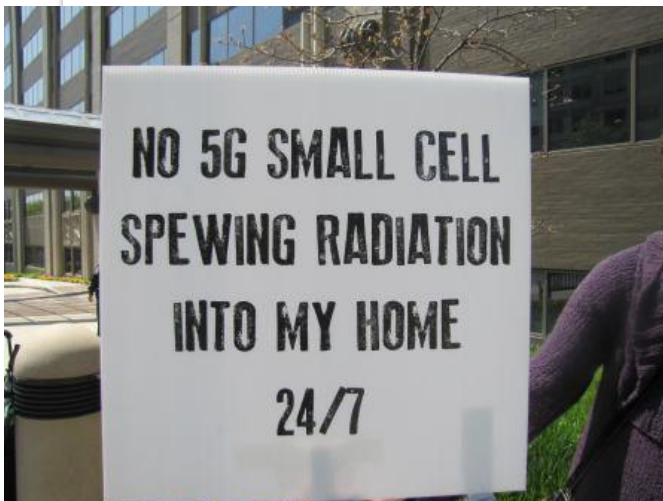
## Scientists and doctors warn of potential serious health effects of 5G

September 13, 2017

*We the undersigned, more than 180 scientists and doctors from 36 countries, recommend a moratorium on the roll-out of the fifth generation, 5G, for telecommunication until potential hazards for human health and the environment have been fully investigated by scientists independent from industry. 5G will substantially increase exposure to radiofrequency electromagnetic fields (RF-EMF) on top of the 2G, 3G, 4G, Wi-Fi, etc. for telecommunications already in place. RF-EMF has been proven to be harmful for humans and the environment.*

(Note: [Blue links](#) below are references.)

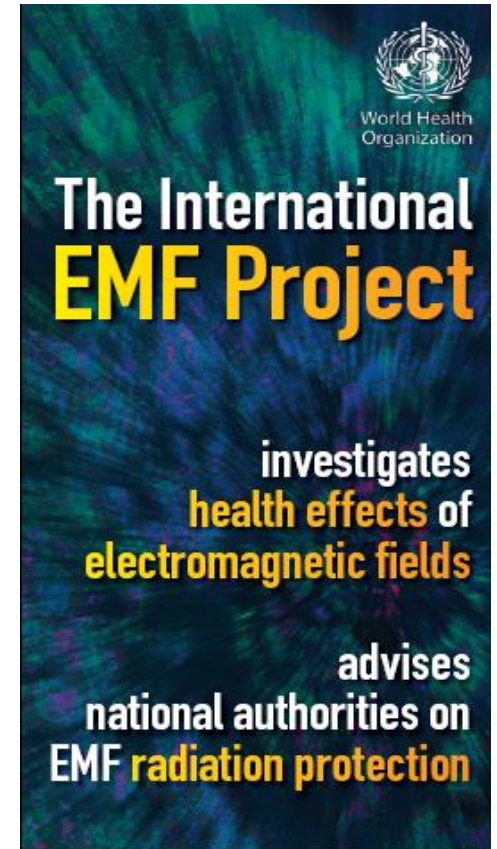
### 5G leads to massive increase of mandatory exposure to wireless radiation

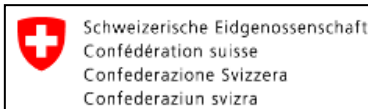


# WHO International EMF Project



- Established in 1996
- Coordinated by WHO HQ
- A multinational, multidisciplinary effort to create and disseminate information on human health risk from EMF
- Membership
  - Open to any WHO Member State government department or representatives of national institutions concerned with radiation protection
  - Over 60 national authorities are currently involved in the Project





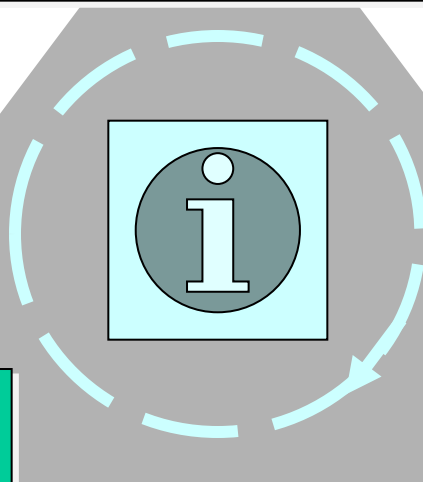
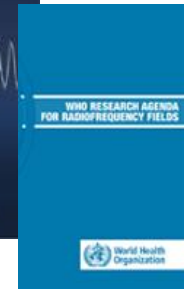
Federal Office of Public Health FOPH





# Do EMFs pose a health risk?

Risk Assessment  
The Evidence



Risk Perception  
The Public Concern

Risk Management  
The Policies

Exposure limits for radio-frequency fields (public)  
Data by country

Country	Year	Electric field (V/m)		Power density (mW/m <sup>2</sup> )		Specific absorption rate (SAR) (W/kg)		
		300 MHz	1000 MHz	300 MHz	1000 MHz	Whole body	Head and neck	Limbs
Argentina	2017	41.25	50.35	4.5	9	0.08	2	4
Australia	2017	41.17	50.17	4.5	9	0.08	2	4
Austria	2017	41.25	50.34	4.5	9	0.08	2	4
Bahrain	2017	41	50	4.5	9	0.08	2	4
Belgium	2017	1	1	1	1	1	1	1
Brazil	2017	41.25	50.34	4.5	9	0.08	2	4
Bulgaria	2017	0.14 <sup>1</sup>	0.14	0.1 <sup>1</sup>	0.1			
Canada	2017	32.1 <sup>2</sup>	40.21 <sup>2</sup>	2.24 <sup>2</sup>	4.4 <sup>2</sup>	0.08	1.6 <sup>2</sup>	4
China	2017			0.111 <sup>3</sup>	0.111 <sup>3</sup>	1.62 <sup>3</sup>	3.62 <sup>3</sup>	1.62 <sup>3</sup>
Cuba	2017	41	50	4.5	9	[0.08]	[2]	[4]

# OUTLINE

Introduction

**Assessing the health risk**



## The Present Scientific Knowledge

- Large and increasingly sophisticated database
- Known mechanisms
- International exposure guidelines based on established health effects
- Scientific uncertainty





# What do we know?

100 kHz

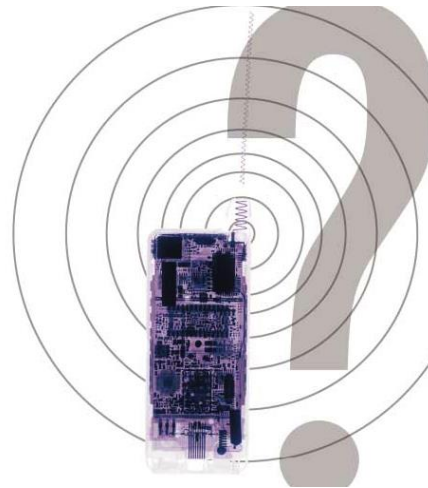
300 MHz

10 GHz

Frequency

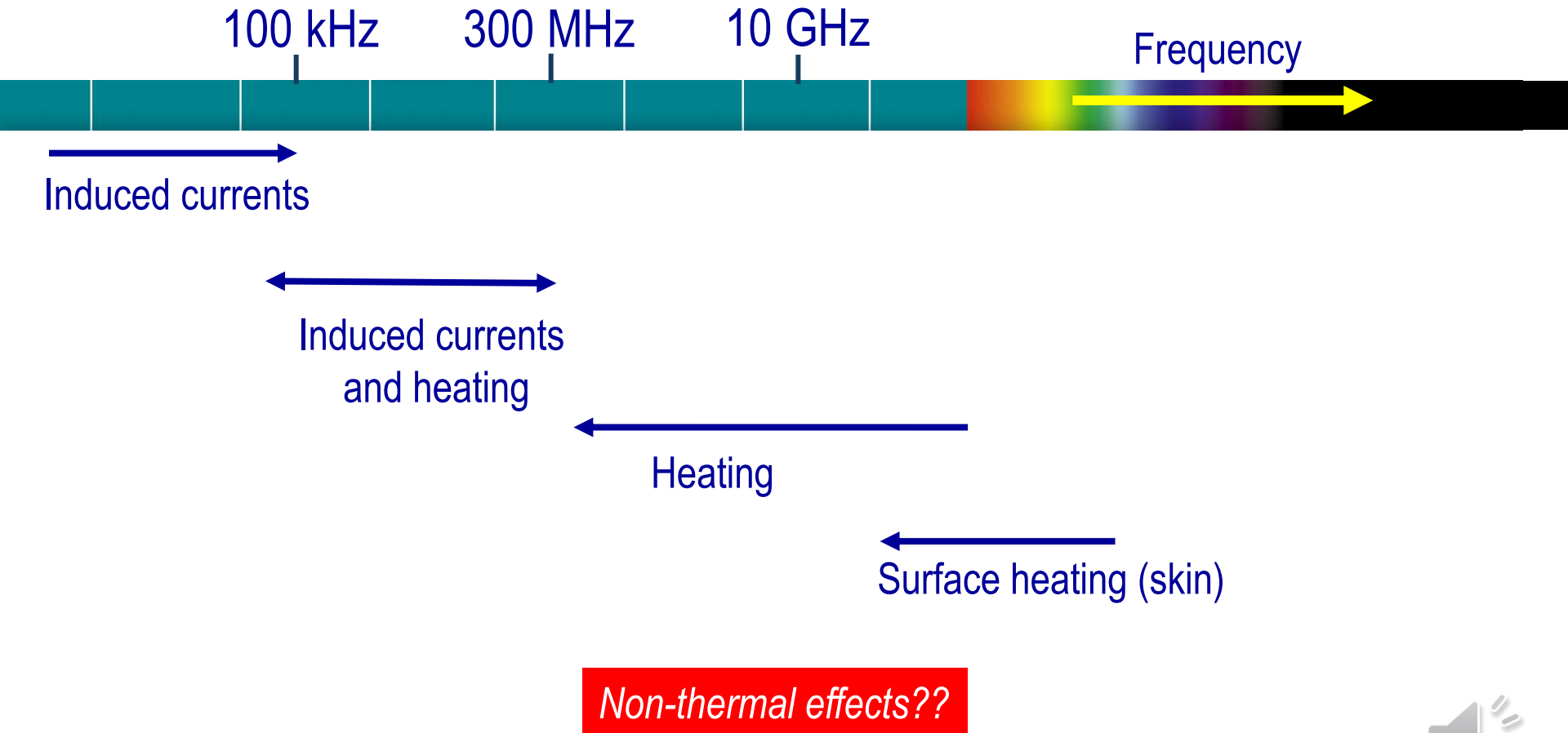


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# What do we know?

## Mechanisms of interaction



# What do we know?

## Mechanisms of interaction



- Below 1 GHz
- 1 – 6 GHz
- Above 6 GHz and most likely above 24 GHz

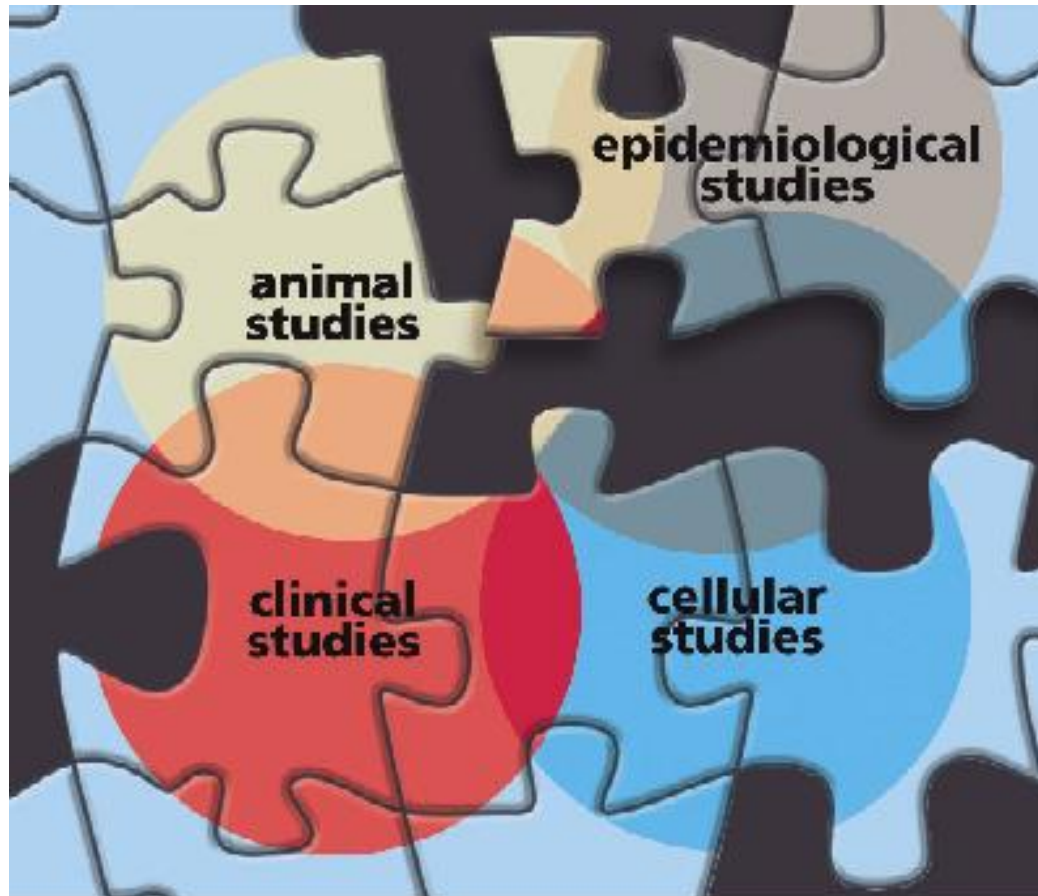
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# Research

## Balance of studies needed



<http://www.niehs.nih.gov/emfrapid/booklet/emf2002.pdf>



# Laboratory Studies

## Cellular studies

- Genotoxicity
- Gene expression

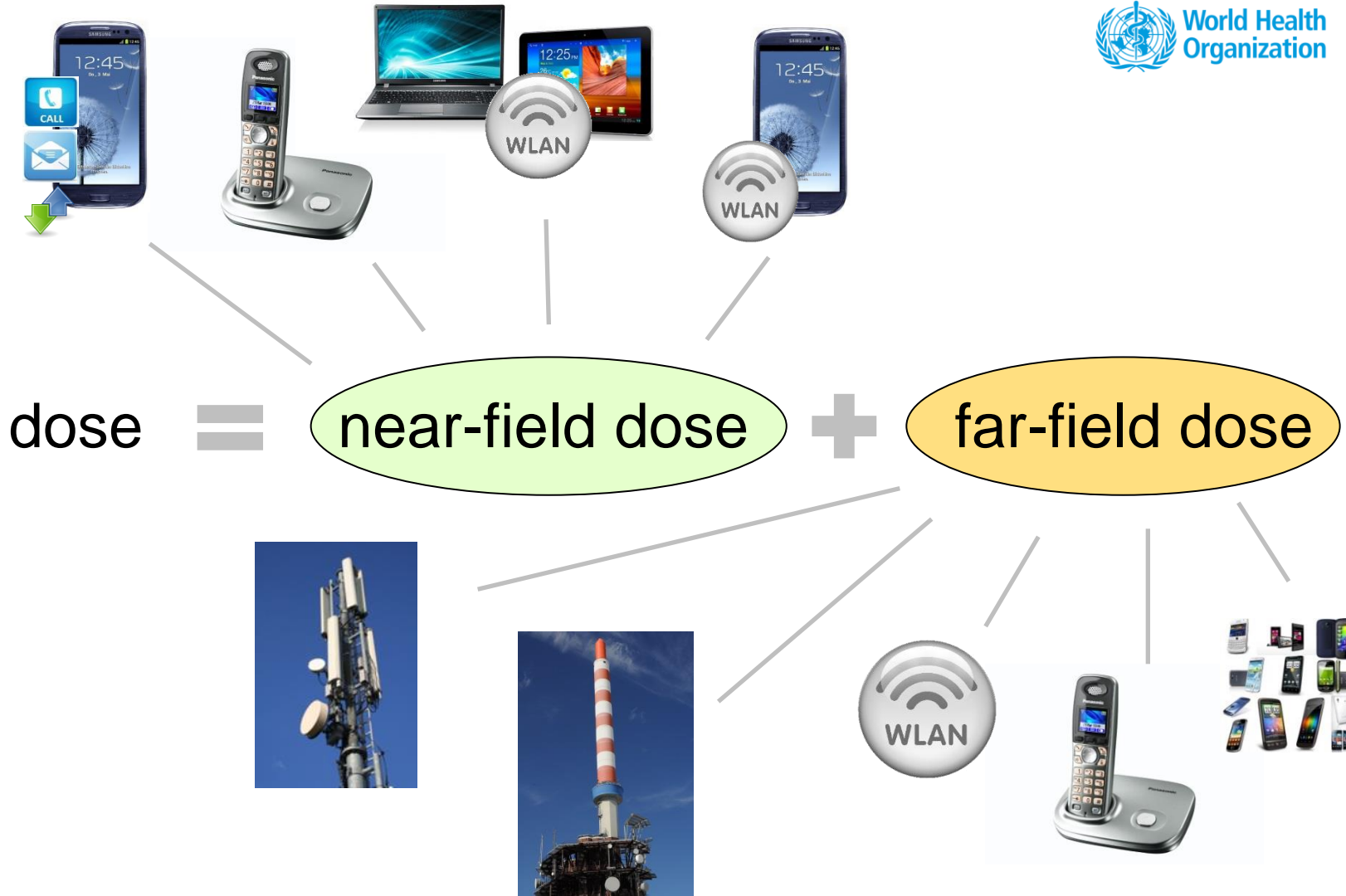
## Animal studies

- Cancer
- Behaviour
- BBB
- Skin

## Human studies

- Sleep
- EEG
- Hormones
- EHS





From Martin Röösl



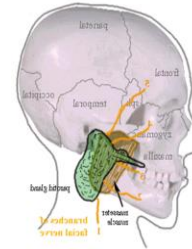
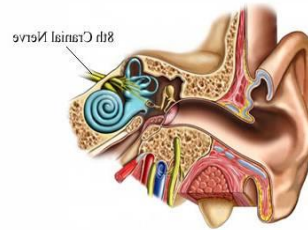
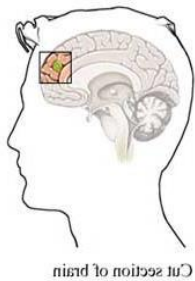
# Epidemiological studies

## Studies on mobile phones



Tumours in head and neck

- Glioma, meningioma, acoustic neuroma, parotid gland



Numerous studies on the use of mobile phones

- Published: USA, Nordic countries, INTERPHONE, CEFALO
- Ongoing: MOBI-Kids, COSMOS, GERoNiMO, ...



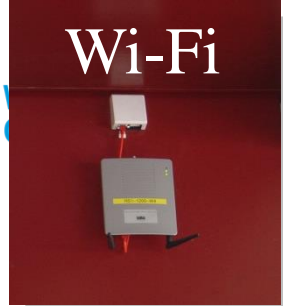


# Epidemiological studies

Base stations and wireless networks



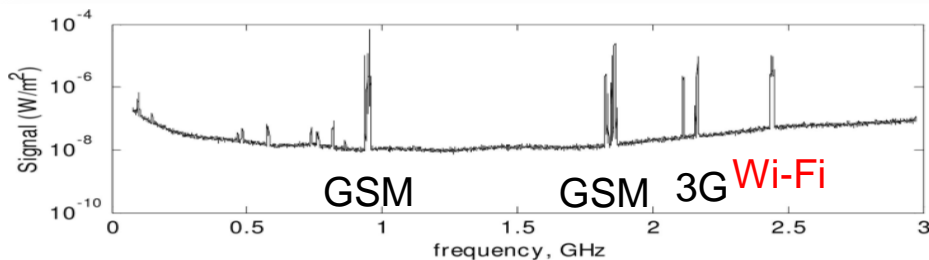
Wi-Fi



Some studies have been performed

- Well-being and performance
- Cancer

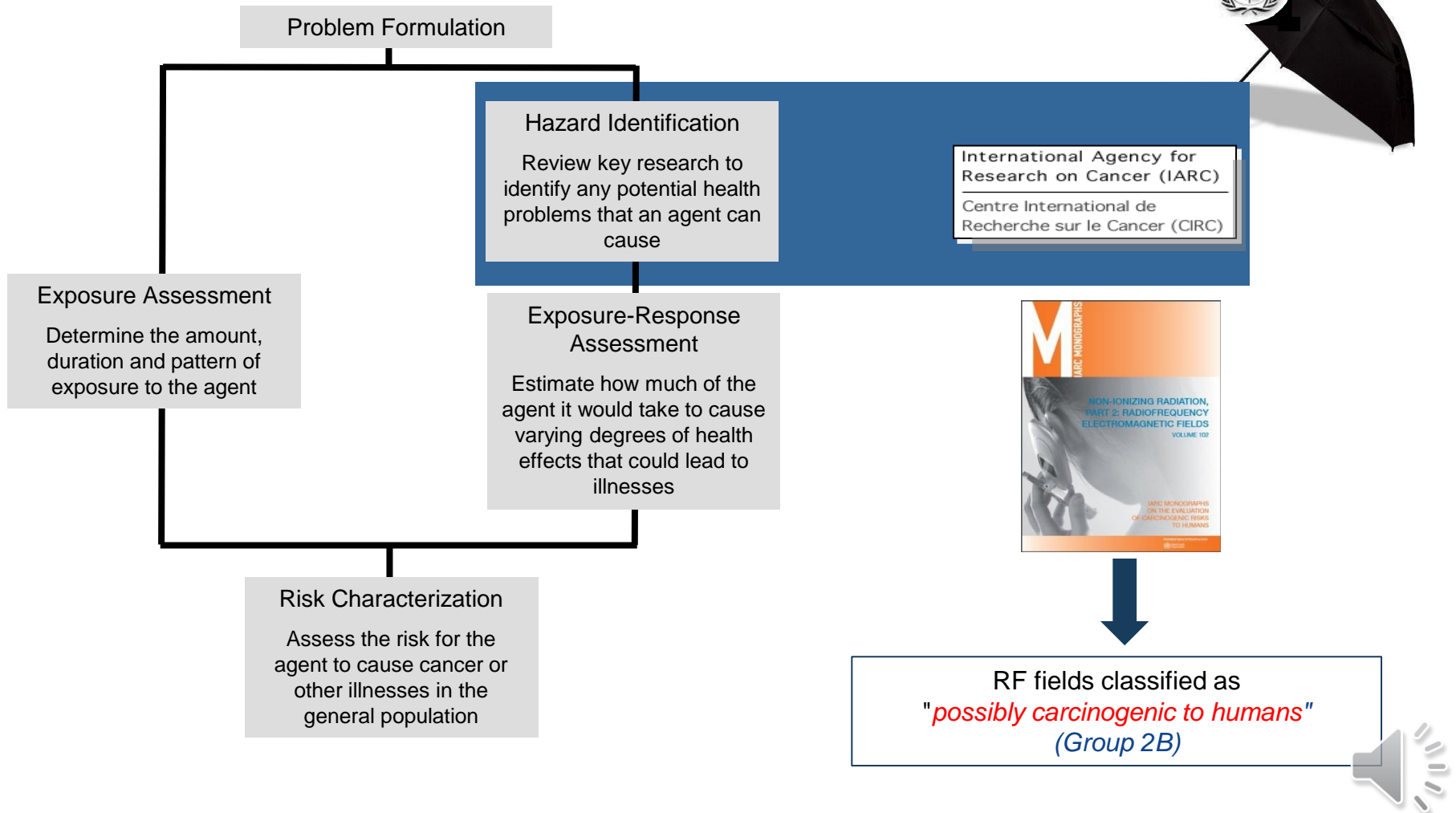
Personal exposure assessment



Kenneth R. Foster, *Radiofrequency exposure from wireless LANs utilizing WI-FI technology*. Health Phys. 92(3):280–289; 2007



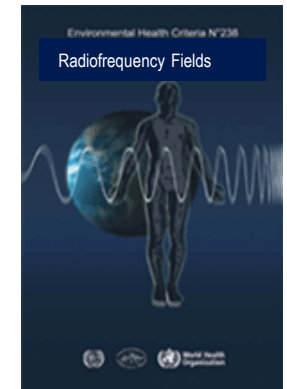
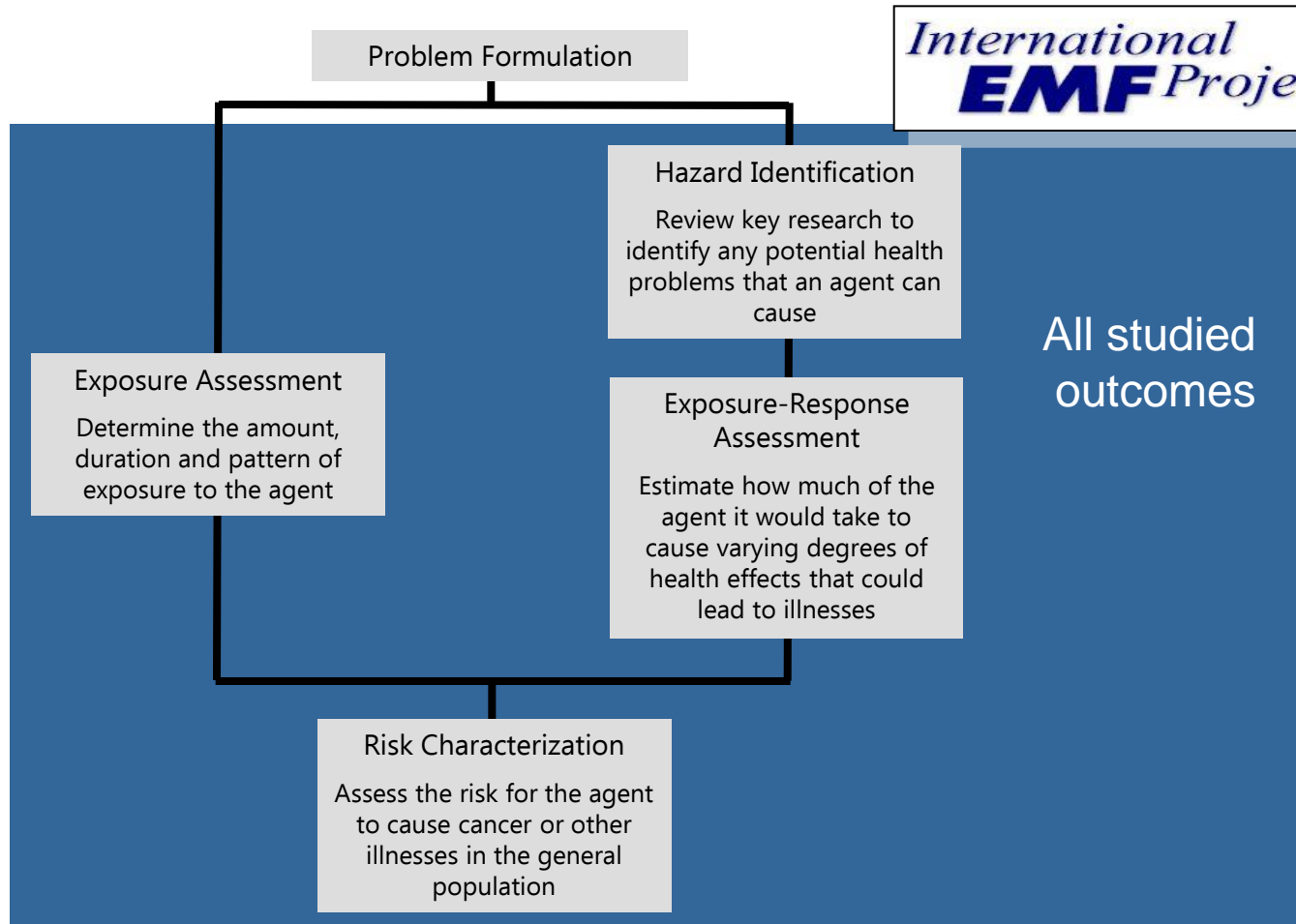
# Health Risk Assessment



# Health Risk Assessment (cont'd)



*International*  
**EMF** Project



# Discussion

## *"5G, EMF & Health"*



- Is it too early to discuss this point?

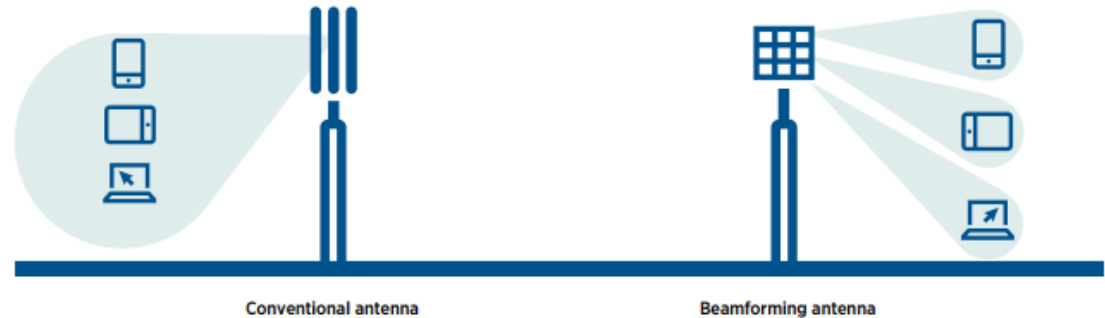




# Challenges

- Exposure assessment

## Advanced antenna technologies



- Compliance assessment

[https://www.gsma.com/publicpolicy/wp-content/uploads/2017/10/5g\\_5iot\\_web\\_FINAL.pdf](https://www.gsma.com/publicpolicy/wp-content/uploads/2017/10/5g_5iot_web_FINAL.pdf)

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## What will be the size of compliance zones around 5G network antenna sites?

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This is a difficult question to answer at this point as the technical standards for the 5G networks and devices are still under development. It is expected that the size of the compliance zone for 5G antennas will be similar to that of other mobile technologies using similar transmitter powers. The size and shape of compliance zones will be evaluated and implemented according to international technical standards.

the public cannot access these areas. Access and shutdown procedures for maintenance workers may be agreed between the mobile operator and the landlord of a rooftop or the operator of street lights when the antenna is installed.

Mobile networks are designed to use only the power needed to provide quality services. Too much power

- Epidemiological studies



## Search

millimeter wave

[Advanced literature search →](#)

Search

The search found 1007 items. Due to your filter selection, 397 items are being displayed.

The following terms were included:

millimeter wave

extrem hohe Frequenz

Millimeterwelle

EHF

extremely high frequency

MMW

超高周波

ミリ波

Filter by category

Articles (998)  Glossary (6)  Info texts (3)

Filter by language

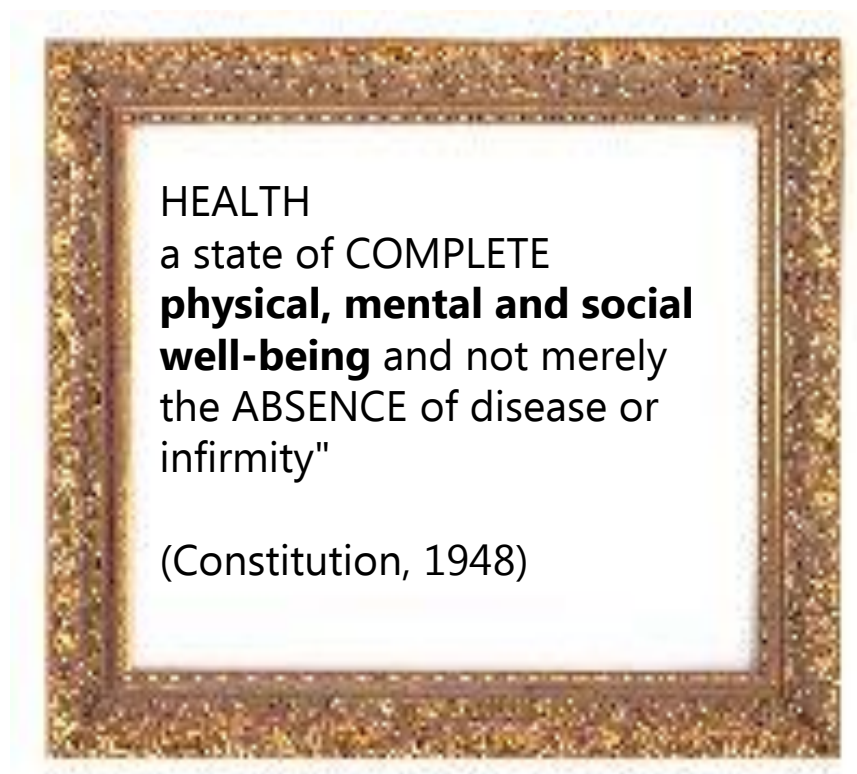
English (397)  Japanese (328)  German (282)



# Discussion

## *"5G, EMF & Health"*

- Is it too early to discuss this point?
- Is exposure to radiofrequency fields from wireless technologies the main health concern?



# Discussion

## "5G, EMF & Health" (cont'd)



### Interdisciplinary Summit on Children and Screen Time

November 1, 2017 | Washington, D.C.



#### Cognitive, Psychosocial, and Physical Effects



- learning
- attention
- sleep
- anxiety

#### Effects on Family, Society, and Culture



- parenting
- privacy
- digital inequality
- stereotypes

#### Media, Usage, and Devices



- violence
- cyberbullying
- advertising
- social media

# 3

## urgent questions:



- How is digital media enhancing and/or impairing children's ability to live happy, healthy, and productive lives?
- How are years of electronically mediated interactions shaping children's physical, cognitive, emotional, and social development?
- What should we do about it?

## PEDIATRICS

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

NOVEMBER 2017 • VOLUME 140 • SUPPLEMENT 2

### A SUPPLEMENT TO PEDIATRICS

Children, Adolescents and Screens: What We Know and What We Need To Learn





# Challenges to governments....

- Rapidly evolving RF technologies
- Launched on the market before health evaluation
- Disparities in risk management measures and regulations around the world
- Concern from the public



# Conclusions

- Need for clear roles and responsibilities in government on this topic
- Need for adoption and compliance of health-based standards
- Need for a public information program and dialogue with stakeholders
- Need for promoting research to reduce uncertainty

***We are a "global village"***





# Thank you.



World Health  
Organization

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