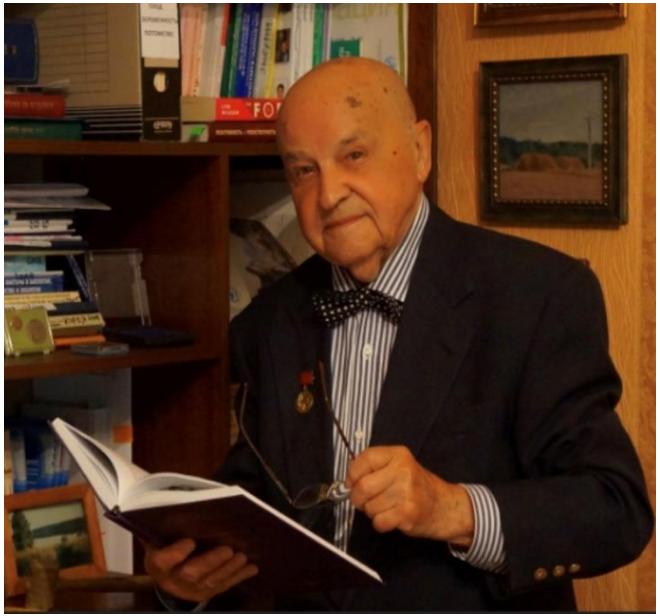
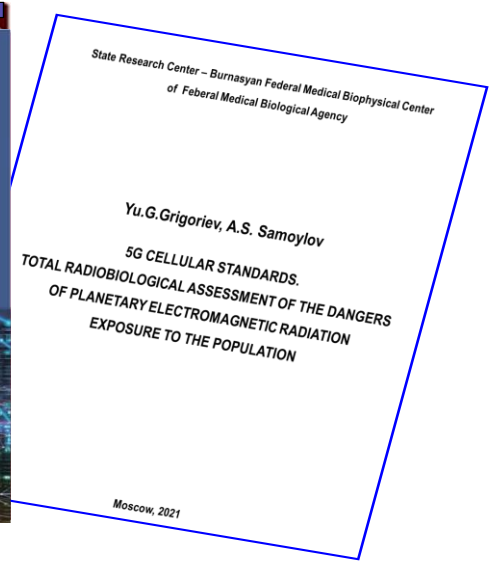
# 5G WIRELESS: A RADIOBIOLOGICAL ASSESSMENT

Victor Leach ( App Physics RMIT, MSc Melb. Uni. ) 50 years Radiation Protection Experience (1972-2022)

## Translation of a Book by: Prof Yuri Grigoriev (1925-2021)

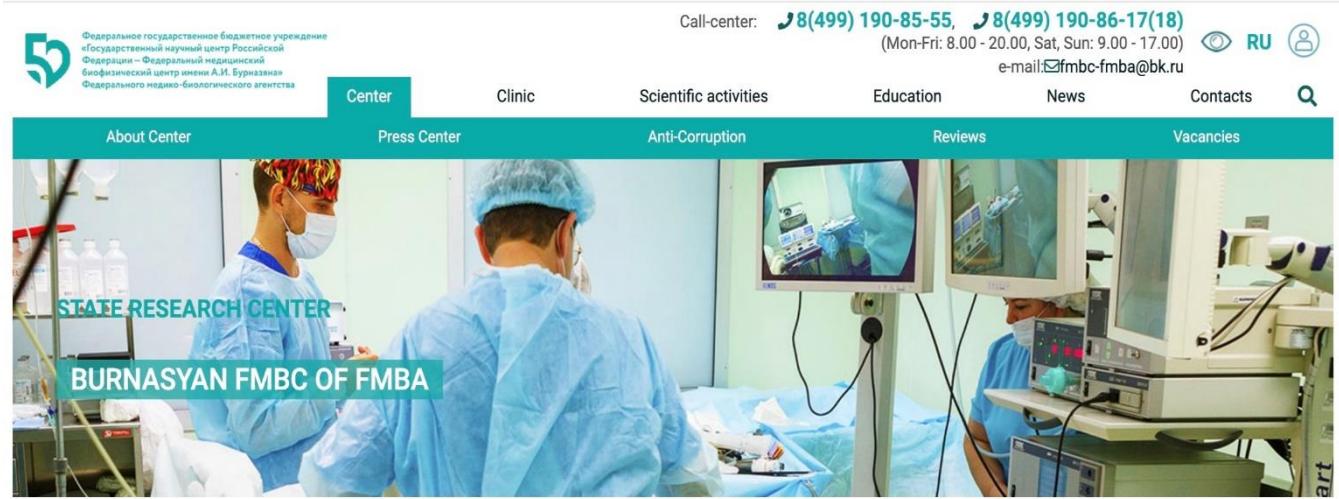



5G Cellular Standards. Total radiobiological assessment of the dangers of planetary electromagnetic radiation exposure to the population.

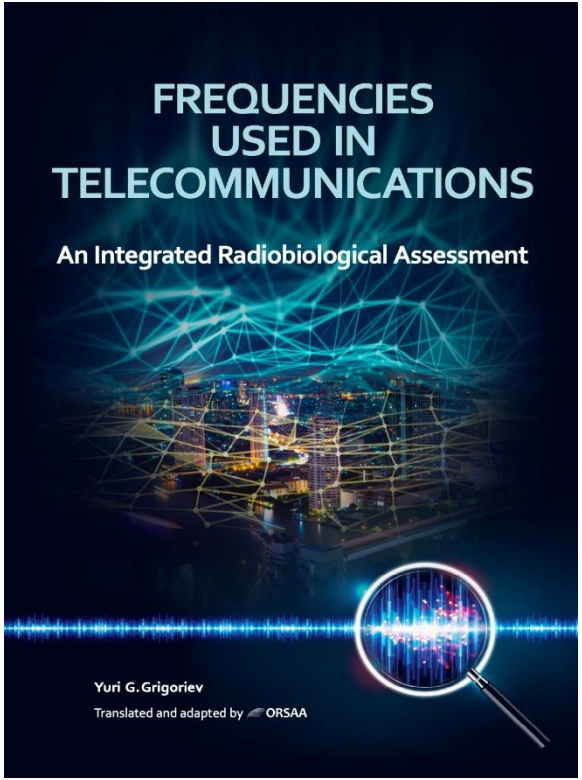
# PROF YURI GRIGORIEV (1925-2021)

- Qualification in Biophysics and Medicine.
- Yuri was initially involved in NIR research and applications for five decades.
- He became head of at the State Research Centre. (SRC) Federal Medical Biophysical Centre (FMBC)
- This Centre is a powerful research and clinical cluster and is a flagship institution of Public Health of the Russian Federation in the field of biophysics, radiation and nuclear medicine and Safety,
- Centre for clinical innovative biomedical technologies



# ORSAA WAS GIVEN THE TASK BY YURI TO TRANSLATE HIS BOOK

**New title : Frequencies used in telecommunications an integrated radiobiological assessment.**
**With Yuri's permission we added in some recent finding from the research.**




For millimetre waves > 30 – 300 GHz what research from the last last half century do we have regarding the skin and eyes?

1. The sclera of the eyes: Almost no research.
2. The skin: Limited research.

ICNIRP approach:

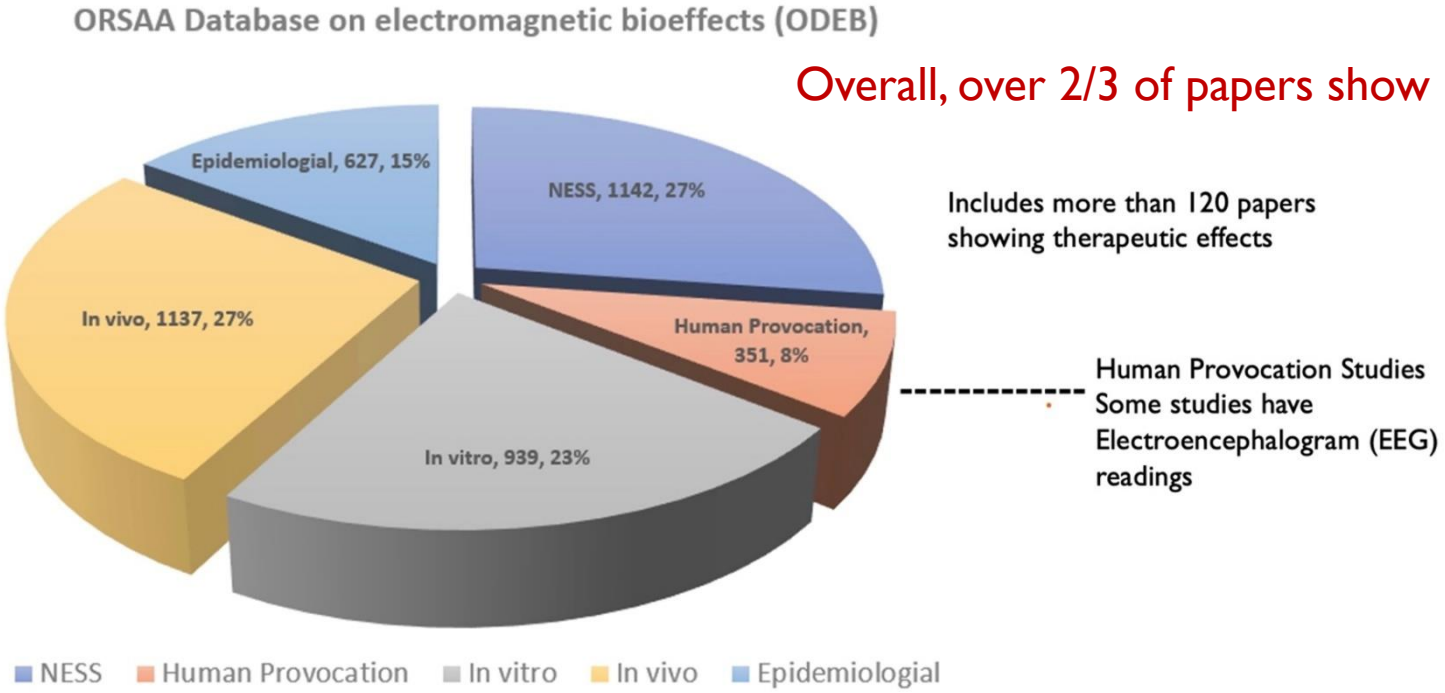
- ICNIRP guidelines treat skin as an inert substrate with no biological function , just an overcoat;
- The only criteria for setting limits is for heating and pain;
- Ignores biological role of skin.;
- Limited research - Leszczynski D. (2020).

# ORSAA – AN INTRODUCTION

Oceania Radiofrequency Scientific Advisory Association Inc., (ORSAA)

- Not-for-Profit scientific association.
- Full members and advisory panel members are non-industry scientists and researchers
- We advocate for change and make submissions to government bodies regarding the evidence we have collated.
- Categorised searchable bioeffect database of over 4000 peer reviewed papers, freely available online. ORSAA Database on Electromagnetic Bioeffects (ODEB)

# BALANCE OF EVIDENCE FOR NON-THERMAL EFFECTS



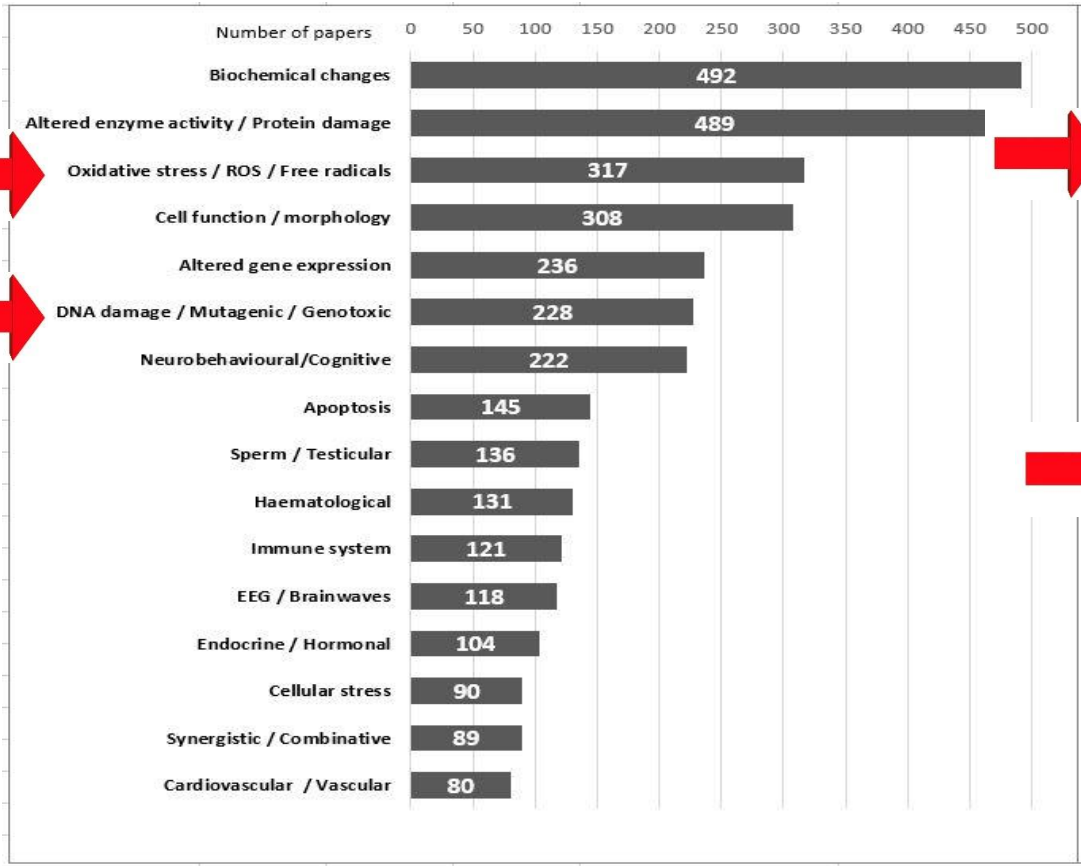

Overall, over 2/3 of papers show bioeffects

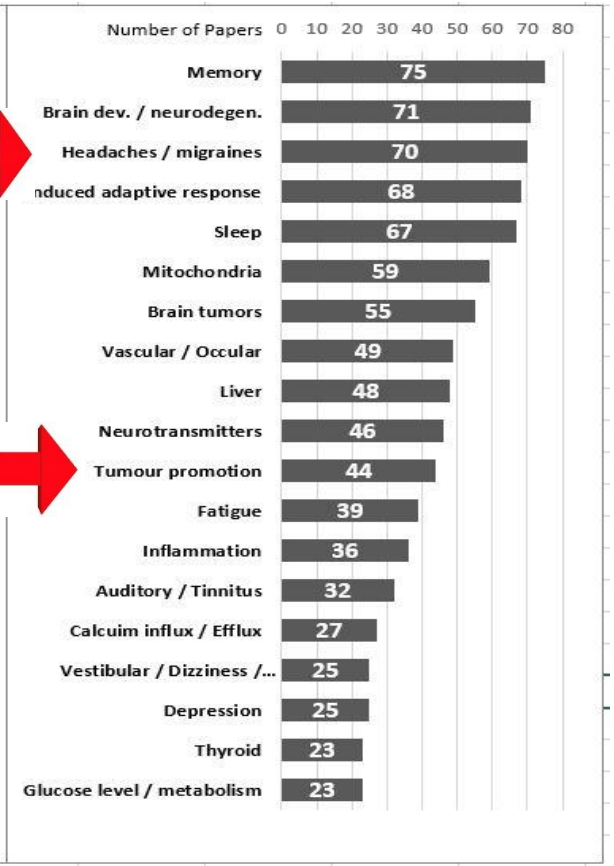
Includes more than 120 papers showing therapeutic effects

Human Provocation Studies Some studies have Electroencephalogram (EEG) readings

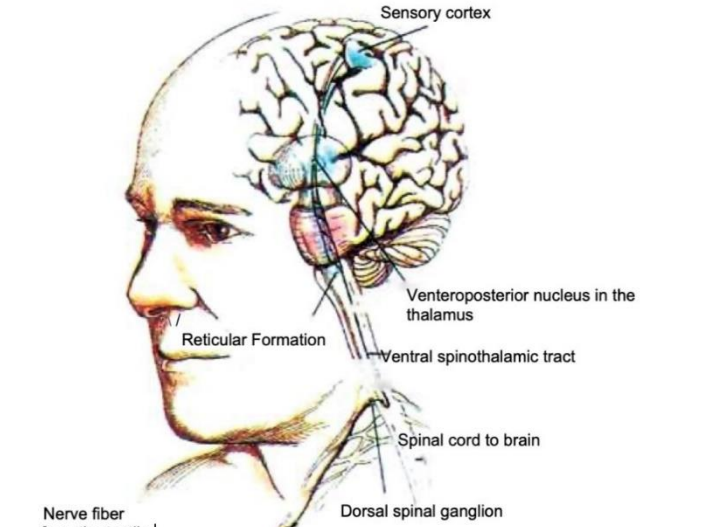
ICNIRP guidelines ignore non-thermal effects as having any heath effects

# The number of experimental papers showing non-thermal effects of radiofrequency within the prominent biological and health categories in ODEB.

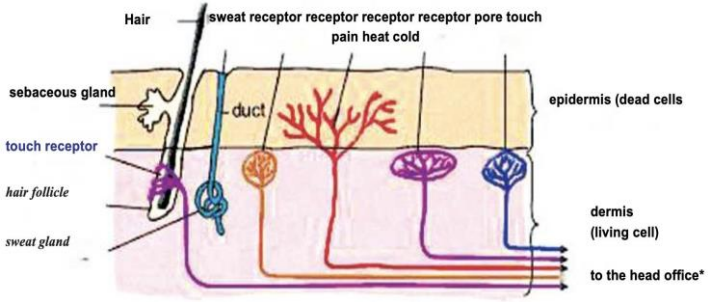


# SKIN (mmWAVES)

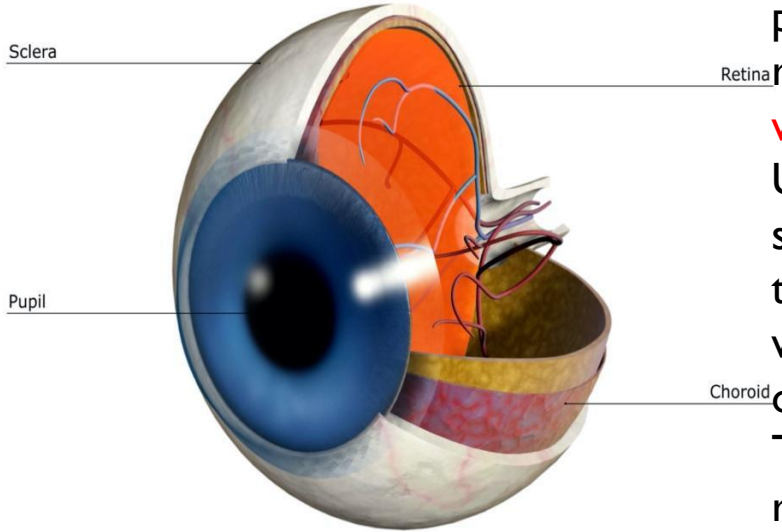



Receptors in the human skin




- Largest organ.
- Interfaces with immune system.
- Rich in nerves and very sensitive.
- Connects to the brain and central nervous system and blood vessels which are interconnected with other organs
- Receptors carry abundant innervation for central and autonomic nervous system.
- Regulates of immunity and wound healing.
- Surface is a natural environment for thousands of different microbial species.
- Part of waste removal system; discharges toxins from body.
- Protects against mechanical and chemical factors, ultraviolet radiation, and the penetration of microbes and viruses.
- Performs endocrine functions; Produces vitamin D

# SCLERA OF THE EYE (mmWAVES)




The sclera itself consists of collagen fibers, the space between which is occupied by fibrocytes that produce collagen. The lamina fusca consists of thinned sclera fibers and elastic tissue. On the surface of the fibers are pigment-containing cells called chromatophores. These cells give the inner surface of the sclera a brown hue.

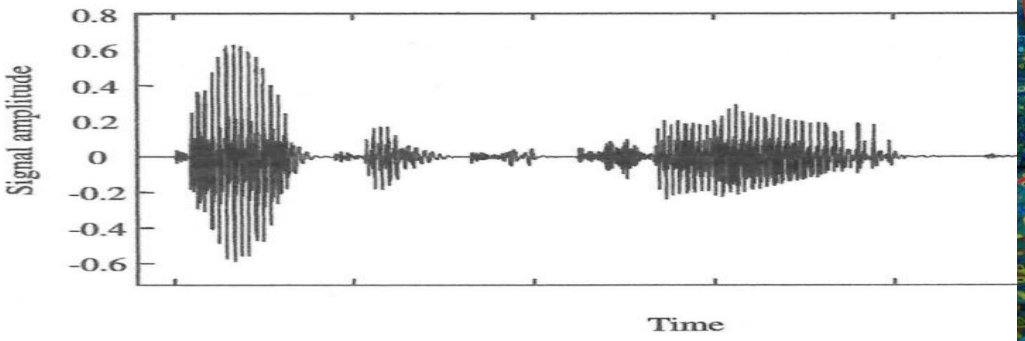
Since the 1950's the eye has been deemed to be a potentially radiosensitive organ, due to scattered reports such as cataracts developing in a radar worker.

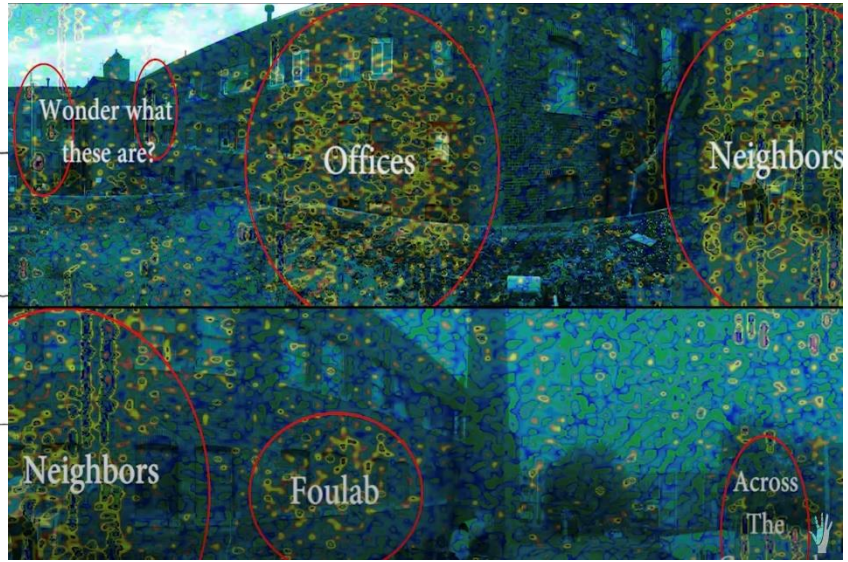
Unfortunately, over half a century later, there are still only isolated studies of the effect of MMWs on the sclera of the eyes. Moreover, these studies were performed with short-term single irradiations only at thermal levels of EMF intensity.

The results of these studies are not sufficiently reflective of real-life conditions to accurately assess the risk for MMW exposures to the sclera.

CW microwaves on the rabbit eye Acute ocular injuries caused by 60-GHz millimetre-wave exposure. Millimetre wave absorption in the non-human primate eye at 35 GHz and 94 GHz.

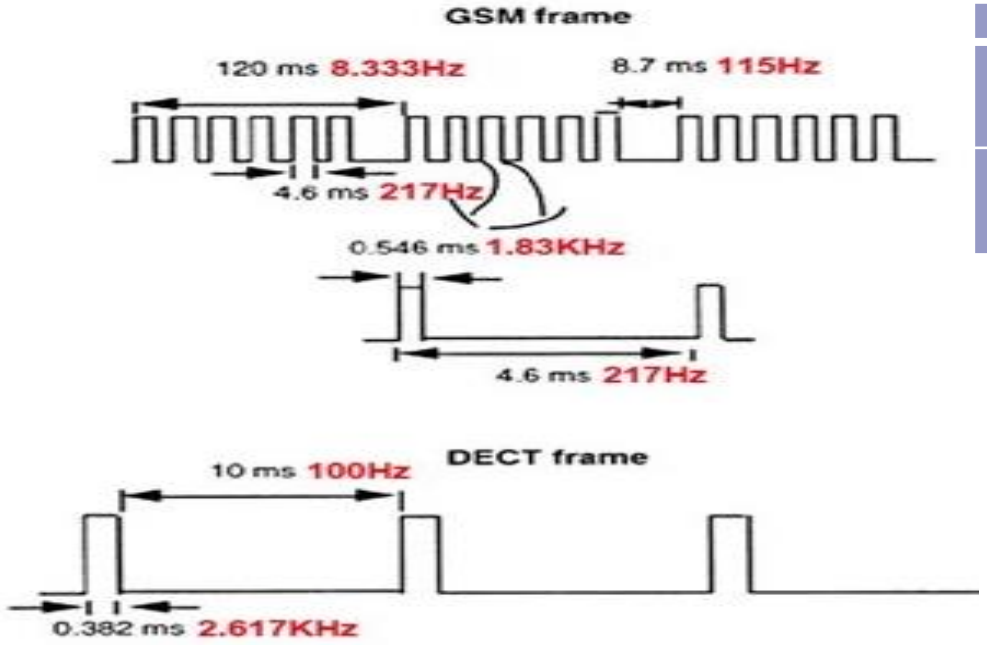
# SIMULATED vs REAL MOBILE PHONE SIGNAL



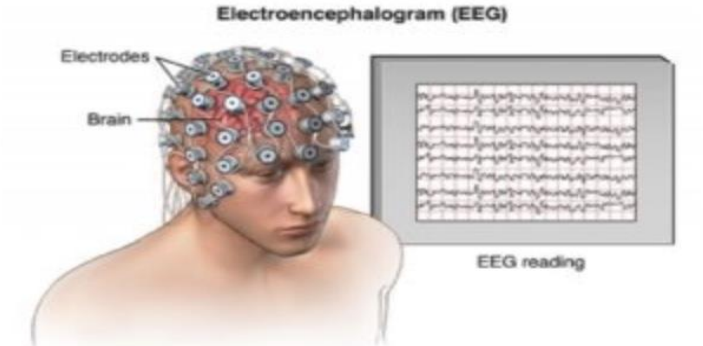




| Research Categories | Real Mobile Phone used in Experiments | | | Simulated Mobile Phone Signals used in Experiments | | |
|---|---|---|---|---|---|---|
| Wave form | Pulsed | | | Pulsed | | |
| Outcome | #Effect | #No Effect | #Uncertain Effect | #Effect | #No Effect | #Uncertain Effect |
| *in vivo* | 120 | 18 | 11 | 69 | 49 | 8 |
| *in vitro* | 28 | 8 | 1 | 60 | 63 | 7 |

# MAN-MADE RF - TROJAN HORSE




| Provocation studies | Effect | No Effect |
|---|---|---|
| All Studies | 132<br>(+25 Uncertain Effect) | 87 |
| EEG Studies | 78 (+5 Uncertain Effect) | 7 |

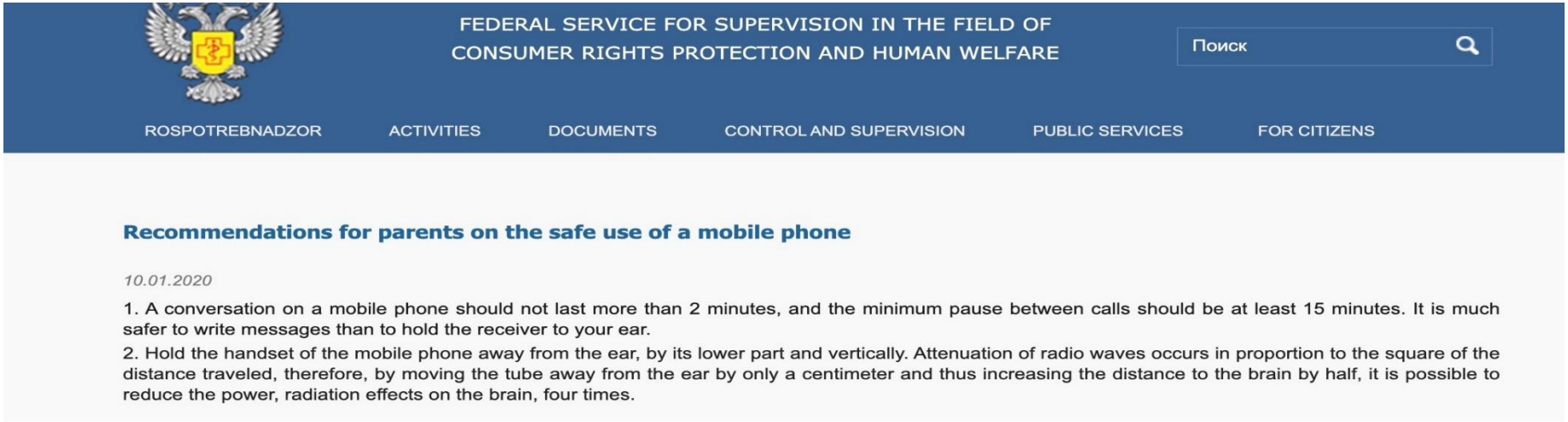



Low frequency pulsing can be selected to be more bio-compatible

# GRIGORIEV – MANY PUBLICATIONS ON CHILDREN

Biologically, children are not small adults.

**Book: Assessment of the danger of mobile communications to children and adolescents (In Russian)**



FEDERAL SERVICE FOR SUPERVISION IN THE FIELD OF CONSUMER RIGHTS PROTECTION AND HUMAN WELFARE

Поиск

ROSPOTREBNADZOR | ACTIVITIES | DOCUMENTS | CONTROL AND SUPERVISION | PUBLIC SERVICES | FOR CITIZENS

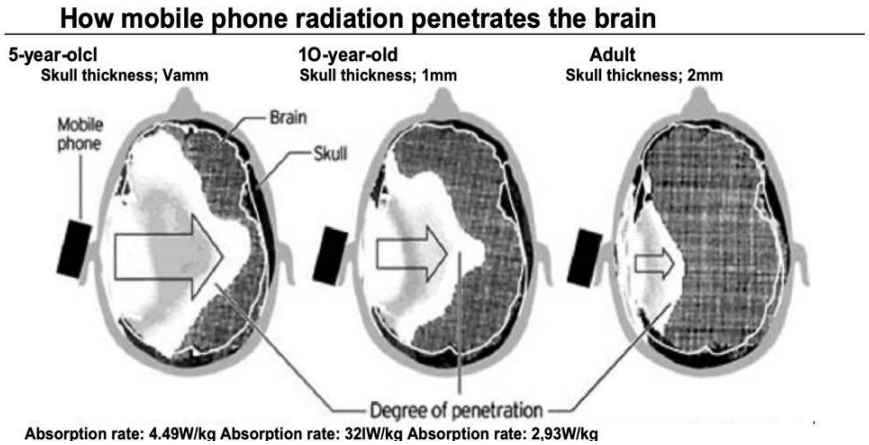
**Recommendations for parents on the safe use of a mobile phone**

*10.01.2020*

1. A conversation on a mobile phone should not last more than 2 minutes, and the minimum pause between calls should be at least 15 minutes. It is much safer to write messages than to hold the receiver to your ear.
2. Hold the handset of the mobile phone away from the ear, by its lower part and vertically. Attenuation of radio waves occurs in proportion to the square of the distance traveled, therefore, by moving the tube away from the ear by only a centimeter and thus increasing the distance to the brain by half, it is possible to reduce the power, radiation effects on the brain, four times.

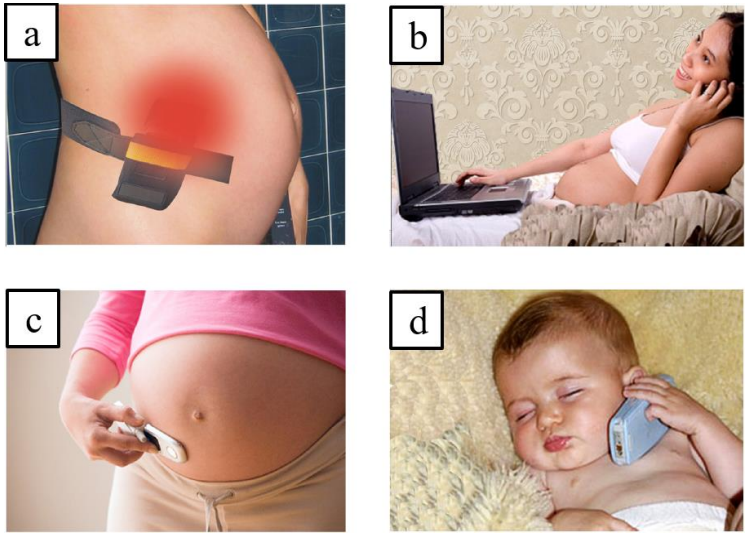
In Russia, the penalty for concealment of information given to teachers by educational officials about the danger to health of participants within educational systems is a criminal offence

# CHILDREN'S BRAINS ARE MORE VULNERABLE



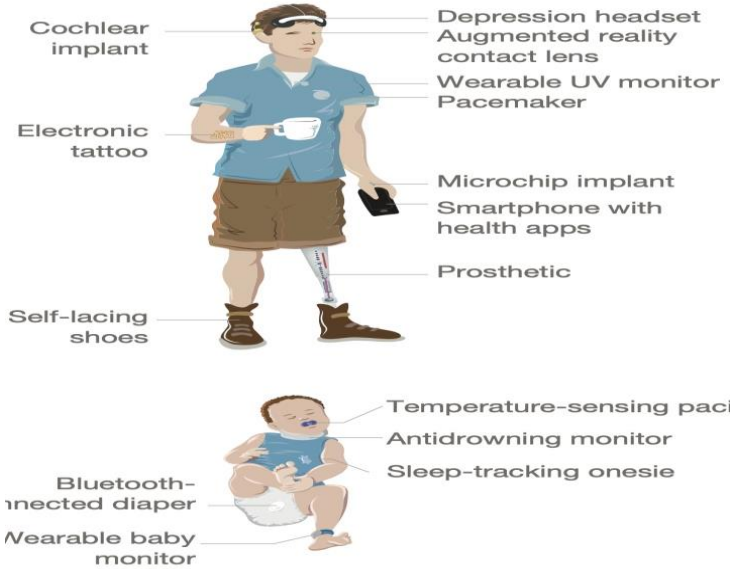

Distribution of absorbed dose in the brain in children aged 5 and 10 years and in adult mobile phone users (Gandhi et al., 1996)

Currently admissible under ICNIRP



# Where are the Optimisation and Justification principles that we practice with ionising radiation (ICRP approach) behind RF-EMF wireless limits?

## Brave New World - Internet of Bodies (IoB)



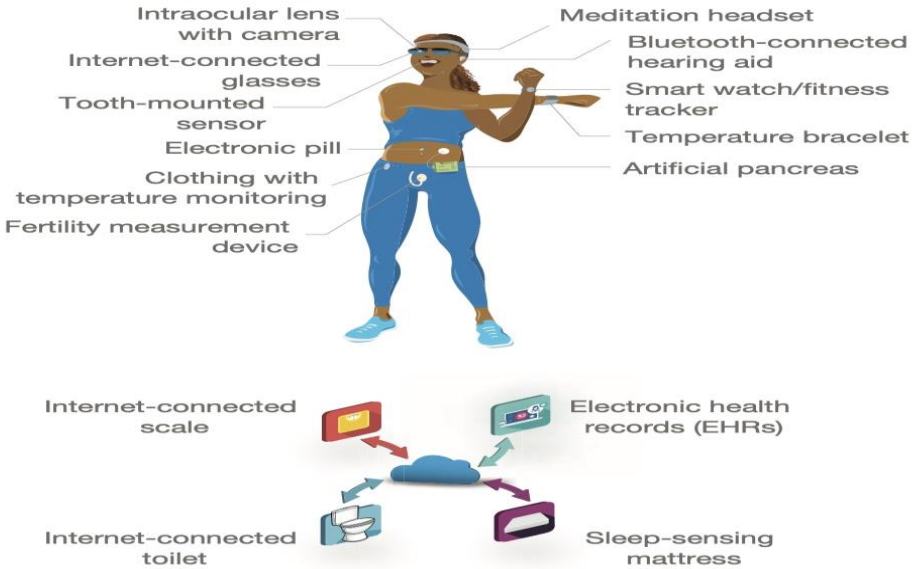




Illustration from : Lee M, Boudreaux B, Chaturvedi R, Romanosky S and Downing B (2021) Internet of Bodies. Free Book

# ORSAA CONCLUSION

- Adoption of the ICNIRP guidelines with limits based on thermal effects, means industry does not have to innovate to keep radiation exposures as low as reasonable.
- ICNIRP invites radiation protection scientist who only believe that the basis for limitation is thermal effects. Non-thermal effects are ignored.
- No consumer advice on the safe use of wireless devices.
- No medical input in the setting of standards. No establishment similar to State Research Centre. Federal Medical Biophysical Centre (SRC-FMBC).
- People with Electrohypersensitivity (EHS) are treated as having a psychological condition.
- ARPANSA no background measurements over reliance on EME reports.

Q: Why is the Russian wireless communication standards for members of the public a factor of 100 times lower than those countries using ICNIRP guidelines?

A: Long-term non-thermal effects are considered to be a plausible health risk and apply the precautionary principle in protecting citizens.

# THANK YOU