

**Microwave electromagnetic fields do not
work by heating. They produce health
effects by VGCC activation.**

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B.A. degree at Johns Hopkins University in Physics, with many chemistry and biology classes.

Ph.D. in Biochemistry and Genetics from Caltech.

Professor Emeritus of Biochemistry and Basic Medical Sciences, Washington State University.

Seven international honors for work in environmental medicine and on the impact of chemical exposures on human health.

Published a paper last year on how electromagnetic fields (EMFs) impact the cells of our bodies.

This was honored by inclusion at the “Global Medical Discovery” as one of the top medical publications of 2013.

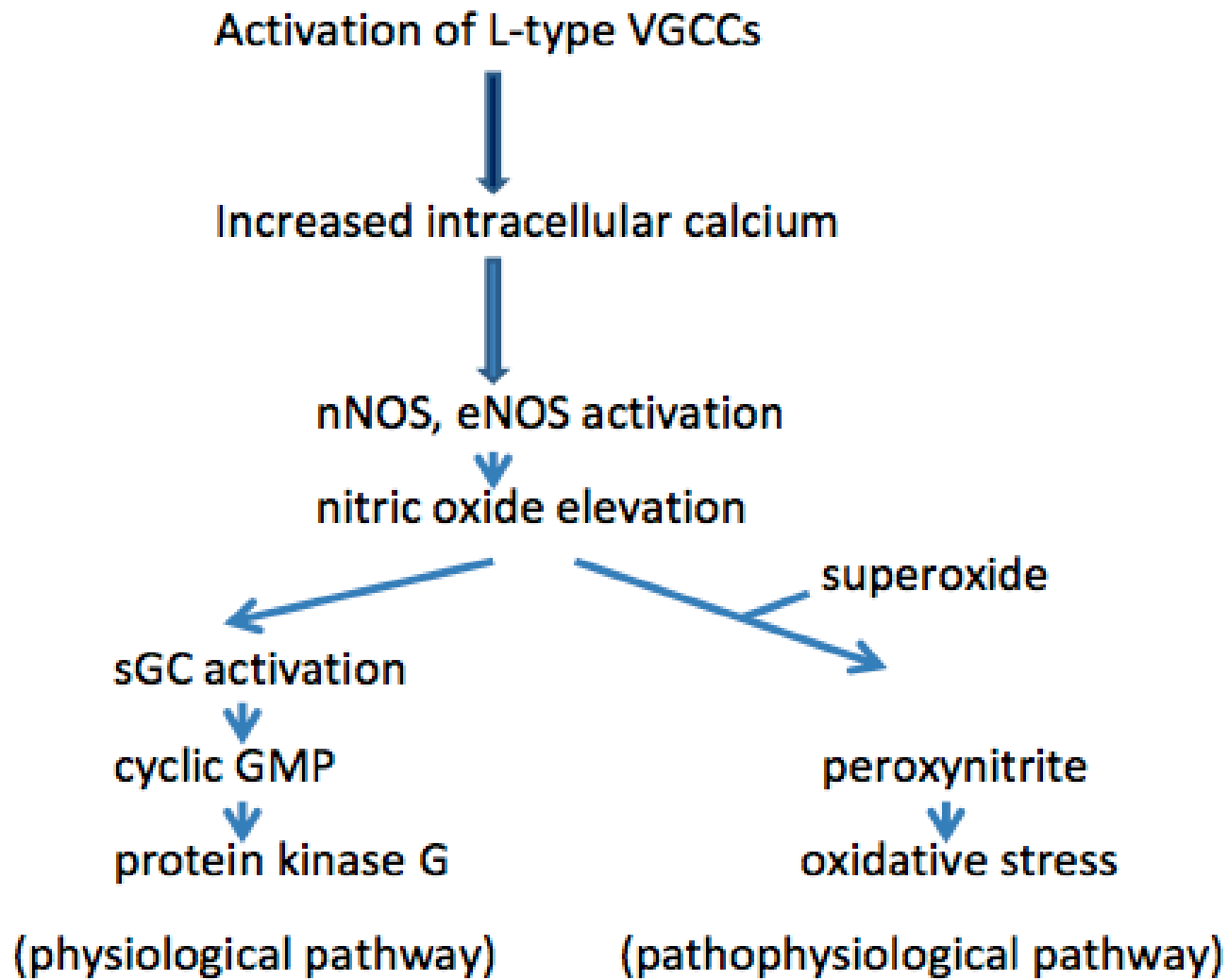
Nine professional talks about this study before March 31, 2014.

International and U.S. “Safety Standards” for microwave radiation exposure don’t directly apply to devices that fall within the control of the State of Oregon, but because they have often been used to claim safety for state-controlled devices, they are relevant in that way.

These safety standards are entirely based on the assumption that the only important thing that microwave EMFs can do is to heat things, like heating food in a microwave oven. They assume therefore that if heating is minimal, we don’t need to worry about health effects.

This assumption is false - ***no basis for safety standards.***
How do we know that?

1. Over 20,000 papers in the scientific literature showing biological effects where there should be none.
2. Pulsed fields are more biologically active than non-pulsed fields.
3. We now know what the actual main mechanism is!



Series of well-documented effects of microwave EMF exposures that can be understood as being caused by the mechanisms shown in the previous slide:

1. Oxidative stress
2. Single strand breaks in cellular DNA
3. Double strand breaks in cellular DNA.
4. Cancer
5. Male and female infertility
6. Breakdown of the blood-brain barrier
7. Loss of melatonin...
8. ...Consequent sleep disruption
9. Therapeutic effects

Possible effects:

Various effects on brain function (these are diverse and the literature has not focused on a few specific effects).

Effects on the electrical control in the heart including tachycardia (rapid heartbeat), and arrhythmia - (may lead to sudden cardiac death).

Health Impacts by Microwave Radiation

There are multiple studies showing that each of these responses have been reported to be produced by microwave radiation exposures.

There may be arguments about how strong the evidence is, but there is no question that there is substantial evidence.

None of these can be explained by heating -- they can all be explained by VGCC activation and downstream effects!

First Disease: Autism

There are a number of researchers who have argued for autism being caused by EMFs, in part because of difficulty in explaining the huge increase in incidence based on any other causal factor, or even set of factors.

CATASTROPHIC AUTISM RATE

1 in 50 Children



Picture credit: Evelyn Lopez Delgado

If autism is caused by EMF exposure to the brain, then one would predict that hyperactivity of the main L-type VGCC in the brain, $Ca_v1.2$ will cause autism. We know that this is true. A rare mutation in that gene that makes the channel hyperactive causes Timothy syndrome. The main symptoms of Timothy syndrome are autism, and in fact the whole autism spectrum and also cardiac changes tachycardia, arrhythmia, sudden cardiac death; most of these Timothy syndrome people die at a very young age of sudden cardiac death.

A derivative of this Timothy syndrome mutation also causes autism in transgenic mice with symptoms described as showing “markedly restricted, repetitive, and perseverative behavior, altered social behavior, altered ultrasonic vocalization, and enhanced tone-cued and contextual memory following fear conditioning.”

In summary these are all things that could not possible occur if the current safety standards were correct. They are all very serious health issues.

We can substantially improve the safety of many of these devices but there are some that should either be abolished or drastically changed. In the last category, in my judgment, are Wi-Fi fields in schools, so called “smart meters” and baby monitors as they are currently designed.

I’ve discussed the first two of these in my recently submitted paper which you may refer to for more information.

You have a difficult challenge. Thank you for your efforts to examine the emerging research in enacting laws to protect Oregonians from potential harm.