NH COMMISSION TO STUDY THE ENVIRONMENTAL AND HEALTH EFFECTS OF EVOLVING 5G TECHNOLOGY

Meeting held: 11/21/19 8:30-10:35am LOB 202

Meeting called to order by Rep Abrami at 8:30 am.

In attendance: (11)

Rep. Patrick Abrami-speaker of the house appointee Rep. Ken Wells- speaker of the house appointee Kent Chamberlin-UNH-appointed by the chancellor Denise Ricciardi-public-appointed by the governor Brandon Garod-AG designee, Asst. AG Consumer Protection Bethanne Cooley-CTIA , trade association for wireless industry and manufacturers Michele Roberge-DHHS- Commissioner of DHHS appointee Dr. Paul Heroux- Professor of Toxicology, McGill University- speaker of the house appointee Rep. Gary Woods-speaker of the house appointee Senator Jim Gray-president of the senate appointee Carol Miller-NH Business & Economic Affairs Dept.

Not present: (3)

Frank MacMillan, Jr. MD-NH Medical Society Environmental Medicine David Juvet-Business and Industry Association Senator Tom Sherman-president of the senate appointee

Agenda: (attached)

- Approval of minutes from 10-31-19:
 -minutes were approved with comment from Rep Woods.
- II.
 Dr. Eric Swanson: University of Pittsburgh, Professor of Physics Presentation

 (Here at the request of CTIA but the opinions are his own)
 - There is a lot of misinformation and misunderstanding out there + fear of the unknown= trouble.
 - Fear of the unknown is what links past worries like power lines and radio waves causing cancer cellphones killing honey bees to the current ones about 5G and cellphones.
 - Millimeter waves (similar to 5G) are used in Russia therapeutically for over 50 diseases.
 - It is not plausible that the same radiation can both cause and cure 50 diseases. It does neither. It does nothing.
 - It does not affect living things: and I have two main points.

Ricciardi: Experiments with 5G on bees show that bees are affected. Bees absorbed more with higher frequencies.(Scientific Reports: 2Ghz-120Ghz). This could lead to changes to insect behavior over time. Can you confirm based on scientific evidence that these frequencies are safe for pollinators? What credentials do you have to speak to this?

- Swanson: It's scientifically not plausible that these waves have any effect on ANY living thing. Biochemical response of a bee cell to EMR is the same as a rat cell and a human cell. That is my scientific opinion. It's true that EMR does not do nothing.
- As far as credentials... There are two aspects:
- 1. The radiation itself: we understand perfectly since 1875. There are no questions and no ambiguity. This is where I come from.
- 2. The biological response: it's difficult to measure. It's complex and messy. We can explain it all with general physics terms, not fancy biological terms.

Heroux: The IEEE standard is based on resonance between dimensions of humans and for example (70MHz) frequency of radiation. Frequencies that match the size of the bees, the transfer of power will be increased by a large factor. These parameters have been recognized by engineers, physicists, etc. not just biologists. They fly everywhere, not walk on the sidewalks and are likely to go to areas where power densities are very high. In my opinion, you are not showing much concern for the small pollinators that we need to survive.

Swanson: I disagree with everything you said. If you want I can go into details of why. Resonance is in fact related to size of important bio mechanical mechanisms inside of cells. There is a famous paper by Robert Gadera (sp?) from twenty years ago showing these resonance effects just cannot occur. These are not relevant to biology and cannot occur inside of cells. You said bees are attracted to these things. I would love to see the study saying bees are attracted to radio transmitters. Bees are actually attracted to flowers. It's true they don't walk on sidewalks. Transmitters are built where people live, not bees. That means they are even more removed, not closer.

Woods: I want to clarify your idea that the Bees are like rats and humans. We know if we test djoxin/aspirin today, rats get cancer but people do not. Can you please clarify what you mean that they are the same? That seems to break down there.

Swanson: This is a good point. You have to be careful about comparison and I was talking about the cellular level.

Woods: But chemicals are processed at the cellular level.

Swanson: If you are feeding aspirin to a rat vs to a human and if they normalize for the size, I would expect the response of test subjects to be very similar. But it's not what we are talking about here. Chemical reaction is far more energetic than reactions that are relevant to cellphones. Chemicals are like taking a hammer versus a gently tweaking it, like a cellphone does.

Chamberlin: On the previous slide, you mention exposure in some cases provides positive therapy. You are saying that it can't be both helpful and harmful. I disagree. For example, sunshine is a form of radiation. It is both beneficial like Vitamin D, etc. and harmful like skin cancer, depending upon exposure. I disagree with the premise stated there.

Swanson: You are right. There is room for something like this to happen. Like I said, I don't find this plausible and I have a reason why I don't find it plausible but I will get to that.

Abrami: On your electric towers slide, you said were definitive studies disproving health effects . We are trying to get at is, are there definitive studies RF in general whether it's 3G, 4G or 5G. Right now I don't know of any definitive studies saying whether 5G is good or bad. As a legislative body, we are trying to understand. We are blessed with having people in the room who understand these things. We have to be responsible to our public. If a small cell tower appears in front of their house, they will want to know, where is the definitive study showing its safe?

Swanson: Valid question. But those studies were specific to those towers. I completely respect that as a question.

Electromagnetic Basics:

- Electromagnetic radiation is the best understood phenomenon in the universe.
- It is not nuclear radiation.
- It is completely described by three numbers (intensity, frequency, and polarization) which makes it so well understood and so simple.
- Electromagnetic spectrum is a continuum from zero to infinity.

Ricciardi: Are you saying that you do not believe a potential mechanism exists for non-ionizing radiation to harm us?

Swanson: I will get to that in a minute. Do you mind?

Abrami: Let him cover non ionizing radiation and then ask your question.

Health Effects:

- You are well aware that there are health effects on this spectrum.
- UV radiation is dangerous. It's not good to get too many x rays. There are two scanners at the airport and you should go through the mm wave scanner not the x ray scanner because x rays are dangerous if you expose yourself to too many.
- Gamma rays are very dangerous. They will outright kill you.

- Ionizing radiation is damaging because of how it damages things. Your body responds by producing more melanin. DNA regulates reproduction of cells. You could mess with the reproduction of your cell and you get cancer. You don't want to damage your DNA.
- Shorter wavelength waves carry more energy.
- Visible light is just below UV light. Threshold effect between UV light and visible light. We can be in visible light all day and never get cancer because visible light is lower in energy. It is only a bit lower. There is no gradual tailing off. There is a threshold. This threshold effect between UV light and visible light was explained by Einstein in 1905. He won the Nobel Prize for this. That's called non ionizing radiation.
- There is a threshold 1.77ev and 2.25ev or minimal energy needed.
- The important thing: is that there is a photo electric effect.
- You need ionizing energy to remove an electron off its atom.
- When we talk about non ionizing radiation, there is no cumulative effect and there is no intensity effect and no effect on cancer.
- Ionizing is above the threshold effect. Non- ionizing is below on the spectrum.
- It doesn't matter how far below the threshold. Something could be just below threshold or far below threshold. It doesn't matter. The threshold is only thing that matters.
- Non Ionizing radiation has no known effect on the human body other than heat.
- Heat is just heat and motion of molecules.

Abrami: I understand water vibrates to heat in microwave but you wouldn't put your head in a microwave would you?

Swanson: I actually intend to put my head in a microwave next week.

Abrami: You are pulling my leg now, right?

Swanson: no. I am not going to have it at full power and will probably put my hand in. My point is, it's regular heating and what I will feel is my hand getting warm and then I will take it out. It's just like putting your hand on a radiator.

Wells: If radio frequencies that are non-ionizing have no effect, can you explain how radios work?

Swanson: they have no known health effects on tissue except for heating. EMR is absorbed by your skin. About half of it is reflected by the body. Metals are special because the electrons are mobile. Our electrons are attached to a molecule. They are hard to move except the salty water part of the cell. The signal in the radio just turns into heat.

Ricciardi: Thank you for explaining that. Before I ask my question, I want to understand what you said. It sounds like what you were saying is due to oxidative stress not heating. Did I understand that correctly?

Swanson: No. I didn't say any of those things.

Ricciardi: Well then. Are you saying there is no real potential harm for non-ionizing radiation?

Swanson: To the degree that you don't cook yourself, yes.

Ricciardi: There are several studies and if you can debunk them. I have a copy for you.

Abrami: Dr Swanson, can you address these later for time sake during your section on studies?

Swanson: Yes. I will address generic, not these particular studies later.

Chamberlin: I just want to say it's quite a statement and in preparation for service on this commission, I did a lot of work reading published peer reviewed journals and a lot of them DO say there are biological effects. So I am assuming you will address those.

FCC Regulations:

- I want to clarify misconceptions about the FCC.
- The FCC does not conduct experiments. It sets regulatory limits based on the evaluation of relevant literature made by many nation and international agencies.
- One of these agencies is: IEEE which has a rigorous policy creation process.
- I was very impressed with their methodology for how they come to their decisions.
- They are very thorough. They have various working groups where reports go into a committee called sub- committee four.
- Sub-committee four has 125 members in it. They have a broad swath of expertise.
- They looked at 2,200 papers.
- 5G is just part of the spectrum. It's the 30Ghz part of the spectrum. 5G is new. The physics and biology of 5G is not.
- You don't have to do studies at 5Ghz. Where do you draw the line? The difference between 4G and 5G is essentially meaningless when it comes to the response of humans to this radiation.
- FCC has two primary measures: Thermal behavior. IEEE determines thresholds of watts/kg.
- FCC sets its limit 50x lower than the limit detected on animal studies. Based on that they
 get the SAR (Specific Absorption Rate which should be less than 1.6w/kg) That is an
 extremely conservative number. I mentioned a heating pad earlier that is roughly 100w/kg.
- Another method is the MPE (maximum permissible exposure) Effects on humans start at 100x higher than the limit.
- Why are there two standards? BC at higher frequencies like 5G that does not penetrate as far in the body so it's hard to measure so they use MPE.
- 5G is called small cell because they are low power and closer together and about 30 feet high.
- Your exposure is about .4% of the extremely conservative limit if you stand at the base.
- It occurred to me that light is EMR and what would happen if the FCC regulated light? Or the sun? They don't for obvious reasons. We can see light. They expect us to react responsibly.
- For a 100W light bulb six feet away, you are at a quarter of the FCC allowable limit in terms of thermal exposure. Three feet away, you are at the FCC limit.
- If you stand outside in the sun, you are at 1600% of the FCC standard for exposure limit.

- The sun would be outlawed if the FCC regulated it.
- Should we worry about standing under a 5G tower? I would say no.
- Another example is the brain. It is a radio transmitter transmitting at the thermal end of the spectrum far higher in energy than 5G. Your body is 85W machine. The brain is 15W. It uses a lot of energy. The brain weighs about 1 kg. So I estimate an SAR of 15w/kg. So thinking would also be outlawed by the FCC whose limit is 1.6w/kg.
- Let's get to what is does to you. It heats the skin up. The higher the frequency, the less it penetrates the skin and 5G is at the very surface.
- 10W/m2 is the FCC limit. Temperature rise at the surface of the skin. According to this model (The Human Body and MM Wave Wireless Communication Systems accepted2015 IEEE International Conference) which shows a rise in temperature for different energy densities. The SAR limit of 10W/m2 results in about .1 degree temperature rise.
- You would have to climb the 5g pole and hug and wait for your skin to rise .1 degrees.
- It would create more heat just in the energy to climb the pole. It's not magical stuff. It's just heat energy.
- Stepping outside or drinking a cup of coffee, you get a larger rise in temperature than irresponsible behavior of climbing and hugging a 5G pole.

Cooley: When you showed the heights of the various towers and small cells, because there will be 5G on towers as well. Can you speak to the difference of towers at 100-200 ft vs the small cells at 20-50 ft. Can you talk about the exposure based on the higher it is, the exposure decreases? I am making an assumption. If you use an average 150ft tower vs a 40ft small cell.

Swanson: If you are asking what would happen if the tower was 40ft instead of 20, then all of those numbers would go down. If you double the height, you go down by a factor of 4 if you are standing right under it. It's not that clean cut. With a higher tower, you have more powerful equipment. It's the same thing with 5G. If it's a 40ft tower, there will be more powerful equipment on that small cell. You have to take that into account. I am speculating that when engineers design the towers, they figure how to get down to 1/1000th of the FCC limit. According to research I just read, there are countries that measured levels at 1/1000th of the FCC limit. It wouldn't surprise me if it ends up being a wash if you double the height.

Cooley: Please clarify a term you used, lens opacity. What is that?

Swanson: It's the beginnings of cataracts.

Roberge: When was the FCC limit set?

Swanson: This is an ongoing thing. I can partially answer this. I know that the IEEE did this in 1996 and did it again in 2005. I believe the FCC monitors these new standards as they come out .But I don't know that they had an official meeting to incorporate all of that. I believe there is something in the news about reinstating a meeting.

Abrami: Yes. We have a paper on this.

Swanson: I believe you know more than I do about this.

Roberge: When they set this, they were only looking at heat effects on the body. Do you know when they look at this again and will that include other biological effects?

Swanson: I wouldn't quite put it that way. They looked at 2,200 papers. They don't just go, oh this one deals with other effects and throw it into the garbage. They take all of it into account. Of course, the things that you focus on are thermal effects because those are easily measurable. Other effects are random.

Heroux: You describe the review process of the IEEE in glowing terms.

Swanson: Yes. It was glowing. I was very impressed.

Heroux: Were you there?

Swanson: Was I there? No.

Heroux: Are you a member of SC3 or SC4?

Swanson: No.

Heroux: You don't go to IEEE meetings?

Swanson: Nope

Heroux: So in other words, your description of this review process is based on what you were told.

Swanson: That's correct and from what I read. Yes.

Heroux: Ok. I was there. I can tell you that this process is far from impartial. I have personal experienced it and if you want, I can tell you how it happened. At the time, I had designed an instrument that measured pulsed EMF. I was part of an epidemiological study at McGill. It was found that all the underground workers exposed to these fields and smoked, systematically died of lung cancer. ...All of them. This was done by Armstrong a biostatistician who is now in London. I was charged with informing IEEE of this. I was a member of SC4. I went when Eleanor Adair was presiding and I unfolded what had happened. Eleanor Adair said we will form a committee and we will look at this. There was a separate meeting. They wanted three members to join the president to study this. I was the one who designed the instrument and the only one at the time who knew of the epidemiological study determining this. At that meeting when they asked for volunteers, I raised my hand. Since only two other people did, I thought I am going to be able to discuss this openly in an IEEE committee. I was never called. This reflects the fact that your selection of the people controlling these committees and the literature that you review is very partial. It's not for some conspiracy but because of the fact that there is a natural tendency to assemble similar opinions in a given location. Are you aware that Eleanor Adair, who was president of SC4 for years and yea, at the time that she was supposed to be a judge on whether non

thermal effects occur, simultaneously published a paper in the open literature promoting the idea that we should heat the people rather than houses.

Abrami: Dr. Heroux, is there a question you want to ask?

Heroux: Yes. The review process is very difficult to control and hard to be impartial. I have lived through these difficulties. When you haven't lived through the process, it's very difficult isn't it? to be entirely certain that it's entirely impartial? Would you agree?

Swanson: That is way too generic for me to agree.

Abrami: We are hoping to hear from IEEE, so we can form our opinion on that.

Swanson: Personally, if I formed a subcommittee I would not want one of the paper's authors on the subcommittee. It would be biased.

Wells: can you give us an idea of the wattage of a 5G transmitter and handset?

Swanson: The handsets will be similar to current handsets that operate around a watt. The 5G transmitters are much smaller than 4G. I ask this question many times and I always get the run around. The reason is because different sites and different manufacturers have different specs. Roughly speaking, it's 10-20 watts for the transmitter.

Wells: The function of 5G is communications so how would you relate data rate to intensity and frequency?

Swanson: Those are good questions. One of the major goals of 5G is to increase data rates. Apparently, everyone wants to watch their videos on their cellphones. That's why this higher frequency is needed. The reason these need to be closer together is higher frequencies have trouble penetrating wet air. The more humid it is, the harder it is to penetrate. So they tend to be closer together, low power, high frequency.

Wells: The power density in w/ square meter. Is that a parameter that affects data rate?

Swanson: Yes. Actually it is. The stronger the signal, the more data you can push through. Dr. Chamberlin can probably address this better.

Chamberlin: I wanted to get clarification on the setting of limits. You mention two ways. One is the IEEE going through publications to find out what other people have established as safe limits. You also mention there was an animal study where you expose some sort of animal to increasing amounts of radiation until you saw a change in their behavior. Then, you use a factor of 50 below. Which is it? Do they use both together?

Swanson: I didn't see a conflict there. Part of what IEEE is doing is looking at animal studies. That's one of the things they look at. That's what the IARC looked at as well, animal studies. So they are looking for any effect.

Abrami: But, isn't it just thermal effects they are looking at?

Swanson: No. they look at everything under the sun. These guys review what scientists look at and the only thing that actually sees something definitive is the thermal effects.

Chamberlin: But these are short term studies and that's my concern.

Swanson: They vary.

Swanson: I touched on it before and I will talk about this again on a famous NTP study later.

Ricciardi: I just wanted to clarify something on the FCC. I have a couple of documents stamped from the federal government in 1985. A letter written from the EPA to the FCC and it says they have done the studies on the heating of tissues and explained to the FCC that they needed to do studies on non thermal effects because it can heat chronically low over time. Heating of tissues vs non heating of tissues and only heating was studied when the EPA wanted to go further. The FCC responded by saying they were taking this out of the hands of the EPA and putting it into the FCC's hands. So we no longer have a health agency representing us doing those studies. The FCC is not a health agency.

Swanson: That's right. They are not. They have a committee and listen to what they tell them. They know what they are talking about.

Ricciardi: I think these scientists that have done peer reviewed studies know what they are talking about. How many peer reviewed studies have you done?

Abrami: we are going to get to the next topic.

Studies:

-Everything I have been telling you is consensus, mainstream science.

-There is no fringe aspect, controversy or conspiracy theories.

-In the internet age, it is possible to find a "respectable" source that says anything, from silly to ludicrous to dangerous. There is the flat earth society, pizzagate, and we all know of black helicopters coming in the night to take us all away. It is important to search out consensus views.

-Statements from National Bodies: FCC, FDA, Cancer Institute, Cancer Society (see slide)

-Statements from International Bodies: European Commission, WHO, Health Canada, UK Health Protection Agency, Swedish Council for Working Life and Social Research, Norwegian Institute for Public Health, Australian Radiation Protection and Nuclear Safety. (see slide)

- The Swedes and Norwegians say this is safe. They are most sensible people in the world.

-Here is the upshot. The rate of glioma, which is a rare brain tumor, has gone down in the US. The rate of cellphone use has increased. There is no correlation at all. That is a very powerful statement.

-There is a difference between doing physics and chemical studies and health and nutritional studies. Health studies are very difficult to do and have them be reliable. There are conflicting claims. I can't tell you how many times I have heard eggs are good for you, then they are bad for you then they are good for you. I don't want to give you the idea that science is useless or these people are dumb. Neither of these is true. It's just difficult to do studies on humans. Humans are not great subjects.

- Amgen tried to reproduce 53 landmark studies on cancer. They were only able to reproduce six of them. Bayer Health was only able to reproduce 25% of 67 studies. It's just really difficult to do this stuff.

- Most cited paper of all time in medicine: Dr. John Ioannidis studying studies. He found that 80% of nonrandomized studies turn out to be wrong. There are many reasons for this: study biases (to make splashy result), lack of blinding, difficulty working with human or animal subjects, the rarity of effects being sought (trying to tease up very subtle stuff), the expense of dealing with many test subjects. Example: NTP study

- One important aspect is the problem of Multiple Comparisons:

- For example, I am going to examine a lot of outcomes from smoking. I have to conduct my experiment at a certain level of acuity. That's called a P-value. Industry standard for P-value is 5%. The P-value is the probability of observing the effect seen, or greater, given that the null hypothesis is true. Let's say you decide that cigarette smoke is not dangerous. That is the null hypothesis. Then you find your rats are getting lung cancer. Then you would say the probability of rats not getting lung cancer is very low. That implies that you are seeing something. I am going to assume a much tougher standard in my experiment with a P-value of 1%. That means that if I have 100 subjects, one of them has to have the outcome.

What happens in the real world with P-values much higher than 1% is that you could have three studies and they all have outcomes. You could have several different outcomes, not just the one you are testing. What is then reported, are all of the outcomes when in fact it should be none. For example...news clip about powerlines causing brain cancer, leukemia, breast cancer, birth defects, reproductive problems, fatigue, depression, and many others. It's implausible that a single thing causes many things.

- A single exposure causing many outcomes is a sure sign of the multiple comparisons problem! All of these studies find different things. If they don't start replicating each other, you shouldn't pay attention to them.

NTP Study-the claim:

- There is clear evidence that RFR causes heart tumors in male rats
- There is some evidence that RFR causes brain tumors in male rats
- There are problems with the NTP Study: (see slides for detail)
- The problem with the NTP study is the Multiple Comparison Effects.

<u>Heroux theory:</u>

He claims that electric fields from cellphones disrupt proton transfer in water, thereby "influencing the properties of water and the stability of DNA"

- This is a valid scientific question. We should delve into it.
- So what is going on here is something called the acid-base reaction which creates H₃O molecules. There is about 1 H₃O molecule per 10 million H₂O molecules. The extra proton can hop along chains of water molecules. This is called the Grotthuss mechanism. This is normal and is a chemical reaction. What is the effect of an electric field on chemical reactions?
- There is a study by Boxer at Stanford using fields from 2,000,000 V/cm to 100,000,000 V/cm to see a reaction. Cellphones max out at 1V/cm!
- So the physics of it and the chemistry of it say its fine but the magnitude of it says it's not something to worry about. A cellphone is not sufficient to cause any chemical reactions.

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Chamberlin Presentation: I need to correct or point out what he said.

Chamberlin claim: power per unit area becomes alarmingly large.

- Significance of 1/r2 Power relationship. The implication that having a cellphone in your sports bra (per slide) is definitely not a good idea, I have a problem with. This is misleading.
- There is something called the Frauenhofer distance. The near field and the far field have different laws.
- You need to compare to IEEE localized MPE at 30 Ghz. It's well below that.
- I have to say this is not what is actually going to happen. What is actually going to happen is very complicated. You have to simulate these on computers.

Abrami: We are running out of time. We need time for questions and responses from Dr. Heroux and Dr. Chamberlin on your remarks. We may take you up on your offer to dial in at a future date. You mentioned the WHO but the WHO categorized RF as a group 2B carcinogen. Can you tell me how that works? You said the WHO said there is no problem but they have graded it like lead and thalidomide.

Swanson: Sure I can address. First a technical point. The reason there seem to be these conflicting statements is it is actually the IARC which is a sub portion of the WHO that made that statement.

Abrami: There are many articles saying WHO.

Swanson: Just because they ascribe it to WHO, it's really IARC a sub portion. They do categorize it like lead like you said but also things like coffee, sawdust are in that group.

Abrami: Ok . You made your point on that.

Swanson: This committee (IARC) like IEEE only smaller looked at literature and concluded Group 2B. The standard for that is a very low bar. They made this on two things. The first is a data point on the interphone study in Europe and a collection of studies from Swedish researcher Hardell. The other

studies find no effect. I actually wrote to them and asked them, what are you doing??? What they said was, we are applying the Precautionary Principle.

Abrami: Dr. Sherman would bring that up, the Precautionary Principle.

Swanson: I have written about this. I am fine with the principle. But you can go overboard. It would be prudent not to go outside, not to get on a plane but I do it and accept the risks associated. One thing about the data points on the phone study. They self -reported that the numbers are unreliable.

Abrami: So why then is there a legal notice on RF in your cellphone telling you to keep it away from your body?

Swanson: It's not science. It's precautionary with a flavoring of legalese is what that is.

Abrami: So you are saying there is no science behind that legal notice?

Swanson: Correct. Yes.

Abrami: Let's talk about insurance industry. They recognize wireless radiation as a leading risk and place exclusions not to cover it. What does the insurance industry know that we don't know?

Swanson: I am not qualified. I don't work in industry and don't talk to them.

Heroux: You make a great point of giving a lot of influence to the concept of ionization vs non ionization. So if I take a copper atom in space and I want to extract an electron from it, it will take me a fair amount of energy. Is that right?

Swanson: Yes.

Heroux: We call this the extraction energy from the atom. But if I take a group of copper atoms together, how much field do I need to move the electrons in them?

Swanson: You don't need much. It's easy.

Heroux: It's called the degenerate fermi gas. The fact that you bring these atoms together changes considerably the electrical properties of the material. So you agree with me that if you have a material that has closely packed atoms and the electrons or protons move through the material then a small electric field can influence the motion of charges.

Swanson: Yes. But so we are not confused. We are talking about metal and of course people are not metal. There is an analogous effect on people though that I rarely ever mention where cooperative effects can cause something below the ionization. However, it's extremely rare and I don't feel like I was lying to you.

Chamberlin: I feel epidemiology is going to play an important part in the decisions of this commission. Your slide on gliomas vs cellphone usage is pretty convincing and that may not be the issue. But something that does concern me in the same time frame (1989-2005) is a 32% decline in male sperm count. That is major and significant. If you look at the studies that have been done, they are pretty convincing even exposing people at low levels below .1W/kg. They are getting statistically significant effects. I am not talking about P-values of .05 but of .001. I am wondering if you are aware of these and it correlates very strongly to wireless networks and cellphones.

Swanson: There are a lot of studies who are going to see an effect and some are going to be statistically significant. The real question is, are they reproducible? I don't look through all of these but every time I do look at one, I see problems and I don't see reproduction every single time. It's just amazing. I thought the NTP study...wow, this is a going to be a good study. Oh my god...they had problems. This always happens. The existence of these studies doesn't surprise me and would concern me if they could be reproduced but they can't. So I have to look at the consensus.

Chamberlin: There were 16 studies where statistics looked good and they all say the same thing. It's global epidemiology 32% sperm count decrease.

Swanson: Let me address sperm count. I use this in my class. There is a problem with studies. They are not based on same criteria or same subjects. About four years ago, the Danish Army did a study and they completely debunked this. There was no effect.

Wells: The Boxer lab slide is that a static field not an RF?

Swanson: Yes. I believe it's a static field.

Ricciardi: You just made a comment that you don't buy into these studies because they aren't reproduced. Many of these have been including the NTP study which was reproduced twice. What peer reviewed studies have you done?

Swanson: I have not done animal studies. I do theoretical studies.

Ricciardi: I find it difficult that you can dismiss all these studies showing biological health effects from cellphone radiation. The international EMF scientist appeal. That's 2,000 reproduced papers of studies over and over again with 240 scientists studying the fields on biology and health. How do you argue that health and regulatory agencies state that there is a scientific consensus that cellphones are safe when so many experts disagree?

Swanson: That's a good question. This thing is called the 5G appeal. These are scientists and doctors in Europe and North America saying let's slow down on 5G. So how many scientists and doctors are there in Europe and North America? They have 260 people out of 26,000,000 that have signed. That's not consensus.

Ricciardi: You misunderstood me. I wasn't talking about a petition. I was talking about 260 scientists doing studies.

Abrami: I think he stated his position already. We are short on time. If you could spend some time later on the phone or webex maybe in a few months. We may have more questions for you and you can finish. (He ended his presentation just before Nasim and Kim).

Next meeting: Friday, December 13th . 8:30 was agreed upon. We will have one speaker and then talk through where we want to go next.

V. Meeting Adjourned at 10:35 am.