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The CDC Hired an Industry Consultant to Draft Website Information on Wireless Health Risk

Documents from FOIA requests by Theodora Scarato reveal that in 2014, the U.S. Centers for Disease Control and Prevention (CDC) hired Kenneth Foster, PhD—a wireless industry consultant and Professor of Bioengineering at the University of Pennsylvania—to serve as a

subject matter expert in drafting new CDC website pages on the health risk of wireless wearables, power lines, smart meters, Wi-Fi, and electromagnetic hypersensitivity (EHS).



Theodora Scarato began a multi-year investigation into the CDC website pages following the agency's [2014 removal of earlier posted precautionary advice](#) on reducing cell-phone radiation exposure. FOIA records show that the CDC hired Foster through an hourly consulting contract.

From: Ansari, Armin (CDC/ONDIEH/NCEH)
Sent: Tuesday, April 22, 2014 10:03 AM
To: 'kfoster@seas.upenn.edu'
Cc: Schlemmer, Maryann (CDC/ONDIEH/NCEH)
Subject: RE: Technical assistance to CDC - nonionizing radiation

Hi Ken,

We are doing the admin part on our end and I have two quick questions for you:

- Do you happen to have an abbreviated CV or resume by any chance? If not, that's okay.
- Do you happen to have a personal e-mail we could use instead of the one with Univ of Pennsylvania? The reason is that we don't want the contracting folks to think they have to go through the university to ask for your services.

By the way, the company who will contact you is SciMetrika www.scimetrika.com. They are our contractor and help us identify subject matter experts as we need them. We are allowed to make suggestions to them, and of course we are suggesting you for this work.

I copied Ms. Maryann Schlemmer who is our branch contracting specialist and liaisons with SciMetrika in case you have any questions.

Best regards,
Armin

It remains unknown whether the CDC conducted a conflict-of-interest review prior to hiring him, despite CDC policy requiring that content experts disclose financial relationships with manufacturers or commercial supporters. Scarato repeatedly contacted the CDC, but her questions regarding vetting contractors for conflicts of interest were never answered.

From: Kenneth R. Foster [mailto:kfoster@seas.upenn.edu]
Sent: Tuesday, May 19, 2015 10:59 AM
To: [REDACTED] (CDC/ONDIEH/NCEH)
Cc: [REDACTED] (CDC/ONDIEH/NCEH)
Subject: Re: Wearable Tech -- one more go-round

Hi John

No problem. I am presently working on another one on wireless networks following the list of topics we discussed earlier:

- 1 - Wireless networks (including Wi-Fi and Smart meters, which are generically the same technology)
- 5 - Electrical hypersensitivity
- 3 - Living near cell towers
- 4 - Living near power lines
- 2 - Radiofrequency energy and cancer

The one hugely controversial topic on which CDC can make a big contribution to public debate is Wi-Fi (particularly in schools), smart meters, and other wireless networking applications

(b)(4) "Wi-Fi in schools" for an idea of the level of controversy on this issue. C4ST, a Canadian activist group (c4st.org) is making a big fuss about this, hearings in Canadian Parliament, the works.

This is a very politicized topic that will need some care to present.

regards Ken Foster

CDC Published Website Information on Wireless Health Risk

The CDC webpages that Foster was involved in and remain online are:

- **Wearable Computers and Wearable Technology (Examples of edited drafts)**
- **The Electromagnetic Spectrum: Non-Ionizing Radiation**

Additional CDC draft webpages that Foster helped create—but which were never finalized—include CDC website pages on:

- **less Networks**
- **Electromagnetic Hypersensitivity**

Like the two published webpages that involved Ken Foster, the unpublished drafts uncovered in Scarato FOIA requests reflect industry-aligned messaging, emphasizing that harm from wireless radiation is “not proven” and that EHS is “not a proven condition caused by electromagnetic fields.” This language closely mirrors the wireless industry talking points that cell phone and wireless radiation is “safe” despite substantial [peer-reviewed, published scientific research](#) reporting harmful effects, especially for children. Foster worked with the CDC for several months, often cautioning the CDC about how to handle the topic.

Kenneth Foster’s Longstanding Wireless Industry Ties

Kenneth Foster has authored numerous studies on 5G and wireless radiation, with many funded by wireless and electric-power industry organizations such as the Wi-Fi Alliance, the Mobile Manufacturers Forum (MMF), the Electric Power Research Institute (EPRI), and the GSMA, which represents mobile network operators worldwide. As an example, Foster’s paper [Transient Thermal Responses of Skin to Pulsed Millimeter Waves](#) (2020) states, “The work of Kenneth Foster, Martin Ziskin and Quirino Balzano was supported in part by the Mobile and Wireless Forum.” Foster has also served as an expert witness in legal cases involving wireless, non-ionizing EMF radiation and health, where he claims no proof of harm exists.

Foster has also been repeatedly hired as a “safety consultant” for industry in smart-meter, cell-tower, and high-voltage-power-line situations. He lists clients including Motorola, Bell Atlantic Mobile, Comcast Metrophone, Sprint Spectrum, Omnipoint Cellular Communications, and EPRI (See page 220 of [this document from a legal case](#)). Public records show that he has testified as an industry safety expert for companies such as [T-Mobile](#), [Towers of PA](#), and [AT&T](#).

How Foster’s Industry Funded Research was Used By the Industry To Show Safety

For nearly decades, Kenneth Foster has repeatedly published industry-funded papers downplaying wireless-radiation risks, and the wireless industry has then used those same papers in glossy brochures, PR campaigns, and “risk communication” materials to promote a narrative of safety. Each time Foster publishes a study funded by groups like the Wi-Fi Alliance, the Mobile Manufacturers Forum, EPRI, or GSMA, the sponsoring organizations quickly cite his work in brochures, FAQs, PowerPoints, and public messaging that reassure consumers there is “no health threat” — even when the studies involve limited samples or methodological gaps. Despite this close relationship, Foster has publicly minimized his industry ties while his research continues to be central to the wireless industry’s safety messaging worldwide.

His paper **entitled** Wi-Fi and Health: Review of Current Status of Research claims to *“examine the current state of research on possible biological effects/health effects of RF energy emitted by Wi-Fi.”*

It also states:

“Acknowledgments: This work was funded by the Wi-Fi Alliance, Washington, DC, and Mobile Manufacturers Forum, Brussels, Belgium.”

See [more statements on Foster’s papers](#) regarding his financial support from wireless companies.

WI-FI AND HEALTH: REVIEW OF CURRENT STATUS OF RESEARCH

Kenneth R. Foster* and John E. Moulder†

Abstract—This review summarizes the current state of research on possible health effects of Wi-Fi (a commercial name for IEEE 802.11-compliant wireless networking). In response to public concerns about health effects of Wi-Fi and wireless networks and calls by government agencies for research on possible health and safety issues with the technology, a considerable amount of technology-specific research has been completed. A series of high quality engineering studies have provided a good, but not complete, understanding of the levels of radiofrequency (RF) exposure to individuals from Wi-Fi. The limited number of technology-specific bioeffects studies done to date are very mixed in terms of quality and outcome. Unequivocally, the RF exposures from Wi-Fi and wireless networks are far below U.S. and international exposure limits for RF energy. While several studies report biological effects due to Wi-Fi-type exposures, technical limitations prevent drawing conclusions from them about possible health risks of the technology. The review concludes with suggestions for future research on the topic. Health Phys. 105(6):561–575; 2013

Key words: exp
protection; radi

to the Internet by laptop computers, although IEEE 802.11 protocols are used including some elect

Initially develop net cable to connect IEEE 802.11 is now area networks present environments. At present SmartPhone comes recent study estimates presently have Wi Increasingly, household devices are incorporating interfaces to allow remote programming and data acquisition: bathroom scales, gaming devices, audio equipment, household thermostats, and running shoes. While numerous wireless networking technologies are available, virtually any device that an ordinary citizen would be

May 25, 2016 UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

Kenneth Foster stated regarding the support by the wireless companies for this paper, "I think the total contract was in the order of \$40,000. As I recall we split the amount. It was a small contract. That's how these things go."

Acknowledgments—This work was funded by the Wi-Fi Alliance, Washington, DC, and Mobile Manufacturers Forum, Brussels, Belgium. Neither organization had any role in the research for, or preparation of, the manuscript; and they had no knowledge of the contents or conclusions of this review prior to submission for publication. The opinions in this review are those of the present authors only.

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Radiation Protection Dosimetry

EXPOSURE ASSESSMENT OF PORTABLE WIRELESS DEVICES ABOVE 6 GHz

Eduardo Carrasco, Davide Colombi, Kenneth R Foster, Marvin Ziskin, Quirino Balzano ✉

Radiation Protection Dosimetry, Volume 183, Issue 4, June 2019, Pages 489–496, <https://doi.org/10.1093/rpd/ncy177>

Published: 10 May 2018 **Article history** ▼

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Abstract

The emerging 5 G wireless devices working at frequencies above 6 GHz are expected to have antenna arrays formed by dipoles, slots, patches or their combination. At lower frequencies, the accepted criteria for exposure compliance is stated in terms of specific absorption rate. IEEE and ICNIRP are adopting epithelial or transmitted power density (PD through body surface) as the dosimetric reference for frequencies above 6 GHz, which entails the measurement of free space PD. Theoretical and numerical results presented in this article show that it is possible to perform meaningful free space PD assessments at half wave ($\lambda/2$) distance from arrays and, with the proper instrumentation, as close as $\lambda/(2\pi)$. However, if a dissipative body is placed close ($<\lambda/2\pi$) to the arrays, its reflection and absorption of RF energy can change the electric

FUNDING

This work was sponsored by Mobile & Wireless Forum.

Here are examples of how the wireless industry funded papers by Foster are frequently used by wireless-industry public relations organizations as "proof of safety" in their health

and safety brochures—creating a circular system in which industry-funded studies serve as the evidence base for industry-produced safety assurances.

Wi-Fi and Health

In 2007, the Wi-Fi Alliance released a glossy [“Wi-Fi and Health Safety” brochure](#) built around Foster’s [Wi-Fi Alliance funded paper](#), claiming there was “no evidence” of health risks and sponsored by the Mobile Manufacturers Forum. That same year, the Wi-Fi Alliance also issued a [one-page FAQ sheet](#) centered on Foster’s study—framing it as one of the largest Wi-Fi exposure investigations while omitting key methodological limits. They also incorporated his work into an internal [“Risk Communications” PowerPoint](#) that outlined a PR strategy to showcase the safety of their product.

In 2013, Foster co-authored [a review on Wi-Fi and health](#) with long-time industry consultant John Moulder, funded by the Wi-Fi Alliance and the Mobile Manufacturers Forum, concluding exposures were “far below limits.” His 2007 and 2013 industry funded papers on Wi-Fi were then featured in an updated [Wi-Fi safety brochure](#) from the Wi-Fi Alliance, MMF, and GSMA, which claimed Wi-Fi signals fall “well below” exposure limits and was distributed internationally as proof of safety.

Smartmeters

Also in 2013, Foster co-authored an EPRI funded [paper on Smartmeters](#) with consultant Richard Tell based on measurements from only two houses, which concluded exposures were “very far below” limits. In 2015, GSMA, one of the most powerful trade associations in the world representing wireless companies, published a [smart-meter safety brochure](#) that again relied on all three Foster papers to promote compliance with RF exposure standards.

Millimeter Waves

Recent examples of Foster's industry-funded work include **Transient Thermal Responses of Skin to Pulsed Millimeter Waves** (2020), supported in part by the Mobile and Wireless Forum. He is also co-author of several papers the Mobile Manufacturers Forum showcased in its 2018 report *Twenty Years of Research*, including:

- *Thermal Response of Human Skin to Microwave Energy: A Critical Review* (2016)
- *Thermal Response to Tissue RF Exposure...* (2016)
- *Thermal Modeling for the Next Generation of RF Exposure Limits* (2017)
- *Tissue Models for RF Exposure Evaluation...* (2018)
- *Are Children More Exposed to RF Energy from Mobile Phones than Adults?* (2014)

Foster's work focuses heavily on measuring RF exposure and comparing it to FCC or ICNIRP limits—limits widely criticized for failing to account for long-term, low-level, or non-thermal biological effects in humans, wildlife, and plants.

FOIA Documents Show Significant Changes to the CDC Wearables Page After Foster's Involvement

The CDC initially drafted a webpage that described potential RF exposure from wearable technology and included sections on health effects and how the public could minimize exposure.

CDC Draft of Wireless Wearables page sent to Foster To Review.

Wearable Computers and Wearable Technology

What are wearable computers and wearable technology?

Some new devices are designed to be worn on the user's head and body for extended times, not just during phone calls as with cell phones. For example, Google Glass is designed to be worn on the user's head for most of the day. These products could increase exposure to radiofrequency (RF) radiation and will require additional monitoring as they become more common.

What are some examples?

Examples include Google Glass, Galaxy Gear, and the Apple Watch.

Wireless Technology and Safety

The Federal Communications Commission (FCC) requires all wireless communications devices sold in the United States to meet its minimum guidelines for safe human exposure to RF energy. These limits are designed to protect against all known hazards of RF energy.

What you need to know:

- The FCC's guidelines on RF energy exposure are based upon standards developed by the National Council on Radiation Protection and Measurements (NCRP) and input from other federal agencies.
- The increasing use of cellular phones and other technology held close to the body that could emit RF radiation make it important to continue to investigate, research, and monitor any potential public health impact.
- CDC will continue to investigate, research, and monitor the effect RF radiation can have on people.

More information on the FCC and NCRP can be found at:

<http://www.fcc.gov/>

<http://www.ncrponline.org/>

On November 20, 2014, CDC staff emailed Foster the draft, which clearly stated that wearables would **increase** a user's RF exposure. On January 21, 2015, Foster sent the CDC detailed revisions. FOIA documents include examples of his proposed wording.

Dixon, Iris H. (CDC/ONDIEH/NCEH)

From: Kenneth R. Foster <kfoster@seas.upenn.edu>
Sent: Wednesday, January 21, 2015 10:26 AM
To: [REDACTED] (CDC/ONDIEH/NCEH); Ansari, Armin (CDC/ONDIEH/NCEH)
Subject: Re: Developing content for website
Attachments: WearableTechnology.docx

Follow Up Flag: Follow up
Flag Status: Flagged

Hi [REDACTED]

Sorry for the delay on this -- I am back on this project, last semester now concluded. I kept the "track changes" on so the draft looks a bit messy

Here is my edited version of "what you need to know". This is a politically sensitive topic and I suggest that the piece needs to be reviewed carefully to prevent embarrassment to CDC.

What you need to know:

- The FCC's guidelines on RF energy exposure are based upon standards developed by the National Council on Radiation Protection and Measurements (NCRP) and the Institute of Electrical and Electronics Engineers (IEEE), using an extensive process that included input from federal agencies and the public. The guidelines date to 1996 and FCC is beginning the process of revising them. However, they are broadly similar to major international guidelines that are presently in effect in many other countries.
- Wearable devices such as smartwatches operate at much lower power levels than those used by mobile phones, and they can be expected to meet FCC exposure guidelines by large margins. However, compliance would have to be confirmed for each device by the manufacturer.
- Wearable electronics such as smartwatches may distract the user and cause significant safety problems, particularly when used while driving. Moreover, because data, frequently of a personal nature, is being transmitted wirelessly there is some possibility of privacy infringements from the use of such devices. Users should be aware of these possible nonhealth risks.
- CDC recognizes that there is some level of scientific uncertainty about possible biological effects of RF energy. In particular, some epidemiology studies suggest a link between long term use of mobile phones and brain cancer (an exposure situation that is quite different from that presented by wearable computers). Numerous reviews by health agencies of the scientific literatures have led them to conclude that major international limits, which are broadly similar to present FCC limits, offer sufficient protection against all known hazards of RF energy. CDC agrees with that assessment.
- CDC will continue to investigate, research, and monitor the effect RF radiation can have on people.

- Ken Foster

The Final Result: Wireless Health Effects Removed, Exposure Minimized

A review of of emails between Foster and CDC staff finds that:

- All references to increased RF exposure were removed.
- The term "increase" was replaced with terms such as "low," "small," "short," and "reduced."
- The word "low" appears five times on the final webpage.
- No health effects are mentioned whatsoever.

- No information on how to minimize exposure is provided.

The final CDC webpage states:

"RF transmitters in wearable devices operate at extremely low power levels... wearable devices expose the user to very small levels of RF radiation over time." The only "safety concern" mentioned is that wearables may be distracting.

While the page links to a CDC non-ionizing radiation overview, that page also provides **no information** on possible health effects. Thus, the final CDC webpage on wearables reads more like promotional material than a public-health information as was initially drafted by the CDC.

Foster Resisted Sharing Google Glass Radiation Data With Public

FOIA emails show that CDC staff and Kenneth Foster discussed the "high SAR values for Google Glass" while finalizing CDC website content. When a CDC staff member suggested sharing this information—"We maybe should include a link to that info"—Foster advised against it, calling the issue *"too complicated."* He urged the CDC to simply state that wearables "operate at low power levels and meet FCC limits," rather than provide actual SAR data.

Staff had pulled the Google Glass FCC test reports because exposures were relatively higher, and one official argued that adding links would "make it more readable" for the public. Foster pushed back, repeatedly referencing "activists" who might use the information to "discredit CDC," and recommended softening the language to say RF exposures are *"generally"* far below FCC limits.

He also noted that Google's FCC filing predated rule changes allowing higher radiation levels in ear, calling this *"a complicated story for laypeople, but easy for the activists to*

spin."

From: Kenneth R. Foster [mailto:(b)(6)]
Sent: Saturday, March 14, 2015 6:46 AM
To: Donovan, John (CDC/ONDIEH/NCEH)
Subject: Re: CDC Wearable Technology Webpage material - discuss?

I agree. But I want to avoid making categorical statements that the activists can find counterexamples for. They will certainly look to try to find ways to discredit CDC

Maybe just weakening a sentence to say that RF exposures from such devices are **generally** far below FCC limits -- and leave it at that?

The comparatively high SAR values for Google Glass vs. Fitbit is due to the fact that its antenna is in the earpiece facing away from the body. If you wear it in a way that the antenna is directly against the pinna (I am not sure that is a normal usage condition since it appears that the antenna would be located posterior to the pinna), the SAR in the pinna directly above the radiating surface could approach 2013 FCC limits. A short time after Google submitted its SAR report, the FCC revised its policy to apply higher SAR limits for the pinna vs. the rest of the head. A complicated story for laypeople, but easy for the activists to spin,

very political subject!

On 3/13/2015 11:51 AM, Donovan, John (CDC/ONDIEH/NCEH) wrote:

Yeah, I think it's worth not going into too much detail.

I get what you're saying about including the proper amount of information. But including these links may be the way to make it more readable and include the info for folks who want to know more.

The issue with radiation in general is the possibility of getting into the weeds. I don't want us to get too complex here, honestly.

From: Kenneth R. Foster [mailto:(b)(6)]
Sent: Friday, March 13, 2015 11:44 AM
To: Donovan, John (CDC/ONDIEH/NCEH)
Subject: Re: CDC Wearable Technology Webpage material - discuss?

the SAR report is attached in two versions - the original (1/13) and revised (4/15) versions.

here is the original (1/13) SAR report

also the revised report that the company submitted on 4/15/13

https://apps.fcc.gov/oetcf/eas/reports/ViewExhibitReport.cfm?mode=Exhibits&RequestTimeout=500&calledFromFrame=N&application_id=201638&fcc_id=A4R-X1

shortened link

<http://goo.gl/W4HBd5>

(test this to make sure it works)

According to the report, these highest levels of SAR occur in the ear (as opposed to the head). Since the antenna is in the earpiece facing out, I assume that the relatively high exposure is only to the pinna. In 2013 (I think after Google submitted the data) they increased the SAR limit of the pinna, from 1.6 W/kg to 4 W/kg. However at the time Google submitted these reports the SAR limit for the pinna and head itself was 1.6 W/kg

this is getting too complicated. Maybe we should just say that wearable devices on the market operate at low power levels and meet FCC limits by a large margin. However, wearable devices such as Google Glass may transmit more signal and their compliance with FCC exposure limits would have to be carefully assessed by the manufacturer.

On 3/13/2015 11:17 AM, Donovan, John (CDC/ONDIEH/NCEH) wrote:

Do you have a reference for the FCC documentation/SAR tests? We maybe should link to that info.

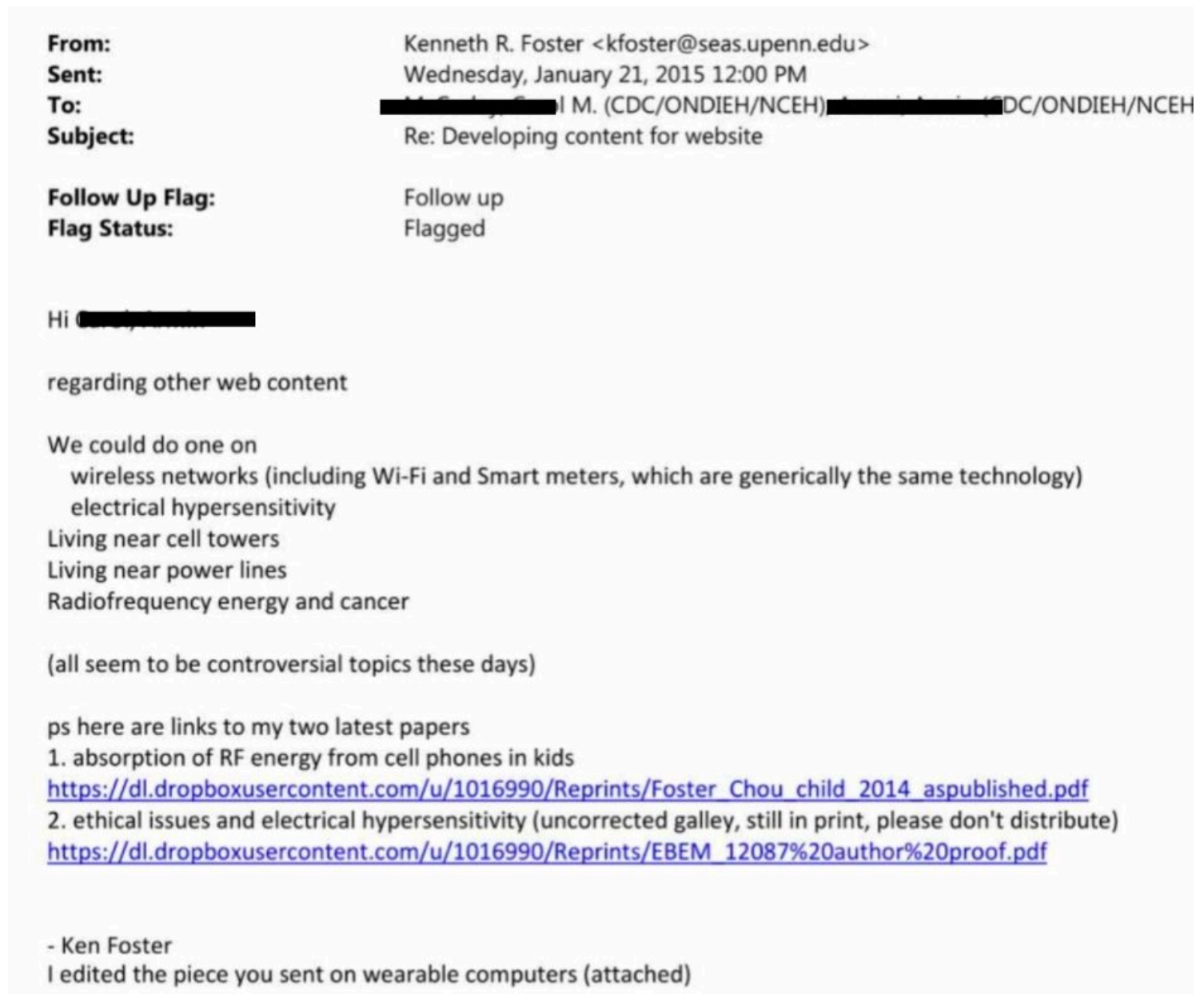
John Donovan, MPH
Associate Service Fellow
Health Communications/Education Specialist -- CDC/RSB
Work: 770-488-0654
Fax: 770-488-1539

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CDC Staff Received Industry-Funded Papers on Wireless and Health Effects from Foster

On February 14, 2015, Foster emailed CDC staff two of his latest papers, including a study on children's RF exposure. The CDC may not have been aware that the paper was funded by

the Mobile Manufacturers Forum and co-authored with C.K. Chou, who was then Chief EME Scientist at Motorola Solutions.



Independent scientists later published a [peer-reviewed critique](#) of this very paper in IEEE Access, describing "glaring internal inconsistencies and systematic errors," and calling for Foster's paper to be retracted.

Foster has publicly [dismissed concerns about wearables](#) as "ludicrous" and argued that research into potential health risks "isn't necessary."

Between August 2014 and December 2014, Scarato's FOIAs show the CDC text on children and cell phone risk was entirely deleted. FOIA documents have redacted sections, and it is unknown why or how this happened.

Foster's Long-Standing Bias Against Wireless RF Radiation Safety Research

This is not new. Nearly 30 years ago, in a [1987 *Nature* commentary](#), Foster argued for halting research into microwave radiation and health, calling such research a "dead end." His stance has remained largely unchanged since then.

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