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The book, in fact, is intended for physicians and other professionals and individuals who wish to better understand the wind turbine-associated symptom complex.

Wind Turbine Syndrome is not the same as Vibroacoustic Disease.<sup>6</sup> I say this because the two are often equated in the popular media. The proposed mechanisms are different, and the noise amplitudes are probably different as well. Wind Turbine Syndrome, I propose, is mediated by the vestibular system – by disturbed sensory input to eyes, ears, and stretch and pressure receptors in a variety of body locations. These feed-back neurologically onto a person's sense of position and motion in space, which is in turn connected in multiple ways to brain functions as disparate as spatial memory and anxiety. Several lines of evidence suggest that the amplitude (i.e., power or intensity) of low frequency noise and vibration needed to create these effects may be even lower than the auditory threshold at the same low frequencies. Re-stating this, one does not have to be able to hear the low frequency noise and vibration to experience the vestibular effects described as Wind Turbine Syndrome.

Vibroacoustic Disease, on the other hand, is hypothesized to be caused by direct tissue damage to a variety of organs, creating thickening of supporting structures and other pathological changes. It is caused by high amplitude (high power or high intensity) low frequency noise. Given my research protocol, described above, my study is of course unable to demonstrate whether wind turbine exposure causes the types of pathologies found in Vibroacoustic Disease, although there are similarities worthy of further clinical investigation, especially with regard to asthma and lower respiratory infections.

A few words about peer review. Peer review is quite simple, contrary to the mystique it has acquired among wind developers (most of whom probably have a fanciful idea of what it is). Peer review *consists of sending a scholarly manuscript to experts in that particular field of knowledge, who are asked to judge whether it merits publication.* Simple as that. The identity of reviewers (also called “referees”) can be either known to the author (this is often the case with book manuscripts, where authors are routinely asked by the editor to submit a list of possible referees) or kept confidential.

If the referees (usually consisting of two or three) manage to convince the editor that the manuscript is not worthy of publication, the editor contacts the author and rejects the manuscript. If, on the other hand, the referees feel the manuscript merits publication subject to certain revisions and perhaps additions, the editor will forward their reports to the author and ask for a response. “Are you willing to make these changes? Do you agree with these criticisms? If not, give me compelling reasons why not.”

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<sup>6</sup> Castelo Branco NAA , Alves-Pereira M. 2004. Vibroacoustic disease. *Noise Health* 6(23): 3-20.

The author then revises the manuscript accordingly, except where she feels her referees are wrong – and manages so to convince the editor. Once the editor feels the author has addressed criticisms and suggestions adequately, he (she) proceeds with publication.

Lastly, referees do not have to agree with the author's arguments or conclusions. This is worth emphasizing. Their purpose is merely to certify that a) the manuscript conforms to conventional standards of scholarly or clinical research appropriate for the discipline, and, perhaps most important, b) the manuscript is a significant contribution to knowledge.

In the case of this book, a variety of scientists and physicians, all professors at medical schools or university departments of biology, read and commented on the manuscript and recommended it as an important contribution to knowledge and as conforming to the canons of clinical and scientific research. Moreover, they did in fact suggest revisions, even substantial revisions and additions – all of which I made. Some gave me written reports to include in the book itself. Others offered to review the book after it was published.

With that said, the litmus test of scientific validity is not peer review (which, after all, is not infallible, as the history of science amply demonstrates). Peer review is an important first step in judging scientific or scholarly merit, however the ultimate test is whether other scientists can follow the author's research protocol and get the same results.

That, of course, remains to be seen with this report.

I thank Dr. Joel Lehrer in particular for providing me with new information regarding vestibular function, contributions echoed by Drs. Owen Black and Abraham Shulman (all in otolaryngology/neurotology). I thank Professors Henry Horn (ecology) and Ralph Katz (epidemiology) for discussion of scientific method and presentation. Dr. Jerome Haller (neurology) and Professor Robert May (theoretical ecology and epidemiology, past president of the Royal Society of London) read the manuscript and provided commentary to be included in the book, as did Dr. Lehrer and Professors Horn and Katz, for which I am most grateful. Barbara Frey (biomedical librarian) edited the manuscript. Other readers read and discussed the manuscript with me and advised on routes of publication. These included Professor Carey Balaban (neuroscience), Dr. Rolf Jacob (psychiatry/neurotology interface), Dr. John Modlin (pediatrics/infectious diseases), and Dr. Anne Gadomski (pediatrics/public health). I thank them all, as well as

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Christina Ransom and William McCall, librarians of the Champlain Valley Physician's Hospital in Plattsburgh, NY, and the FYI Hospital Library Circuit Rider Program.

George Kamperman and Rick James, INCE (Institute of Noise Control Engineering) certified noise control engineers, edited the sections describing noise measurement and modeling. They also analyzed noise studies done at the homes of several affected families, while developing standards and protocols for the assessment and control of noise from industrial wind turbines. Kamperman and James presented their standards and rationale at the Noise-Con 2008 meeting of the Institute of Noise Control Engineering (USA) in July 2008, then expanded their paper with a detailed discussion of noise measurement protocols and a model wind turbine ordinance.<sup>7</sup> The expanded paper is posted on the Wind Turbine Syndrome website.<sup>8</sup>

Some are surprised that I chose to publish this study as a book rather than an article. My reason is straightforward: it's too long for a medical or scientific journal. The problem is the incompressible yet indispensable narrative data – people's accounts of their sensations, experiences, symptoms, and history. It would be impossible to present these accounts in a 3000 or 7000-word article, yet they are essential as evidence for qualitative changes around turbines. For example, to support a summary statement like, "The noise from wind turbines has a different and disturbing quality, even when it does not seem loud," I must present the descriptions given by multiple study participants. To describe a symptom new to medicine, such as the feeling of internal vibration or pulsation, I again need the words of multiple participants. Because I could not do testing to examine thinking and memory abilities, for example, I need to recount the subjects' own evidence, consisting of their descriptions of things they used to do easily but now cannot do, or of loss and recovery in their children's school functioning.

Many of my reviewers suggested ways to split the study into shorter papers – a segment on migraine, a segment on tinnitus, a segment on methodology, for example. However, I feel that keeping the entire study in one piece makes for a more powerful and intelligible document, allowing readers to appreciate the intertwined nature of individual symptoms and the way they fit with new neural models of vestibular function.

As for the reception I anticipate for this report, I don't flatter myself that it will be greeted with loud hosannas from the wind industry. Keep in mind that wind developers have what is called in science a

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<sup>7</sup> Kamperman GW, James RR, "Simple guidelines for siting wind turbines to prevent health risks," at the annual conference of the Institute of Noise Control Engineering/USA, Noise-Con, July 28-31, 2008.

<sup>8</sup> See "How loud is too loud?" [www.windturbinesyndrome.com](http://www.windturbinesyndrome.com).

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“conflict of interest.” Meaning, their judgment is unduly influenced by money. “It’s difficult to get a man to understand something when his salary depends upon his not understanding it,” wryly observed Upton Sinclair.<sup>9</sup>

I, on the other hand, have no conflicts of interest. This research was unfunded, and neither my small village property, my town, nor the Adirondack Park bordering my town is a likely candidate for a wind farm. Is a fondness for bats and other interesting, highly evolved animals a conflict of interest? I wouldn’t think so. Admittedly, I am distressed to hear about bats dying of internal hemorrhage as they fly near wind turbines, just as I am distressed to hear that people are forced from their homes or endure cognitive impairment of uncertain reversibility in order to remain in the only home they can afford.<sup>10</sup> I have spoken and written earnestly and vigorously about wind developers because of their stubborn refusal to acknowledge health problems amply documented in this and numerous other studies.<sup>11</sup> Such stonewalling would test the patience of a saint – and I am no saint.

My hope is that this report will balance the risk-benefit picture of wind turbines more realistically, and help those individuals, such as George Kamperman and Rick James, who are actively promoting noise control criteria that will prevent the health and home abandonment problems documented here.

Kamperman and James have convinced me that a single, one-size-fits-all setback distance may not be both protective and fair in all environments with all types of turbines. Even so, it is clear from this study and others that minimum protective distances need to be:

- a) more than the 1-1.5 km (3280-4900 ft or 0.62-0.93 mi) at which there were severely affected subjects in this study,
- b) more than the 1.6 km (5250 ft or 1 mi) at which there were affected subjects in Dr. Harry’s UK study,
- c) and, in mountainous terrain, more than the 2-3.5 km (1.24-2.2 mi) in which there were symptomatic subjects in Professor Robyn Phipps’s New Zealand study.<sup>12</sup>

*Two kilometers, or 1.24 miles, remains the baseline, shortest setback from residences (and hospitals, schools, nursing homes, etc.) that communities should consider. In mountainous terrain, 2 miles (3.2 km)*

<sup>9</sup> Sinclair, Upton, 1935. *I, Candidate for Governor: And How I Got Licked*.

<sup>10</sup> Baerwald EF, D’Amours GH, Klug BJ, Barclay RM. 2008. Barotrauma is a significant cause of bat fatalities at wind turbines. *Curr Biol* 18(16): R695-6. Due to air pressure shifts near moving turbine blades, blood vessels in bats’ lungs and abdomen are disrupted, which produces fatal internal hemorrhage.

<sup>11</sup> In anticipation of wind industry blowback, I imagine it may once again publicize that it thinks *I think* wind turbines cause mad cow disease. I do not and never did. My reply to this canard – now a family joke – was published several years ago ([www.windturbinesyndrome.com/?p=84](http://www.windturbinesyndrome.com/?p=84)). My previous reports and papers on Wind Turbine Syndrome and the wind industry can be found on [www.windturbinesyndrome.com](http://www.windturbinesyndrome.com).

<sup>12</sup> See *Introduction*, p. 4, for discussion and references.

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*is probably a better guideline.* Setbacks may well need to be longer than these minima, as guided by the noise criteria developed by Kamperman and James.

The shorter setbacks currently in use in the USA and elsewhere – 1000 to 1500 ft (305-457 m) – are a convenience and financial advantage for wind developers and participating landowners. They have no basis in research on safety and health, and they do not make clinical sense.

My next step in this project will include 1) amassing a larger series of cases to further clarify setback needs relative to turbine power and other characteristics, 2) initiating a standard symptom survey tool for physicians to use in their practices or citizens in their communities after turbines are built, and 3) working with neurotologists to explore objective testing protocols for Wind Turbine Syndrome.

For those who, reading this, recognize their own symptoms, the appropriate medical specialist to consult would be a neurotologist, who is an otolaryngologist (ears, nose, and throat doctor) or neurologist who specializes in balance, the inner ear, and its neurological connections. When I sent this report out for critical review, these were the physicians who recognized a remarkably similar symptom complex from cases familiar to them – such as certain inner ear pathologies.

To those of you living near turbines who recognize your own symptoms within these pages, you are not crazy and not fabricating them. They are clinically valid – and unnecessary. While wind developers rush headlong into yet more projects, you unfortunates will have to exercise patience as the medical profession catches up with what is ailing you. Meanwhile, my advice is: Speak out. In *The Tyranny of Noise*, Robert Alex Baron calls for an end to “our passive acceptance of industry's acoustic waste products.”<sup>13</sup> This will happen only when the suffering refuse to be silenced.

By the time I finished interviewing (February 2008) and moved on to data analysis and writing, six of the ten families in this study had moved out of their homes because of turbine-associated symptoms. Three months later (May 2008), when the first draft was complete and I contacted the families for their approval and permission to publish the information about them, two more had moved out because of their turbine-associated symptoms – bringing the total to eight of the ten. The ninth family could not afford to move, but had done extensive renovations in an effort to keep the noise out. (Renovations, ironically, that made

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<sup>13</sup> Baron, Robert Alex, 1970. *The Tyranny of Noise: The World's Most Prevalent Pollution, Who Causes It, How It's Hurting You, and How to Fight It*. St. Martin's Press, New York. P. 12.



the house worse to live in, since they could no longer heat it properly.) As of this writing, family number ten is struggling to remain in their home.

Behold ten families whose lives have been turned upside down because of the wind industry's acoustic waste products.

Finally, ask yourself why a country doctor practicing in the poorest county in New York State did this study, and not the Centers for Disease Control or some other relevant government agency. It's a fair question and a troubling one. I ask it myself.

It is well known that wind developers target impoverished communities for their wind farms. This explains the "poorest county" part of my question, and likewise why wind turbines quickly became a looming issue in my life four years ago. But it leaves unanswered the part about, Why did I write this report, and not the government?

To answer that would of necessity catapult this report (and me) into the treacherous territory of public policy. One would like to think science is not beholden (craven?) to public policy, but that would be naïve, would it not? Moreover, while the scientist in me would like to imagine that I can write this report and remain above the hurly burly of public policy, I know this, too, is naïve. Wind Turbine Syndrome is an industrial plague. It is man-made and easily fixed. Proper setbacks are the best cure I know of; they do the job just fine. If I could scrawl this on a prescription pad and hand it to my subjects in this report, I would do so. No brilliant scientist needs to discover a new antibiotic or vaccine or sleeping pill to treat it.

Setbacks, however, are not considered matters of public health, but matters of public policy – what is called "politics." And right there is the rub. Right now, in the global rush to wind energy, there is almost no voice heard for public health repercussions. Where it is heard – at town meetings, on the Internet, in Letters to the Editor, in courtrooms – it is routinely ridiculed. I speak from experience.

Wind energy is being promoted by every state and national government I know of – under intense lobbying by wind development companies generally owned or otherwise capitalized by powerful investment banks which in turn take large tax write-offs and reap large government subsidies for their wind farm projects, who then turn around and sell carbon credits (green credits). Perhaps this helps explain why no provision is made for clinical caution?

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And perhaps this goes some way toward explaining why a pediatrician in rural NYS and a general practitioner in Cornwall, England – along with a handful of physicians elsewhere in the UK and Australia and who knows where else – are the ones funding this research and writing these reports.

Then so be it.

Nina Pierpont, MD, PhD

Malone, NY

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