Vibro Acoustic disease

Vibroacoustic disease: biological effects of infrasound and low-frequency noise explained by mechanotransduction cellular signalling

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Author: Alves-Pereira, Mariana; and Castelo Branco, Nuno

Abstract

At present, infrasound (0–20 Hz) and low-frequency noise (20–500 Hz) (ILFN, 0–500 Hz) are agents of disease that go unchecked. Vibroacoustic disease (VAD) is a whole-body pathology that develops in individuals excessively exposed to ILFN. VAD has been diagnosed within several professional groups employed within the aeronautical industry, and in other heavy industries. However, given the ubiquitous nature of ILFN and the absence of legislation concerning ILFN, VAD is increasingly being diagnosed among members of the general population, including children. VAD is associated with the abnormal growth of extra-cellular matrices (collagen and elastin), in the absence of an inflammatory process. In VAD, the end-product of collagen and elastin growth is reinforcement of structural integrity. This is seen in blood vessels, cardiac structures, trachea, lung, and kidney of both VAD patients and ILFN-exposed animals. VAD is, essentially, a mechanotransduction disease. Inter- and intra-cellular communication is achieved through both biochemical and mechanotranduction signalling. When the structural components of tissue are altered, as is seen in ILFN-exposed specimens, the mechanically mediated signalling is, at best, impaired. Common medical diagnostic tests, such as EKG, EEG, as well as many blood chemistry analyses, are based on the mal-function of biochemical signalling processes. VAD patients typically present normal values for these tests. However, when echocardiography, brain MRI or histological studies are performed, where structural changes can be identified, all consistently show significant changes in VAD patients and ILFN-exposed animals. Frequency-specific effects are not yet known, valid dose-responses have been difficult to identify, and large-scale epidemiological studies are still lacking.

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- Infrasound and low frequency noise dose responses

Noise Health. 2004 Apr-Jun;6(23):3-20.

Vibroacoustic disease. Branco NA[1], Alves-Pereira M. **Author information**

Abstract

Vibroacoustic disease (VAD) is a whole-body, systemic pathology, characterized by the abnormal proliferation of extra-cellular matrices, and caused by excessive exposure to low frequency noise (LFN). VAD has been observed in LFN-exposed professionals, such as, aircraft technicians, commercial and military pilots and cabin crewmembers, ship machinists, restaurant workers, and disk-jockeys. VAD has also been observed in several populations exposed to environmental LFN. This report summarizes what is known to date on VAD, LFN-induced pathology, and related issues. In 1987, the first autopsy of a deceased VAD patient was performed. The extent of LFN induced damage was overwhelming, and the information obtained is, still today, guiding many of the associated and ongoing research projects. In 1992, LFN-exposed animal models began to be studied in order to gain a deeper knowledge of how tissues respond to this acoustic stressor. In both human and animal models, LFN exposure causes thickening of cardiovascular structures. Indeed, pericardial thickening with no inflammatory process, and in the absence of diastolic dysfunction, is the hallmark of VAD. Depressions, increased irritability and aggressiveness, a tendency for isolation, and decreased cognitive skills are all part of the clinical picture of VAD. LFN is a demonstrated genotoxic agent, inducing an increased frequency of sister chromatid exchanges in both human and animal models. The occurrence of malignancies among LFN-exposed humans, and of metaplastic and displastic appearances in LFN-exposed animals, clearly corroborates the mutagenic outcome of LFN exposure. The inadequacy of currently established legislation regarding noise assessments is a powerful hindrance to scientific advancement. VAD can never be fully recognized as an occupational and environmental pathology unless the agent of disease--LFN--is acknowledged and properly evaluated. The worldwide suffering of LFN-exposed individuals is staggering and it is unethical to maintain this status quo.

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Vibroacoustic disease: Biological effects of infrasound and low-frequency noise explained by mechanotransduction cellular signalling Mariana Alves-Pereira[a,*], Nuno A.A. Castelo Branco[b]

Abstract

At present, infrasound (0–20 Hz) and low-frequency noise (20–500 Hz) (ILFN, 0–500 Hz) are agents of disease that go unchecked. Vibroacoustic disease (VAD) is a whole-body pathology that develops in individuals excessively exposed to ILFN. VAD has been diagnosed within several professional groups employed within the aeronautical industry, and in other heavy industries. However, given the ubiquitous nature of ILFN and the absence of legislation concerning ILFN, VAD is increasingly being diagnosed among members of the general population, including children. VAD is associated with the abnormal growth of extra-cellular matrices (collagen and elastin), in the absence of an inflammatory process. In VAD, the end-product of collagen and elastin growth is reinforcement of structural integrity. This is seen in blood vessels, cardiac structures, trachea, lung, and kidney of both VAD patients and ILFN-exposed animals. VAD is, essentially, a mechanotransduction disease. Inter- and intra-cellular communication is achieved through both biochemical and mechanotranduction signalling. When the structural components of tissue are altered, as is seen in ILFN-exposed specimens, the mechanically mediated signalling is, at best, impaired. Common medical diagnostic tests, such as EKG, EEG, as well as many blood chemistry analyses, are based on the mal-function of biochemical signalling processes. VAD patients typically present normal values for these tests. However, when echocardiography, brain MRI or histological studies are performed, where structural changes can be identified, all consistently show significant changes in VAD patients and ILFN-exposed animals. Frequency-specific effects are not yet known, valid dose-responses have been difficult to identify, and large-scale epidemiological studies are still lacking.

Is this Vibro-Acoustic Disease? (Germany)

http://www.windturbinesyndrome.com/2011/is-this-vibro-acoustic-disease-germany/ —Calvin Luther Martin, PhD

Is this VAD? *We don't know*. Read on.

Marco Bernardi and his wife Jutta Reichardt have been living next door to wind turbines (Schleswig-Holstein, Germany) since 1994.

At first it was 3. Each, 39m (128ft) high and each 200kW, 450-750m (0.28-0.47mi) from their home.

Soon, several more went up, with the same specifications—except closer still, 320-450m (0.20-0.28mi).

The building frenzy began in 2001, when 115 more appeared like huge mushrooms, 2.3km (1.4mi) to 15km (9mi) from their front door. This last batch ranged from 1 to 5MW, with a height of 90m (295ft) to 189m (620ft).

The Wind Turbine Syndrome symptoms started soon after the initial 3 began operation. By Marco and Jutta's account, the symptoms have markedly worsened over time. (The following is an imperfect, digital translation.)

Jutta: tinnitus (4 different tones), insomnia, nausea (for about 3 years continuously), high blood pressure (at certain wind directions), angina pectoris vibrating of the upper body, ear pressure (a feeling like cotton wool in the ears), urgency, difficulty falling asleep, palpitations, heart flutters or tachycardia, reddish-white ulcers in the mouth, fluctuating blood pressure at highly variable pulse, internal unrest with urge to work more and more.

Marco: tinnitus (4 different tones), sleep disorders, high blood pressure (at certain wind directions), angina pectoris (not as pronounced as with Jutta), vibrating of the upper body, ear pressure (a feeling like cotton wool in the ears), difficulty falling asleep, palpitations, heart flutters or tachycardia, reddish-white ulcers in the mouth, fluctuating blood pressure at highly variable pulse, lethargy in conjunction with internal unrest.

Recently, Nina Pierpont was notified by Marco that Jutta is now hospitalized with tissue damage which Nina suspects the Vibro-Acoustic Disease (VAD) research group in Portugal (Castelo Branco and Alves-Pereira) might well diagnose as VAD—from the turbines.

Vibro-Acoustic Disease? Nina explains the difference between VAD and WTS as follows. (See *Wind Turbine Syndrome*, 2009, pp. 13-14.)

Readers should understand that Wind Turbine Syndrome is not the same as Vibroacoustic Disease.[10] 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, inner 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 (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, it appears that even low frequency noise or vibration too weak to be heard can still stimulate the human vestibular system, opening the door for the symptoms I call Wind Turbine Syndrome. I am happy to report there is now direct experimental evidence of such vestibular sensitivity in normal humans.[11]

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.[12] The suspected agent is high amplitude (high power or 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 that may be worthy of further clinical investigation, especially with regard to asthma and lower respiratory infections.

[10] Castelo Branco NAA, Alves-Pereira M. 2004. Vibroacoustic disease. Noise Health 6(23): 3–20.
[11] Todd NPMc, Rosengren SM, Colebatch JG. 2008. Tuning and sensitivity of the human vestibular system to low-frequency vibration. Neurosci Lett 444: 36–41.
[12] Castelo Branco and Alves-Pereira 2004.

Extreme WTS can, it seems, cross the line into VAD. At least this is Nina's hunch, from conversations with the Portuguese VAD research group and her reading of the VAD literature.

Nina's concern is that Jutta Reichardt has perhaps crossed that line.

Watch the video, below, made by Marco & Jutta last fall, I believe.
(Be sure to turn up your speakers; the native volume of the video is exceptionally low.)

http://www.vibroacoustictherapy.com/