Mariana Alves-Pereira, Ph.D.
Lusofona University, Lisbon, Portugal

Nuno A. A. Castelo Branco, M.D.
Principal Investigator, Vibroacoustic Disease

UTRECHT, The Netherlands  11 Oct 2013
Noise is a Pressure Wave: A time-varying force impacting upon a surface.

Rudimentary and outdated segmentation of the acoustical spectrum.

The dBA unit is inappropriate for measuring LFN.
Disclaimer

We:

- Do not harbour anti-technology sentiments;
- Consider Wind Turbines as welcome additions to modern technological society;
- Have scrutinized data under one, and only one, agenda - pure scientific inquiry;
- Are not producing a report arguing against the implementation of Wind Turbines;
- Are not contractually (or otherwise) linked to the firm that conducted the acoustical measurements; and
- Have provided consulting activities to this family, of a purely academic and scientific nature, and hence pro bono.
Between 321 and 642 m from the home (2007).
**Infrasound & Low Frequency Noise**

**Technical Details of Measurements**

- **dBLin**
- **1/3 octave bands**
- **1-500 Hz** (herein reported: 6.3-500 Hz)
- **01dB Symphonie**
- **½” microphone** (GRAS, model 23606)
- **Continuous - Apr 5th-16th, 2007**
- **30-min periods**
- **Wind Speed + Structural Vibrations**
Wind Turbine Home With Same Wind Speed (5.4 Km/h)

- Residual - Night (08/09Apr07)
- Environmental - Night (11/12Apr07)
- Environmental - Day (15Apr07)
View from Balcony of “Grain Terminal” Home

2004
Grain Terminal Home vs. Wind Turbine Home

**WT > GT**

- **GT home - Eve** (04Feb04)
- **WT home - Night** (11/12Apr07)

In GT Child’s Bedroom vs. WT Master Bedroom

Frequency (Hz)

Amplitude (dB)
Problems in the WT Home

- WT began operation in Nov 2006.
- Inability to obtain restful sleep; increased irritability.
- Dog, horse, and ant behaviour.
- Mar 2007: letter from school (12-yr-old):

  “...It seems that [the child] has lost interest, makes a lesser effort, as if he were permanently tired”.

Our team was contacted in March 2007, and the following complementary diagnostic tests were recommended:

- Echocardiograms, P300, PCO$_2$ respiratory drive.
Vibroacoustic Disease (VAD) Clinical Stages

**Mild**  1-4 years of LFN exposure
Slight mood swings, indigestion & heartburn, repeated mouth & throat infections, bronchitis.

**Moderate**  4-10 years of LFN exposure
Chest pain, back pain, fatigue, fungal & viral skin infections, allergies, blood in urine, inflammation of stomach lining.

**Severe**  > 10 years of LFN exposure
Psychiatric disturbances, headaches, hemorrhages of nasal & digestive mucosa, duodenal ulcers, spastic colitis, varicose veins & hemorrhoids, decreased vision, severe joint pain, severe muscular pain, neurological disturbances.
VAD Clinical Signs in the WT home

**P300-Event-Related Potentials in Child**

- Jun 2007: 352 ms
- Sep 2007-after 2 mo. holiday: 322 ms
  (norm: 300 ms)

**Respiratory Drive**

- 39-year-old father: 46%
- 42-year-old mother: 53%
  (norm: >60%)

**Echocardiography Score for Pericardial Thickening:**

- 39-year-old father: 1
- 42-year-old mother: 1
- 12-year-old child: 1
WT No. 2, closest to home, at 322 m was ordered to be shut down.

All other (3) WT were ordered to be shut down during the evening (8-11 pm) and night hours (11 pm – 7 am).

Meanwhile, the installation of WT continued in the contiguous vicinity of the R family home.
Mrs. R and the children have moved.

The child has normal P300 values.

Mr. R. must stay to care for thoroughbred Lusitanian horses.

Mr. R’s health is visibly deteriorating, with increased cognitive impairment and severe noise intolerance.

Between 2000 and 2006, 13 healthy thoroughbred Lusitanian horses were born and raised on Mr. R’s property.

All 4 horses raised after 2007 developed asymmetric equine flexural limb deformities (EFLD).

All 4 were studied + 1 control.
**Equine Flexural Limb Deformities** (EFLD)

**Espirataco – Case 4**
Born: 02 May 09 and raised on R’s Farm; Father: Zircão; Mother: Vassoura.

**Engenheiro – Case 5**
Born: 17 May 09 and raised on R’s Farm; Father: Zircão; Mother: Zizi

**Normal right forelimb:**
Hoof wall-to-floor angle is $>115^\circ$

**EFLD left forelimb:**
Hoof wall-to-floor angle is $<115^\circ$
Corrective Surgery: severing the accessory or check ligament.

Case 1 (Canela; Born: 26Feb07), Case 4 & Case 5: Born and raised on Mr. R’s farm.

Case 2 (Desplante; Born: 20Apr08): Acquired at 15 days of age and raised on farm.

Case 3 – Control - (Dondoca; Born: 04Apr08): Acquired at 14 months of age.
Response of Biological Tissue to LFN

In all cases (1, 2, 4 & 5), blood vessel walls were abnormally thickened due to the presence of collagen. No such images were seen in Case 3. Cells normally associated with inflammatory processes were absent from all images.

This unusual biological feature is the hallmark of LFN exposure.

Blood Vessel Wall Thickening in LFN-exposed Wistar rat.

Blood Vessel Wall Thickening in Vibroacoustic Disease Patient.
Response of Biological Tissue to LFN

Structural thickening due to abnormal growth of collagen in the absence of an inflammatory process.

Thickening of Alveolar Walls (LFN-exposed Wistar rat).

Note: Scale of paired images is the same.

Thickening of Pericardium (VAD patient).
The remaining 3 WT must be removed.

Monetary retribution to the R. Family was increased from the previous value stipulated by the lower court.

Meanwhile, Mr. R’s health has visibly deteriorated further.

“Acquired flexural deformity of the distal interphalangic joint in foals” (2012), by Teresa Margarida Pereira Costa e Curto.
Thank you for your attention!

m.alvespereira@gmail.com