Electromagnetic hypersensitivity

1. Real symptoms of unknown origin

Figure 1. Linky meter. [Source: © Benoît Prieur / Wikimedia Commons]

Electromagnetic hypersensitivity (EHS) manifests itself through a set of **symptoms that vary in nature and intensity** from one individual to another, the cause of which is attributed to electromagnetic waves by patients. Most of the people affected are women. The waves in question are often radiofrequencies of recent wireless communication tools (Wifi, mobile phones...). Equipment emitting in other frequency ranges, such as high-voltage lines, and various electrical equipment are also incriminated, such as Linky electric meters for example [1].

More than 50 so-called challenge studies have been conducted in a **double-blind** fashion to determine whether subjects with self-declared electrosensitivity or electromagnetic hypersensitivity (EHS) were able to detect the presence of an electromagnetic field. These studies showed no difference in the perception of electromagnetic waves between EHS and non-EHS individuals. Indeed, the rate of correct answers obtained by both groups is not different from the one obtained "by chance". In 2005, the WHO identified electromagnetic hypersensitivity as an **idiopathic environmental intolerance** (IEI) attributed to electromagnetic fields [2].

Other syndromes related to IEI include multiple chemical hypersensitivity (or chemical odour intolerance) [3], sick building syndrome [4] (environmental air), Gulf War syndrome [5], noise hypersensitivity [6] , and wind tunnel syndrome [7]. It has been observed on many occasions that some people can accumulate several IEIs simultaneously. More generally, these syndromes are similar to **medically unexplained disorders** [8]. The symptoms and suffering are very **real** and can become disabling, particularly due to avoidance behaviours, the extent of the disorders experienced and the isolation that can result.

2. Can information play a role in the appearance of disorders?

It has been shown that **disturbing information** on the dangers of electromagnetic waves can promote the appearance of various

symptoms in "normal" subjects (with no *preconceived notions* about the effects of waves and no pre-existing health problems). It is indeed possible to induce the appearance of symptoms in non-EHS people, simply by making them believe that they are exposed, all the more so if a frightening picture of the effects of waves has been presented to them beforehand [9],[10],[11]. The analysis of the psychological profile indicates a stronger tendency to **somatization** in some subjects. Other studies indicate a greater attention to environmental factors and an increased tendency to anxiety without a clear typical profile emerging. This has reinforced the hypothesis of a ***nocebo*** effect, also reported in the challenge studies. The *nocebo* effect is a mechanism comparable to the well-known *placebo* effect, but with opposite effects: an expected negative effect occurs when the person thinks that the cause is present.

3. How is the self-diagnosis constructed?

Figure 2. Character suffering from EHS in the TV series "Better Call Saul". [Source: screenshot from the series created by Vince Gilligan and Peter Gould, AMC]

Interviews conducted with people who declare themselves to be EHS have revealed a process in several stages leading to the **conviction** that the waves are the cause of their problems (Figure 2). Symptoms, which may have existed for a long time, are explained by a radio program, a newspaper article or a conversation with relatives reporting harmful effects of waves [12]. The *nocebo* effect then appears as a secondary component that amplifies the process.

The notion of socio-cognitive exposure had been proposed [13], joining that of "**cognitive opportunism**" [14], where the individual suffering from symptoms for which he or she has no satisfactory explanation, thus finds a cause as soon as he or she can conceive one in his or her environment. Clearly, there are different paths that lead people to declare themselves EHS. To date, **no** biological or psychological **marker** allows a **medical diagnosis of electromagnetic hypersensitivity on a scientifically validated basis**.

4. Underlying mechanisms

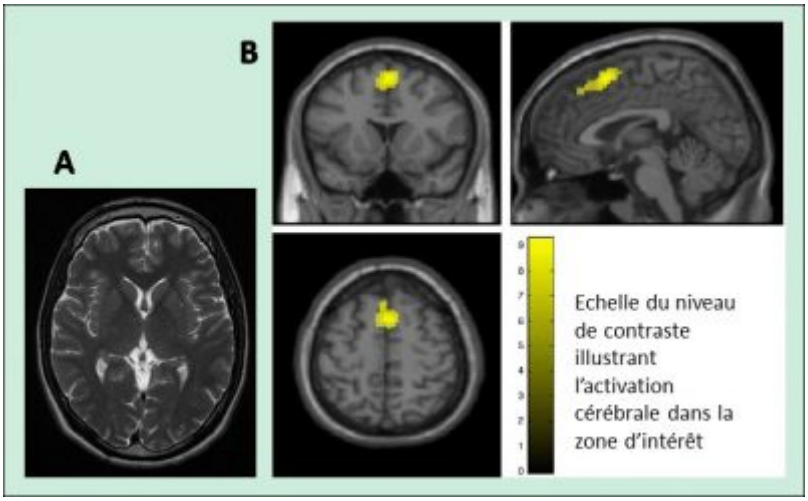

Figure 3. A : MRI image showing a normal brain - B: MRI images of the brain illustrating significantly activated areas in the cingulate cortex [Source: A: Novaksean, CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0>, via Wikimedia Commons [Source B : Landgrebe et al. NeuroImage 41 (2008) 1336-1344). Publication : https://doi.org/10.1016/j.neuroimage.2008.04.171]

The mechanisms leading to this state are not **elucidated** [15]. We will only discuss here the issue of perception. The influence of psychological and societal parameters on symptom **perception** and **judgment** is known. An increased sensation of tactile stimuli (electrical impulses) has been repeatedly described in EHS subjects. It is also exacerbated in non-EHS subjects after watching a disturbing film about waves, particularly in people who tend to perceive bodily symptoms as intense, disturbing and harmful. On the other hand, a functional MRI study [16] (Figure 3) comparing EHS and non-EHS subjects showed that **false exposure** to RF waves resulted in **activation** of the same brain areas as real pain in EHS subjects [17]. The authors also reported that a similar response was observed in subjects hypersensitive to chemical odors with simulated exposure. These results seem to provide an interesting basis for future research in scientific psychology and neuroscience, in addition to the search for specific markers, which has so far been inconclusive [18].

5. Patients in search of recognition

People who claim to suffer from EHS and are supported by **associations** have a strong demand for recognition of their condition, but also of the fact that waves are the cause. They are also **targeted** by actors who take advantage of the situation by selling equipment supposedly protecting them from waves [19], field strength measurement devices, etc. In the absence of objective confirmation, the problem is regularly transferred to the judicial arena [20]. The outcome of a few court cases in favour of the plaintiffs is seen as recognition. The court decision is often presented as proof that the waves cause symptoms [21]. In conclusion, EHS **suffer from real pain without** scientific studies showing a **causal link between the symptoms experienced and exposure to waves**.

Notes and references

Cover image. [Source: Vincent van Gogh, Public domain, via Wikimedia Commons]

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