

Effects of Extremely Low Frequencies on Human Health

Theoretical explanations, statistical evidence and possible applications

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Abstract— Transmission and evolution of genetic transmitted diseases seem to be clearly associated with solar activity. This could be explained by the influence of geomagnetic variations in intercellular communication through sodium-potassium pump, affecting both neural network activity and development and the replication of mitochondrial DNA. The causal mechanism would be the interference of Schumann resonance intensity oscillation on suprachiasmatic nucleus cells communication and subsequent alterations of melatonin/serotonin secretion and/or balance. Extremely Low Frequencies implicated could not only be the determinant for the disease transmission and development but a key element of new therapies and prevention strategies.

Keywords-component; ELF; Schumann Resonance; genetical disease; mental disorders; autism; geomagnetism; solar activity; energy medicine.

I. EXTREMELY LOW FREQUENCIES AND EVIDENCES OF THEIR INFLUENCE ON HUMAN HEALTH

The atmosphere protects us from the main damaging effects of solar and cosmic radiation. However, the interactions of such radiation with Van Allen belts cause alterations in the Earth's magnetic field [1]. Solar activity and cosmic radiation in form of Gamma Ray Bursts (GRB) excites these electromagnetic pulses, altering their intensity [2]. Intercellular communication takes place by way of little electric pulses that flow due to a difference in potentials (ions) resulting from the sodium-potassium exchange that happens in the sodium and calcium channels through cell membranes [3]. This electrochemical flux can be interfered by electromagnetic waves from the environment in much the same way that a metal detector can interfere with a pace-maker, affecting adults, infants and embryos in formation, provoking all kind of illnesses [4]. Calcium ion efflux has been proved to be altered between 0.5 and 30 Hz [5] and effects of environmental Extremely Low Frequencies (ELF) on brain functioning are widely documented [6] and tested with healthy humans [7]. This would be caused specifically by the above cited interference, operating in the area between the hypothalamus and the pineal gland, with the subsequent alteration of melatonin /serotonin secretion and/or balance, causing autoimmune diseases, mental disorders, immune deficiency and vascular crisis [8]. ELF affect intercellular communication in a particular part of the hypothalamus, the suprachiasmatic

nucleus (SCN). SNC works at an average frequency of 7.83 Hz, the same frequency at which the Earth emits electromagnetic pulses, known as Schumann Resonance (SR). This biological link to environment is presumed to act as a chronobiologic mechanism or *Zeitgeber* [9] or, even further, considered in the long term as source of genetic diversity and adaptability [10] [11].

II. METHODOLOGY

We crossed the data involving solar activity with the prevalence, by month and year, of the different pathologies considered. We selected, for each of them, the most affected age group or the age cohorts tending more toward hospitalization before they began to be affected by high mortality rates (approximately 54 to 60 years in most cases). Depending on each particular disease, the moment of conception or the post-birth period was considered. We obtained data from the National Aeronautics and Space Administration (NASA) database on solar activity and Spanish statistics regarding hospitalizations. The whole population studied is around 3.5 million people, from which we extracted subpopulations according to diagnosis and age group. We used as well data about infant mortality by age and cause, both provided by the National Spanish Institute of Statistics (INE).

III. RESULTS

First of all, we crossed the data pertaining to the number of deaths in the first two years of life due to cancer with solar activity by month (with a 12 month lag period—nine for pregnancy plus three for the illness to develop and lead to death). In Fig. 1, we can observe the correlation (0.86). We had only data for deaths within the first two years of life, but not for children affected by cancer in general. It would be necessary to confirm whether children of other ages follow the same pattern. The results for this and other illnesses are shown in table 1.

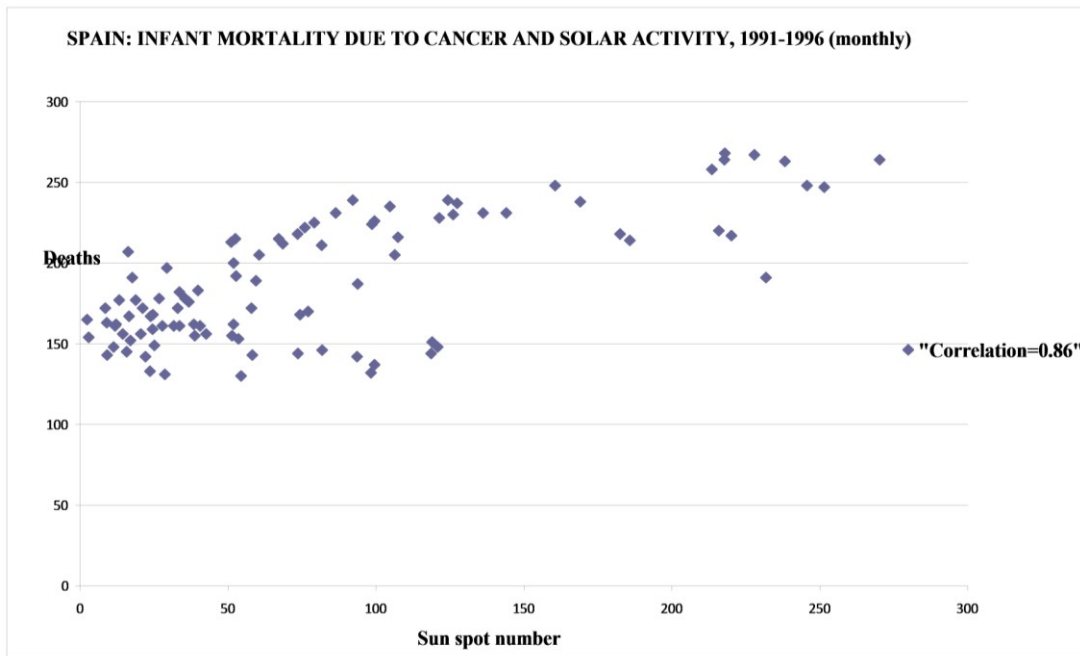


Figure 1

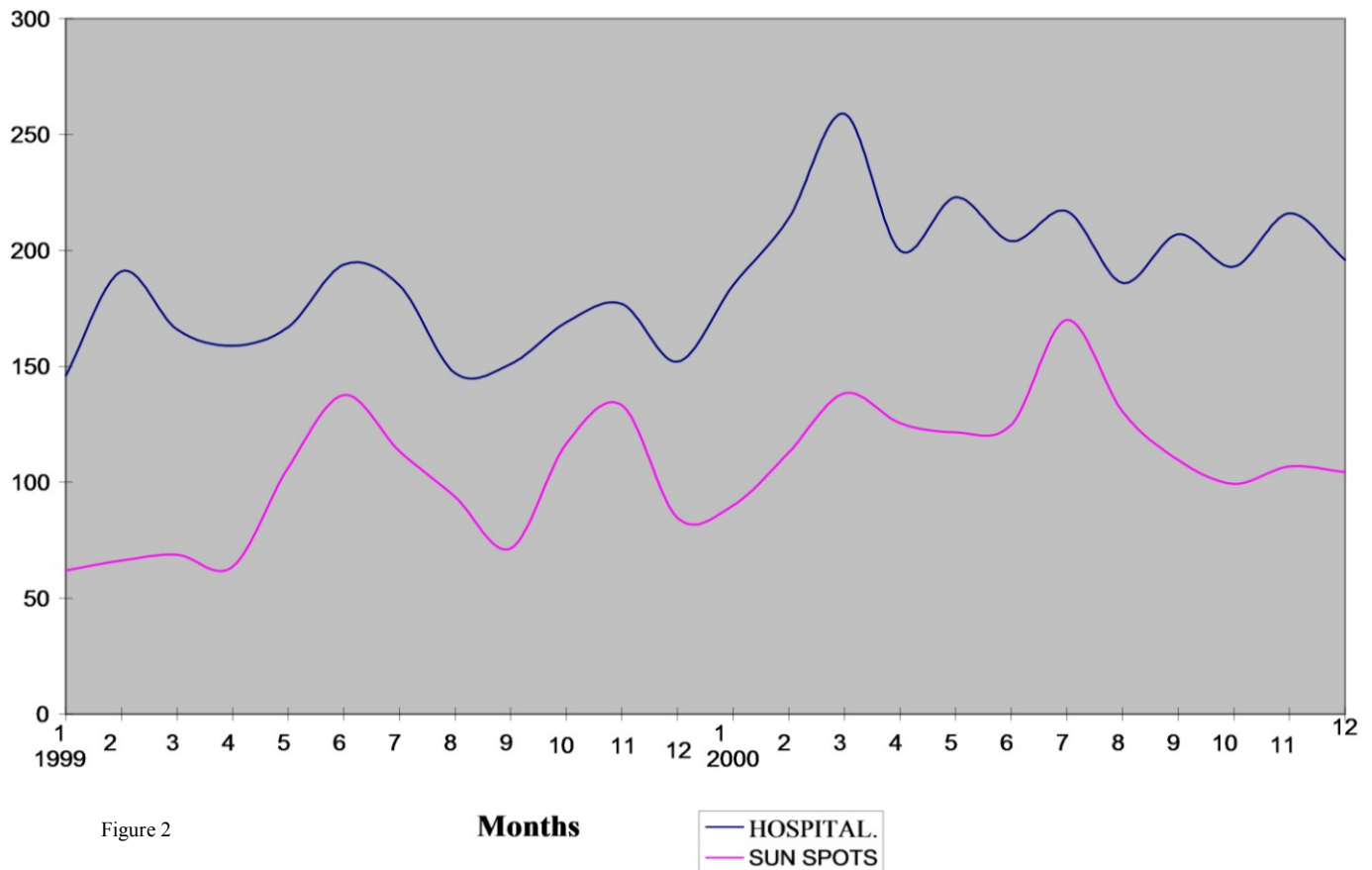
Table 1: Correlation between genetically transmitted diseases and solar activity at estimated month/year of conception

DIAGNOSIS	BY MONTH		BY YEAR	
	Coef. Corr.	(N) Population	Coef. Corr.	(N) Population
Alzheimer's	0.64	(4504) Hospitalizations 1999-2000	-0.85	(278) 51-60 Born 1930-1939
Infant mortality due to cancer	0.86	(15252) Deaths 1992-1998		
Congenital anomalies	0.50	(807) 0-2 Born 1998-1999	-0.56 ^a	(836) 54-60 Born 1939-1945
Breast and colon cancer	0.67	(1238) 54-60 Born 1939-1945	0.80	(1361) 54-60 Born 1939-1945
Sclerosis	0.42	(509) 20-30 Born 1969-1979	0.88	(525) 20-30 Born 1969-1979
Schizophrenia	-0.43	(1137) 54-60 Born 1939-1945	-0.89	(1137) 54-60 Born 1939-1945
Diabetes (mellitus)	-0.82	(382) 9-13 Born 1987-1990	-0.62	(1727) 9-20 Born 1979-1990

Source: INE and NASA

^a In the case of genetic anomalies we could only detect the correlation by month of conception during the first year of life (when most detection occurs). After that age, correlations become distorted by mortality rates. That is why at 54-60 years of age, the correlation is negative.

SPAIN: SOLAR ACTIVITY AND HOSPITALIZATION – ALZHEIMER’S, 1999-2000



In the case of Alzheimer’s disease, the findings are revealing. The correlation coefficient was 0.64 and the synchronicity, evident (Fig. 2).

When examining possible effects of solar activity at the time of conception on the incidence of Alzheimer’s (as manifested at ages 51-60), an inverse correlation (-0.85) is found. This could explain how solar activity could play a role in the early etiology of the disease but may work, as well, as a factor inducing crisis in old age.

We chose breast and colon cancer because they are generally considered to be mostly genetically transmitted. The correlation between the number of people with these diagnoses and solar activity (at the estimated month of conception) is 0.67. The correlation is clearly more significant if calculated by estimated year of conception (0.8). This difference has to do with the proportional error due to assigning a ‘normal’ period of nine months (or one year) before birth. In fact, the population considered is not exactly the same depending on the time criteria used to select cases (N=1,238 by month and 1,361 by year). The error is higher if we estimate the month of conception rather than the year.

Sclerosis, generally detected between twenty and thirty years of age, shows the same pattern (with a correlation

coefficient of 0.42 by estimated month of conception and 0.88 by estimated year of conception).

In the case of schizophrenia, we found highly significant correlations as well (-0.43 by estimated month of conception and -0.89 by estimated year of conception). Notice that in this case we have the same population, so the difference is due to the estimated time of conception by month. It is relevant to observe the incidence of cases by month and appreciate the clear link to low solar activity one month before birth (Fig. 3).

Another example of an autoimmune disease, diabetes, also shows significant correlations (-0.82 by estimated month of conception and -0.62 by estimated year of conception). Subjects were divided into two groups, one between the ages of nine and thirteen (age of detection of the disease) and the other between nine and twenty (age of the development of the disease).

In the case of autism, we used information dating from 1995 obtained from a local database which was provided to us by a research support team pertaining to the Spanish educational system. In this way, we were able to determine the exact month of birth and estimate the month of conception of

SPAIN: SOLAR ACTIVITY (AT ESTIMATED MONTH OF CONCEPTION) AND SCHIZOPHRENIA, 54-60 YEARS (1999)

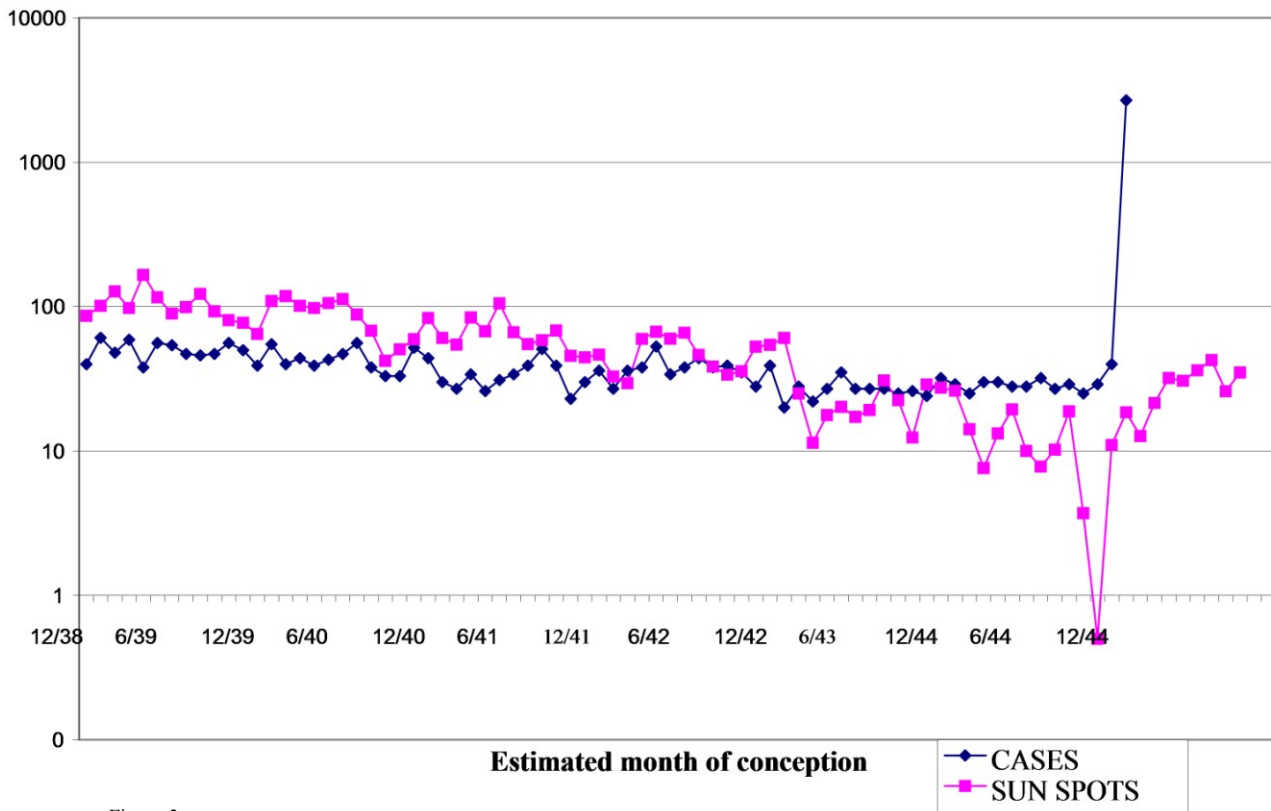


Figure 3

each subject. However, we found a negative correlation (-0.83) between the Solar Flux Index and autism in the first year of life. This led us to the conclusion that solar activity affects babies just after birth. The number of cases of autism correlates positively with cosmic radiation (0.9), but we are unable to discern whether these effects are produced by way of low solar activity (which is our main hypothesis) or high levels of cosmic radiation (there is an inverse correlation between both kinds of radiation of -1). A recent study carried out with a panel of patients during sixteen years [12] shown a significant correlation between solar activity and bipolar disorders. In addition, recent genetic research [13] reveals that bipolar disorders, autism, and schizophrenia share many genes. Our main hypothesis is that they all react in a very similar way to solar activity; although schizophrenia is related to neurological development before birth while developmental disorders are associated with solar activity after birth, showing different kinds of neurological development depending on the timing within solar activity cycles. According to this hypothesis, the cases of autism used to collect our data were analysed qualitatively. We found that those born in the year 2000 (solar maximum) had language disorders, while those born in 1995

and 2004 (solar minimums) had mainly psychomotricity problems. The pattern shows a probable relationship between stages in brain development and the ages most affected by the extremes of solar cycles. Analysing the variety of disorders within families affected by Asperger, we noticed *high performance* in those born in years of solar minimums, and *mental retardation* (linked to language development) in those born in years of solar maximums. Those born in the *in between years* did not show any relevant peculiarities in their mental development. Our sub-hypothesis is that the autistic spectrum works just as a bipolar disorder would do at early ages, either by accelerating or slowing down neurological functioning of the central nervous system as early discovered by other researchers [14]. A research with data from 1980 to 2010 (including 61 millions cases of hospitalisation) is being carried out in this moment with the assistance of the Chronobiology Institute of Minnesota. However, we have no further data to present in this regard for now and we hope other studies will attempt to replicate our findings and extend our understanding of these dynamics.

IV. DISCUSSION

In the present study, significant statistical correlations were found between solar activity and the prevalence of some autoimmune diseases and mental disorders. We feel that this pattern of interaction should be studied further by experts in epidemiology using more in-depth databases. Our hypothesis is that these effects have to do with the oscillations of natural electromagnetic fields and their interference in the ion exchange between cells, by way of the sodium-calcium channel, affecting the current functioning of the sodium-potassium pump in the SCN area.

In the case of mental disorders, a special sensitivity to electromagnetic fields [15] within the brain wave range (0.5-30 Hz.) could affect brain functioning and that expected as normal development. We suggest that these disorders fluctuate within the time frame of solar cycles, showing different symptoms depending on the ages at which people are first affected by maximum and minimum solar activity. We feel that future research should continue to examine the relationship between the diagnosis of autism, schizophrenia, and bipolar disorders within the framework of developmental disorders, bearing in mind a possible common link to solar activity.

V. APPLICATIONS

The study of ELF and their effects on human health could allow us, in theory, to prevent the development of and implement the early detection of at least the diseases mentioned in this article, potentially saving many lives and resources. A scientifically based treatment should bear in mind the effects of solar radiation on sensitive population and subgroups with certain genetic peculiarities; alternative and/or complementary treatments should also be considered, such as isolation from electromagnetic radiation sources and the possible generation of a controlled electromagnetic environment [16]. In fact, the first hypothesis that guided our research involved the effects of low frequencies on a group of autistic children under treatment to eliminate heavy metals [17].

We think that the key in mental disorders with a common genetic component has to do with how the flux of ion interchange between neurons is affected by ELF, an effect which has already been tested by NASA [18]. In the process of our research, we have not found there to be many reliable clinical trials on this topic, although there is a suggesting theoretical work made by James Oschmann [19] about the possible medical applications of electromagnetism and other energies. We can also refer to several studies carried out about the effects of transcranial magnetotherapy with depression [20]; [21] and schizophrenia [22]. Finally, we experienced an unexpected success with *alternative* therapies when used binaural beats at the range of Schumann resonance and its harmonics in a few children with language disorders. We witnessed an extraordinary change in one girl who used them by chance (she was intended to use it as a relaxing tool). From the first session, she started to understand and speak more fluently, to express emotions and verbalize them and changed

all the items in her room that suddenly she considered *childish* (she was 10 then). Her logopedist reported the change to parents without having been informed previously about the *therapy* or the change seen by her own parents. The logopedist herself used it then with two more children with similar language disorders and reported noticeable changes, but, for now, we do not know how far the use of these therapies can be generalised.

Although our study might be inconclusive it seems consistent enough to suggest that future studies should be carried out under controlled conditions.

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