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ELECTROMAGNETIC BIOCOMPATIBILITY AT WORKPLACE : PROTECTION PRINCIPLES, ASSESSMENT AND TESTS.
RESULTS OF AN EMF PROTECTIVE COMPENSATION TECHNOLOGY* IN HUMANS AND IN ANIMALS
* Tecno AO technology

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ELECTROMAGNETIC BIOCOMPATIBILITY AT WORKPLACE : PROTECTION PRINCIPLES, ASSESSMENT AND TESTS.

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## Summary - Part 1

**The existing safety guidelines governing the exposure of the public to multi-frequency electromagnetic fields of the kind associated with mobile telephony and computer screens (VDU) only protect against adverse intensity effects of microwave and ELF-VLF fields. Even if more stringent limits were to be imposed on the intensity, the ability of living (but not dead) systems to respond to aspects of a field other than intensity - specifically properties allied to its wave nature - makes this fundamental principle of intensity limit inadequate. The way of guaranteeing any protection against non-intensity aspects - e.g. non-thermal microwave and ELF effects - is to redirect attention away from attempts to regulate the field towards devising ways in which the resilience of the living organism under irradiation can be increased, so that an adequate degree of biocompatibility with an aggressing electromagnetic field can be maintained, thereby permitting the emitting device to be used with a greater degree of safety than is possible at present.**

## ELECTROMAGNETIC BIOCOMPATIBILITY AT WORKPLACE : PROTECTION PRINCIPLES, ASSESSMENT AND TESTS (§ I, II, III)

§ I.

*Living systems are electromagnetic instruments of great and exquisite sensitivity*, and thus vulnerable to being interfered with by corresponding exquisitely delicate external electromagnetic influences. For although they have developed an immunity to *natural* electromagnetic radiation - such as that from the Sun - this does **not** extend to that of technological origin. For the latter has a crucially important discriminating property, namely **coherence** - a concept that is familiar in the context of lasers, whose light - due to its coherence - is particularly pure in frequency. The coherence of technologically produced electromagnetic radiation

significantly enhances its potency to affect living systems - a potency which, however, depends very much on the *frequency* of the radiation.

This frequency sensitivity arises because living systems themselves support a variety of highly organised (**coherent**) electrical activities, each characterised by a different frequency, which play an important role in the control and organisation a living organism [1]. Exposure of the living organism to external radiation of the same frequency can result in an (resonant) amplification of an *endogenous* coherent activity - perhaps to a dangerously high level ; on the other hand, if the frequency is *close* (but not equal to) the endogenous activity, it can result (*via* interference) in the degradation of this activity, and with it any bio-control reliant on it.

Thus the natural (endogenous) coherent activity 'preconditions' the living organism to have a high sensitivity to external coherent electromagnetic radiation, no matter how weak. This is illustrated by the well-known ability of a light flashing at a certain frequency (between 15 and 20 times per second) to induce epileptic seizures in certain susceptible people. It is not the brightness of the light (*i.e.* its intensity), but rather the (coherent) *regularity of its flashing* that is the harmful aspect.

The microwave signals used in the GSM system of mobile telephony similarly "flash" (217 times/second) - with a low frequency modulation that lies in the range of the important *alpha brainwaves*. Given that light and microwaves are simply different varieties of electromagnetic radiation (differing only in their frequency and degree of coherence), there is no reason to suppose that the deleterious effect of a flashing *visible* light does not extend to ***microwave radiation*** flashing at an equally low frequency.

Less well known is the fact that living systems themselves support *another* kind of organised (coherent) electrical activity, the frequency of which happens to fall in the ***microwave*** band [2], to which the GSM carrier frequency belongs! Again, just as relatively slowly flashing radiation can affect neurological processes characterised by a similar frequency, so living systems ***also*** have a preconditioned sensitivity to ultra-weak ***microwave radiation*** - either through resonance effects, or by its ability to 'switch on' an internal microwave activity which Nature did not intend to be on [3].

**§ II .**

It is thus apparent that existing safety guidelines, which address effects dependent only on the intensity of the field - specifically, in the case of microwave irradiation, *heating* -do **not** protect against effects allied specifically to the **wave** nature of the radiation, such as its frequency, *(phase)* coherence, etc; clearly there is 'another side of the coin' to be taken into account. Sensitivity to these latter effects, however, depends on the organism **being alive** (since it is through its vitality that it is 'sensitised' - just as a radio has to be switched on before it can receive a signal); effects due solely to intensity, by contrast, do **not** require the organism to be alive - *i.e.* are **not** specific to a living system. Thus existing safety regulations neglect to take into account the most discriminating feature of all - namely the **"aliveness"** of the organism!
In turn, whilst the aliveness "opens" the organism to certain features to which it would not otherwise be sensitive, it also means, however, that the occurrence of any particular non-thermal effect *cannot be predicted to occur with the same absolute certainty* as that with which (intensity-based) thermal effects can. For the occurrence of even the primary initiating interaction cannot be predicted with certainty, since it depends on the 'aliveness' of the irradiated organism, which, in general, ***varies from person to person!***

Thus statements to the effect that *'there are no established health hazards of radiation of sub-thermal intensity'* are fundamentally flawed, since, unlike thermal effects, only the **possibility** of such hazards can be meaningfully spoken of [4]. It is thus clear that effects not allied to intensity inevitably 'slip through the net' of existing safety guidelines, which, of course, raises the question as to how a more comprehensive level of safety might be ensured.
Before considering this, it is necessary to assess the status of evidence - both theoretical and experimental -

consistent with the potentiality of living organisms to be adversely affected by ultra-low intensity radiation.

*Firstly*, it is to be noted that the preconditioned hypersensitivity of adequately metabolising living organisms to ultra-weak microwave radiation of a particular frequency is a *quite* general prediction of modern biophysics [2], reflecting the self-organising ability of open, dissipative systems in the non-linear regime far from thermodynamic equilibrium, whereby once the rate of metabolic energy supply exceeds the rate at which the system can turn it into heat, a certain fraction of this energy is (non-thermally) channelled into a highly organised (coherent) collective vibration of the whole system, wherein it is *sto*red and effectively protected against dissipation - the frequency of this vibration being in the **microwave** band.

*Secondly,* much experimental evidence has accumulated over the past 25 years that is consistent not only with the existence [5] of this endogenous microwave activity, and with associated non-thermal, highly frequency-dependent influences [4] - such as, for example, alterations in the growth rate of *E.coli* [6] and yeast [7], synchronisation of cell division [8], the 'switch-on of certain genetic processes [9], alteration in the activity of important enzymes [10], *etc*, - but also with the fact that *other* organised electrical activities in quite different frequency ranges, such as brainwaves [11], can likewise be influenced in a non-thermal way by external fields (amplitude) modulated to a similar frequency; in addition, there are numerous reports of other non-thermal influences of the radiation of the kind used in mobile telephony, such as effects on human blood pressure [12], depression of the immune efficiency of human leukocytes (white blood cells) [13], increases in the permeability of the blood-brain barrier [14], increases in calcium efflux from brain tissue [15], and most dramatically, a significant increase in the mortality of chick embryos [16].

Apart from possibly preventing the microwave radiation from switching on some particular non-thermal effect, simply reducing further the level of allowed intensity, either by legislation or by using a screening device of some kind, is pointless - particularly with respect to any *magnetic* fields associated with low frequency modulations of higher frequency carrier waves since, under the conditions in which a mobile phone or VDU is normally used, such fields are effectively *unscreenable;* a certain minimum intensity is, in any case, necessary in order that a mobile phone can operate at all!

**§ III .**

The hopelessness of this situation clearly mandates a **fundamental reappraisal** of the whole problem of protection against the electromagnetic pollution emitted by the ever increasing number of technological devices of all kinds - not just mobile phones and VDUs. It is clearly necessary, if *non*-intensity effects are to be successfully dealt with, to shift attention away from the external aggressing field (only the intensity of which can be regulated) *to the organism that is being irradiated.* If we cannot do anything to regulate the radiation (other than its intensity), then it becomes necessary to consider how the living organism can be protected, so as to be able to withstand the electromagnetic pollution **without** sustaining deleterious effects on its health.
Clearly then, it is necessary to extend the domain of competence of existing safety guidelines to include the essential new dimension of ***electromagnetic biocompatibility*** [4].

Thus, to deal with adverse effects of *electromagnetic* pollution - other than those connected with its intensity - it is necessary to develop a kind of preventative *electromagnetic* pharmacology that in some way strengthens the immunity of the human organism against those effects that *cannot* be **regulated** - for example, by helping to maintain the integrity of the alpha rhythm of the brain in the face of external electromagnetic aggression.

Rather than attempting to shield against, or nullify any externally aggressing electromagnetic 'pollution', a biotechnology [named Tecno AO : A(lpha) O(scillator) ] appears to work by increasing the body's resilience against possible deleterious side-effects of this pollution attributable to properties of the associated electromagnetic fields *other than* their intensity. Tecno AO electromagneto-bioprotective technology (international patent) is a passive autonomous magnetic oscillator (8-12 Hertz ; 100-150 fT) made of a double

antenna filled with an electromagneticcally treated saline solution [17]. The living organism is submitted to the simultaneous exposure of the magnetic compensation emission of the specially organised hyperweak electromagnetic field - provided by a device.

It has been suggested that this resilience effect is achieved by strengthening and maintaining the coherence of the alpha activity of the brain - the importance of which to the control of the human organism is well recognised [1] - and by maintaining ion-protein links against the disruptive effect of the external radiation; in this way, '**electromagnetic biocompatibility**' is promoted.

Under the influence of an externally aggressing field, such as that from a VDU screen or a mobile telephone hand-set, the device emits an extremely weak - but *coherent* - magnetic field of extremely low frequency (*ELF*), the dominant frequency component of which lies within the range of the alpha brain-wave activity. *It should be noted, however, that the strength of the emitted magnetic field is vanishingly low in comparison with that of the external fields which it helping the body to combat.*

Notwithstanding its experimentally established efficacy [18] the credibility of the device would be greatly enhanced were it possible to understand how it might possibly work - it being necessary, in the first place, to understand how a living organism can discern a magnetic field as weak as that emitted by the device, which is actually comparable to that emitted by the brain itself!

To date, the only suggestion [19] has been in terms of the *torsion fields* that are currently attracting attention. Before embarking on such considerations, however, it seems worthwhile to ascertain whether the possibilities offered by recent developments in biophysics have been fully exhausted - in particular, those in which the aliveness of the system under consideration plays a **crucial** role *ab initio.*

As noted above, [3, 4], living systems have the ability to store significant amounts of energy (either of metabolic origin, or absorbed from an external irradiating field) in certain *supra-thermally* excited vibrational modes. Not only does this sensitise them in the ways described above, but it also means that living systems can function as *macroscopic **quantum** systems* [20]. Consequently, quite novel possibilities exist of sensing and, in turn, responding to vanishingly small external **magnetic** fields - such as that emitted by the TAO device - *via* a field known as the ***vector potential***, whose *variation* in space and time determines, respectively, the associated magnetic and electric field *intensities;* accordingly, the underlying vector potential can be significant even when the associated electric and magnetic fields are arbitrarily small, or *even vanishing*! The ability of a vector potential (associated with which is no magnetic field) to influence a living system is dramatically illustrated by its effect [21] on the development of *Drosophila* embryos.

The efficacy of the *(ELF) Tecno AO technology* in establishing electromagnetic biocompatibility with VDUs and mobile phones, which operate at highly discrepant frequencies, empirically indicates the bio-importance of *low frequency modulation* in the case of the latter - specifically, that at 8Hz, which as mentioned above, *lies in the range of the brain's alpha activity.* VDU screens, by contrast, emit a *very much wider* range of frequencies. It has recently been established by laboratory experiments [22], however, that it is the lower frequencies, which are the most deleterious to health.
The potency of low frequency modulated electromagnetic radiation to *(non-thermally)* induce adverse health effects derives from the ***information content*** of the incoming signal (i.e. its regular pulsation) - as opposed to its energy content - i.e. its intensity.

**Conclusion**

It must be concluded that it is really only possible to protect - by way of safety guidelines and devices employing some kind of screening - against effects which are in some way dependent on field *intensity,* although only in the case of effects **not** allied to the *aliveness* of the organism can such protection actually be guaranteed; for, as has been argued at some length elsewhere [4], the intensity threshold required to achieve

the switch-on of a certain non-thermal effect in a living organism depends on the **state** of the organism at the time of irradiation: it is thus ***not a uniquely defined quantity***. Accordingly, in such cases, and *a fortiori* in the case of effects not dependent on intensity *at all* - such as **resonant** responses to both *MW* and *ELF* fields - *a radically new, and more comprehensive approach to protection is mandated*, if the undoubted benefits of contemporary telecommunication and computer technology are to be enjoyed with a higher degree of safety than is possible at present. Given the virtual certainty that, having experienced these benefits, society will never renounce its dependence on this technology, the development of such a new approach to protection is a matter of the highest priority. The nature of the protection required, in conformity with the considerations of the implications of aliveness, is encapsulated in the new concept of **'electromagnetic biocompatibility'**.

The Tecno AO EM technology must be considered to be in the vanguard of a new generation of bioprotection that conforms to this electromagnetic biocompatibility principle - its efficacy being intimately allied to the very 'aliveness' of the human organism whose well-being it helps to maintain in an ingenious and novel way.

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## RESULTS OF AN EMF PROTECTIVE COMPENSATION TECHNOLOGY* IN ANIMALS AND IN HUMANS

**Professor M. Bastide ; Dr. B. J. Youbicier-Simo ; Dr. L. Faivre-Bonhomme ; Dr. R. Coghill ; Professor M. Miyata ; Dr. J. Catier ; Professor T. Canavan ; M. Fillion-Robin ; Dr. J.-L. Marande ; Mr. J. Jukes ; Professor D. Clements-Croome**

**Summary - Part 2 -**

**The practical applications of this electromagnetic biocompatibility concept have been experimented through several university research programmes in animals and in humans - (I) in immunology, (II) neuroendocrinology, (III) embryogenesis, (IV) haematology, (V) in human immunology, (VI) ophtalmology, (VII) neurologie, (VIII) neuropsychology, (IX) psychophysiology, (X) clinical study - using a magnetic oscillator(*) which compensates the harmfull effects of the field emitted by actual computer screens and cellular phones. The assessment of the protection given by the compensating emission shows that the EMF of actual VDUs and mobile phones are harmfull for the health of users and that it is possible to make them electromagnetically biocompatible by the use of specific EM compensation technology (* named Tecno AO).**

### IN ANIMALS

**I. - II. In Immunology and Endocrinology : Effects on corticosterone - melatonin - IgG responses in chickens**

Extracts from : 'Bioeffects of continuous exposure of embryos and young chickens to ELF emitted by desk computers : protective effects of Tecno AO antenna.'
and from : 'Biological Effects of Continuous Exposure of Embryos and Young Chickens to Electromagnetic Fields Emitted by Video Display Units.'

**III. In Embryogenesis : Effects on embryo hatching (from VDUs and cellular phones irradiation)**

Extracts from : 'Damage to chicken embryos exposed to EMFs from mobile phone : protection by a compensation antenna.'

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**Introduction**

In 1989, Dr BJ Youbicier-Simo who is specialist in Neuro-immuno-endocrinology at the University of Montpellier (France), conceived an avian model, with the aim of investigating the fonctional interrelationships between the immune and neuroendocrine systems, as well as the involvement of both systems in the regulation of stress. Especially, Dr Youbicier-Simo studied the ability of juvenile chickens (intact, immunodeficient or immunodeficient and supplied with immunoenhancing endogenous compounds) to respond hormonally and immunologically to antigen challenge. The endpoints were hormone levels (ACTH, corticosterone, melatonin), pineal enzymatic activities (NAT, HIOMT) and antibody titers (IgM, IgG). This

research was funded during four years by the pharmaceutical industry and was achieved in collaboration with Madeleine Bastide, who is Professor Emeritus and head of the Laboratory of Immunology at the Faculty of Pharmacy, University of Montpellier (France). A Ph.D. dissertation was completed (1) and four publications issued from this work (2, 3, 4, 5). The chicken model was chosen for the study of stress because the avian embryo is easily accessible and can be easily immunodeprived at an earlierstage of development (3 days of age).

Since 1993, the same model has been extensively used to investigate the potential for Electromagnetic radiation given off by actual communication devices such as video display units and cellular telephones, to induce biological stress in vivo. The idea was to address the issue of the safety of the electromagnetic fields (EMFs) generated by the incriminated devices for human beings in real use conditions. Fertilized chicken eggs were chronically exposed to the radiation during embryonic development. Then embryonic mortality, as well as hormonal and immune parameters were assessed in the surviving brood. The data obtained with Video display units showed that chronic exposure was toxic for embryos and was associated with hormonal and immune disturbances in juvenile chickens (6, 7) Trials with operating cellphones indicated a very high mortality rate among exposed embryos (60% vs 14% for the sham-exposures)(8). When an actual GSM cellphone signal was split into its carrier (microwaves) and modulating (low frequency: ELF) components - by means of copper gauze immune to microwaves but transparent to low frequencies -, embryonic mortality was even worsened (76%), as compared to what observed with full cellphone signal (60%).To date, in vivo studies are rather scant that have been carried out using actual VDU devices or cellphones. Most studies are with field generators with selection of specific frequencies and intensities. Thus the full spectrum of commercially available devices cannot be assessed for their potential biological hazards.

During this 6 year study, endeavours were made to protect exposed organisms from the deleterious effects of electromagnetic radiation. This was achieved by simultaneous exposure to an hyperweak magnetic compensatory signal, intended to make an initially stressing EM radiation biocompatible for the exposed living organisms (7, 9). This compensatory emission is provided by a device, that is an autonomous magnetic oscillator (8-12Hertz ; 100-150fT) termed Tecno AO technology, internationally patented as an electromagneto-bioprotective technology.

**Materials and Methods**

The tested devices were either video displays units (TV sets or computers at MPR2 standard) or GSM cellular mobile telephones. Fertilized eggs were incubated (38±1°C, 40-50% humidity) and issued embryos experienced different electromagnetic treatments with the tested devices, continuously during embryonic life (21 days). In the trial with video display units (TV sets or computers), the eggs were placed 0.5-0.8 m from the source of EMFs.
Three groups of embryos were studied : the sham-exposed control group, exposed to switched off devices the exposed group, exposed to operating devices; the protected group, exposed to operating devices with Tecno AO oscillator installed. Embryonic mortality was evaluated by candling the eggs at the age of 3, 5,7,9,11, 13 and 21 days. Juvenile chickens were repeatedly immunized with porcin thyroglobulin and hormonal (corticosterone, melatonin) and antibody (IgG) responses at different point times (20,29, 35, 38 and 47 days of age). The body weight was also measured. The data were processed by the Mann-Whitney test. The experiments were blind and each one was replicated three times. The results are expressed as mean for three experiments. In the study with the cellphone, the eggs were placed on a platform 5 cm below the cellphone. In addition to aforementioned 3 groups, two other samples were studied: the " safety test group ", exposed to the Tecno AO oscillator alone, in order to assess the safety of Tecno AO compensatory emission by itself; the " low frequency test group ", exposed the low frequency component (modulating ELF fields) but not to the microwave component (carrier frequency) of an actual GSM cellphone signal. The cellphone signal was split into its two components by means of copper gauze (350 µ mesh) immune to microwaves and transparent to ELF fields. Embryonic mortality was evaluated at the age of 3, 5, 7, 9, 11, 13 and 21 days (ED3, ED5, ED7, ED9, ED11, ED13, ED21).

## Results

The results are expressed as total death rate registered at ED21 and Tecno AO oscillator protective efficacy is derived from total death rate. In the study with video display units, total death rate was 10-33%, 47-68% and 10-28% for the sham-exposed, exposed and protected groups respectively. The compensation oscillation effectively protected the embryos with 60-78% efficacy. Corticosterone and melatonin levels, as well as and antibody titers and body weight were markedly decreased by EMF exposure. Once more, the Tecno AO antenna could fully compensate these disruptions: 100% for corticosterone; 102% for melatonin, 105% for antibody titer and 93% for body weight. The results are summarized in the table below. In the study with cellphones, the mortality rate with full signal was very high (60% vs 14% for the sham-exposures) and surprisingly, the modulating frequency (ELF) alone appeared more harmful (76%) than whole radiation spectrum (with MW).Conversely, total death rate was only 27%, 16% in the protected and safety test groups respectively. The compensation oscillator effectively protected the embryos with 74% efficacy.

**Efficacy of Tecno AO electromagnetic compensation emission on hormonal and immune responses and body weight**

| | Corticosterone | Melatonin | IgG | Body weight |
|---|---|---|---|---|
| Control | 6.0 ± 0.2 | 49.0 ± 2.0 | 5.0 ± 0.3 | 741 ± 14 |
| Exposed | 2.5 ± 0.1 | 4.0 ± 0.5 | 2.8 ± 0.2 | 659 ± 16 |
| Exposed/Protected with Tecno AO | 6.0 ± 0.3 | 50.0 ± 4.0 | 5.1 ± 0.5 | 717 ± 21 |
| TPE* | 100% | 102% | 105% | 93% |

*The Tecno AO antenna protective efficacy (TPE : %) was calculeted for each test point where noticeable variation occurred (D29, D35, D38). The data represent mean ± SEM.[a]P<0.01 vs D20 ; [b]P<0.01vs Exposed

**Embryo mortality**

| | Cellular Telephone | VDU |
|---|---|---|
| Control | 14% | 18% |
| Exposed | 60% | 54% |
| Exposed/Protected by Tecno AO | 27% | 29% |
| Tecno AO alone (safety group) | 16% | |
| Group with microwaves schielding *(*)* | 76% | |
| Group with 'Microshield' device *(*)* | 77% | |

*(* low frequency test group)*

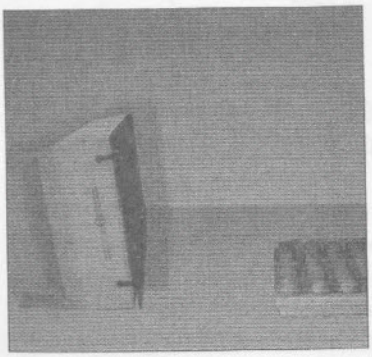
## Discussion

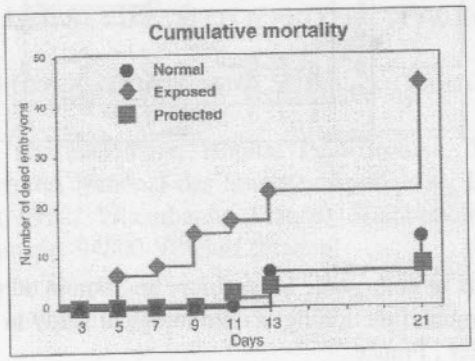
Together, these data demonstrate that EMFs given off by the tested communication devices are stressful and toxic for chicken embryos, as well as for derived young chickens. Microwave modulation by ELF fields seems crucial for the induction of stressful effects by a typical GSM cellphone signal. These results are in line with findings by different investigators (10, 11, 12, 13). Extrapolation of present data to humans might appear as being excessive. However, one must keep in mind that the biochemical processes underlying embryonic development are similar in virtually all the species. This argument is sustained by examples found in scientific literature. For example, Goldhaher and colleagues (14) found 80% increase in abortion among pregnant women working with computers.The hyperweak compensatory signal emitted by Tecno AO antenna was able to significantly reduce all the polluting effects subsequent to VDU and cellphone exposure, so that the latter communication devices were made biocompatible for the users. We can say that the Tecno AO devices that we have tested - (two different applications of the same patent, each one adapted to the specific EM pollution

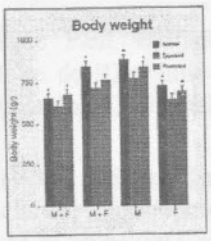
either for VDUs or for cellular telephones) - efficiently and safely protects the embryos and young chicken from EMF damage.

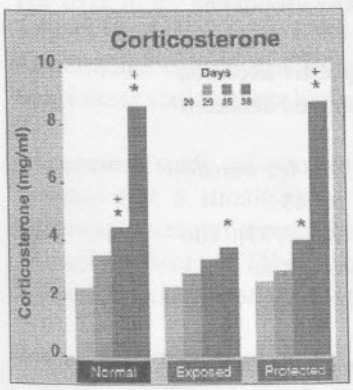
## Conclusion

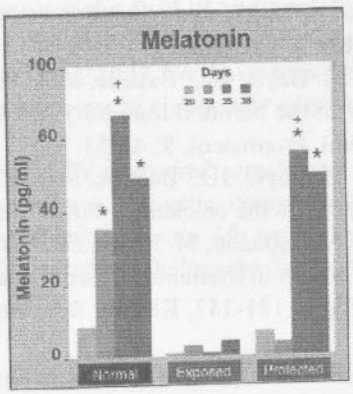
The present EMF-sensitive chicken model is simple, not time expensive and looks suitable for testing the safety of any EMF radiating device available on the market, as well as the efficacy of any device claiming to protect from EM pollution. In the analysis of the EM pollution, instead of trying to establish a link between the general polluting EM environment and grave deseases like cancer or leukaemia, we focused on the observation of the stress process, - that can occur in any healthy living organism. We have also chosen to work on prevention topic, with the aim of making man-made EMFs biologically compatible.

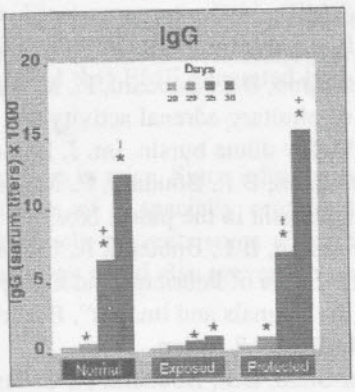


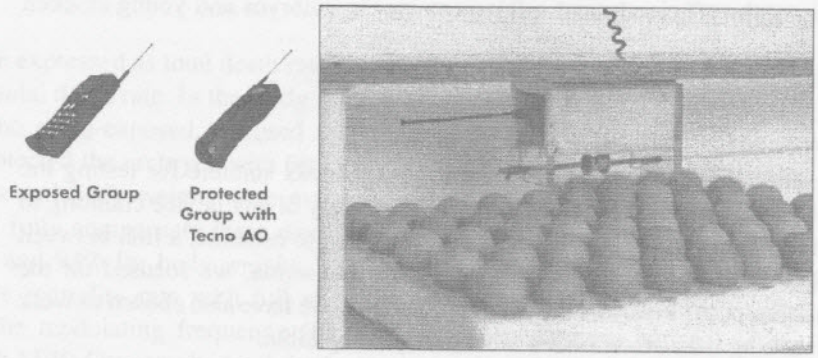


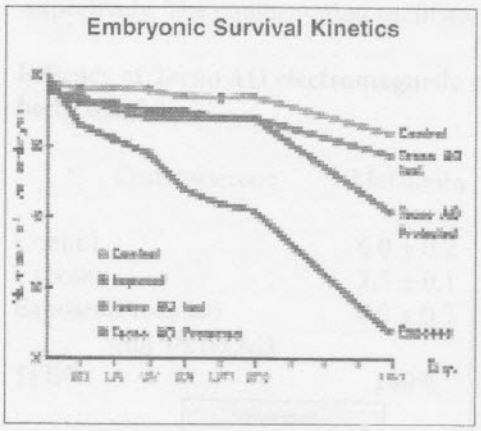



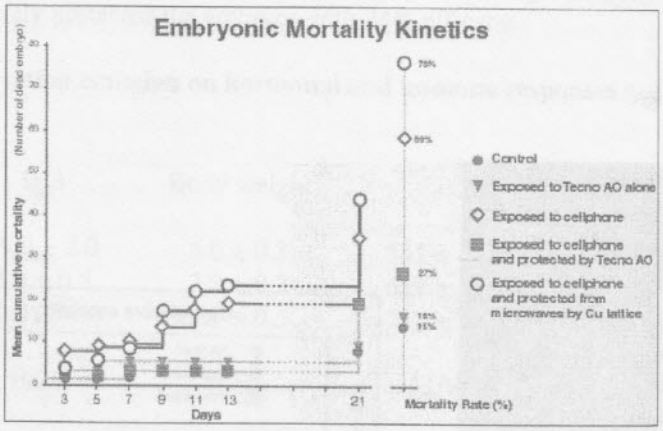



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## IV. In animal heamatology

## HAEMATOLOGICAL ALTERATIONS OBSERVED IN MICE PLACED IN FRONT OF A COLOR TELEVISION SCREEN : A PARALLEL STUDY WITH A PROTECTIVE EQUIPMENT

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### Introduction

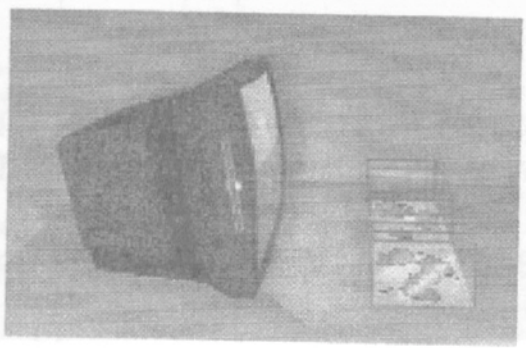
It has been shown both experimentally and clinically that heamatological parameters may be modified when one lives in the middle of an electric magnetic field of various frequencies. Electromagnetic fields (EMF) emitted by video display units (TV or computer) increase embryonic mortality, alter humoral immunity and its hormonal control and reduce body weight (1). We have personally observed that EMF generated by a transformer station alters biological parameters of chronically exposed mice (2).

Our present study concerns alterations of TV exposure haematological parameters in mice. Since it has been reported that a simultaneous exposure to a magnetic compensation emission of a specially organised hyperweak electromagnetic field - provided by Tecno AO technology - effectively prevents some adverse biological effects of TV exposure (3), we tested whether the Tecno AO technology could also prevent those haematological alterations.

### Material and methods

4 week old Swiss male mice (from the breeding center of Olivet France) (n=9) were placed at a distance of 20 cm of a TV screen 5 days/week, 9 ± 2 h a day during 106 days, in transparent plastic 21x14 cm cages (2 cages). Another group (n=9) was placed in the same conditions with the tecno AO protective equipment. The exposure system was a TV set (Waltham 230 V, 50 Hz, 35 cm diagonal screen).
Measurement of the magnetic field strength was performed with a Mag check 50+ USA. We measured it in all three dimensions and calculated the sum of the squares. The square root of the sum was the result of the three partial measurements.

The magnetic field was spatially homogeneous within the cage. The magnetic field was 0.8 μT in front of the cage and 0.23 μT its back. TV was left on stand by after exposure (0.03 μT).
The control group (n=9) was placed in another room under identical light, noise and temperature conditions except for the magnetic field which was below 0.01 μT.
The geomagnetic field in the exposure room was 572 milliGauss (Geo-magnetometer BPM 2001 Bio-physic Mersmann D5471 Wassenach). The light value was 400 lux (lux-meter L x 101. Bioblock France).The electric field at 50 Hz was 30 V/m in the center of the cage for the exposed groups and 3 V/m for the control group. (EFM 130 Electric field measurement stocbridge MA 0266 USA.
Hematological parameters (total leukocytes and differential leukocyte counts) and body weight were measured at days 0, 21, 56, 106. Blood was taken by retro-orbitral puncture (200 μl) always at the same time in the morning.
Blood samples were analysed with a Sysmex NE 1500-10A (Medical Electronics Japan) and included erythrocyte counts (RBC), absolute leukocytes (WBC), mean corpuscular hemoglobin concentration (MCHC), mean corpuscular hemoglobin (MCH) hematocrit and platelets.
Differential leukocyte counts were carried out after May-Grunwald-Giemsa staining of the sides (200 cells/mouse).



**Results**

On day O : there was no statistical difference in hematological parameters or body weight between the groups. Later on at different times of the study, there was no significant difference in body weight between the three groups.
On day 21 : (when mice were 7 weeks-old) erythrocytes, hemoglobin and hematocrit values were higher in the exposed group than in the control or in the exposed protected ones. (Table 1)
On day 56 : (when mice were 3 months-old) in the exposed and exposed protected groups, the MCHC values were higher than in the control group. In the exposed group neutrophils counts were lower than those of the controls, and monocyte counts lower than those of the exposed protected group (figures 1, 2, 3, 4). The lymphocyte of the exposed-protected group were significantly higher than those of the controls.
On day 106 : after 3 months exposure, for the exposed group, hematocrit and MCH values were lower than the controls. In the exposed group, MCHC was significantly higher than in the control and exposed-protected groups.
Neutrophil counts were lower in the exposed than in the control group and monocytes lower than those of the exposed protected or control groups.

**Discussion**

When mice were exposed during their young age and later on to a TV screen electromagnetic field emitted by a TV screen, modifications of hematologic parameters were observed.
Differences between the haematological values of the group were mostly visible after 56 and 106 days of exposure. Monocyte and polynuclear values appeared to be the most affected. Values of the exposed mice were statisticaly lower than control ones on day 106, while values of the exposed-protected ones were significantly greater.
The protective equipment showed some efficacy. When the values of the exposed mice were compared to

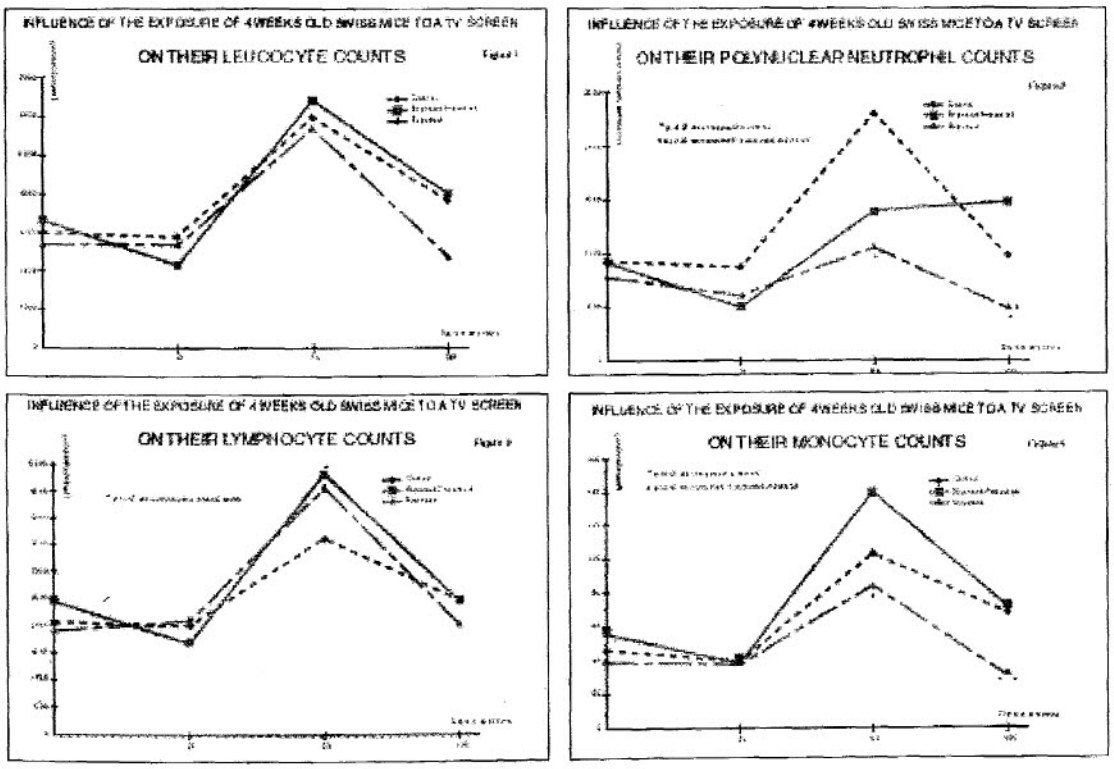
those of the control mice, there were 11 modifications, while when the values of the exposed protected mice were compared to those of the control mice, there was only two changes (lymphocyte and MCH increase on day 56) : this can be taken as a sign of protection.

**Body weight and haematological data from swiss mice exposed to a TV screen (mean values ± (SD)**

| | Day 0 | | | Day 21 | | | Day 56 | | | Day 105 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CONT (n=2) | EXP.P (n=2) | EXP (n=2) | CONT (n=2) | EXP.P (n=2) | EXP (n=2) | CONT (n=2) | EXP.P (n=2) | EXP (n=2) | CONT (n=2) | EXP.P (n=2) | EXP (n=2) |
| Erythrocytes 10^12/L | 6.5 ± 0.9 | 6.5 ± 1.1 | 6.1 ± 0.8 | 6.54 ± 0.9 | 6.5 ± 0.6 | 8.18 ± 0.5* (1-2) | 8.11 ± 0.7 | 8.37 ± 0.9 | 8.02 ± 0.65 | 8.79 ± 0.4 | 8.48 ± 1 | 8.459 ± 0.8 |
| Hemoglobin g/dl | 13.2 ± 1.2 | 13.8 ± 1.4 | 12.7 ± 1.2 | 11.3 ± 1.3 | 11.0 ± 0.9 | 12.66 ± 0.9* (1-2) | 14.8 ± 1.3 | 15.3 ± 1.5 | 15.1 ± 0.8 | 14.8 ± 0.6 | 13.8 ± 1.5 | 13.4 ± 1.3 |
| Hematocrit % | 40.6 ± 6.8 | 39 ± 3.4 | 36.4 ± 5.4 | 33.2 ± 5.4 | 35.2 ± 3.2 | 44.5 ± 3.9* (1-2) | 43.4 ± 4.5 | 42.6 ± 4.4 | 41 ± 3.7 | 45.7 ± 2.1 | 42.5 ± 4.1 | 41.8 ± 4.2(1) |
| MCH pg | 20.6 ± 1.5 | 20.9 ± 1.2 | 21 ± 1.4 | 17.3 ± 0.8 | 16.9 ± 0.5 | 16.8 ± 0.5 | 18.8 ± 0.7 | 18.8 ± 0.6 | 18.7 ± 0.9 | 16.8 ± 0.8 | 15.8 ± 0.5 | 15.8 ± 0.6(1) |
| MCHC g/dl | 32.8 ± 3.1 | 34.9 ± 4.1 | 35.2 ± 2.8 | 29.7 ± 2.6 | 31.1 ± 0.6 | 30.7 ± 0.96 | 34.8 ± 1.6 | 35.4 ± 1.1(1) | 37 ± 2(1) | 31.8 ± 0.9 | 31.8 ± 0.9 | 32.7 ± 0.4(1-2) |
| PLT | 1066 ± 301 | 1206 ± 303 | 1156 ± 339 | 614 ± 257 | 585 ± 91 | 649 ± 154 | 1029 ± 325 | 1136 ± 494 | 1321 ± 170 | 670 ± 233 | 842 ± 330 | 544 ± 206 |

Student T test *p<0.05 *=compared to exposed group, *(1)=compared to control group, *(2) = compared to exposed-protected group

CONT= control group EXP.P = exposed-protected group EXP = exposed group

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## RESULTS OF A EMF PROTECTIVE COMPENSATION TECHNOLOGY* IN HUMANS

### V. In Immunology

### PROTECTIVE EFFECT ON HUMAN PERIPHERAL BLOOD LYMPHOCYTES OF AN EM OSCILLATOR (TECNO AO) AGAINST ADVERSE EFFECTS OF CELLPHONE RADIATION. *(In progress)*

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**Summary**

The cell model chosen was the lymphocyte because of its easy availability and its well characterised importance to immune defence against infection and in tumour oncostasis. Moreover there are a large number of studies reporting sensitivity of lymphocytes to biophysical agents, including electromagnetic fields and radiations.

The adverse effects on human peripheral blood lymphocytes of RF/MW exposure from cellphones was first verified. Viability of lymphocytes following exposure to the Tecno AO oscillator was tested by trypan blue exclusion. It was found that the device had a significantly protective effect against overnight exposure to electromagnetic fields and radiations from a mobile phone on standby, compared both with cellphone-exposed cells not exposed to the device, and with controls.

**Materials and Methods**

Human peripheral blood lymphocytes were isolated from 20ml fresh whole blood drawn from vena cubitale into anti-coagulated vacutainerrs (Becton Dickinson, EDTA, K3), transported into four 5ml sterile test tubes, and differentially centrifuged at 450g. The serum was removed for heat inactivation, and then the buffy coat was detached by micropipetter with as little disturbance as possible of the red blood cells and platelets, which were discarded. The collected buffy coat (approx. 2ml) was mixed with an equal amount of density gradient Ficoll-Triosil prepared according to standard procedures, and centrifuged for 5 minutes at 800g. The lymphocytes were removed as the layer between the density gradient and the remaining serum, which contained the platelets. The pellet was resuspended in balanced saline solution with added glucose, and washed twice by centrifugation at 100g for five minutes. To the final pellet was added a culture medium (RPMI-1640 plus antibiotics and antimycotics). The medium was divided into three samples and one of these were exposed to a device known as Tecno AO. Another sample was not exposed to the device, whilst the other served as control.
One Tecno AO-exposed sample and one unexposed sample were placed in separate mu-metal boxes and then exposed overnight to a Philips 301 mobile phone on standby, by means of a separate 30cm gold wire leading into the box. For the same period one sample was placed in a separate mu-metal box, into which separate but adjacent gold wires were introduced, but kept in a separate room and not near the cellphone. The final (third) sample was enclosed in a mu-metal box and then placed inside a double skinned mu-metal container for the duration of the experiment and maintained at 20 C.

On the day following exposure the cells were mixed sequentially prior to counting with trypan blue dye left

for 15 minutes and then counted double-blind in a haemocytometer (Brightline, Hausser-Scientific) in accordance with the method recommended by the suppliers (Sigma-Aldrich Co., Poole Dorset, UK). At least 400 cells were counted from each sample. After counting the codes were broken and the results analysed statistically.

**Preliminary results**

| | Control group | Exposed group with Tecno AO | Exposed group without protection |
|---|---|---|---|
| Total of observed lymphocytes per group | 2659 | 435 | 566 |
| Viable | 1027 | 96 | 75 |
| Non viable | 1632 | 339 | 491 |
| **% viability per group** | **38.62 %** | **22.06%** | **13.2%** |
| **% viability compared to control group:** | | **58 %** | **39%** |

Comment : The effect of the tecno Ao device afforded some protection against these radiations even two days after cessation of the RF / MW exposure.

**VI. In Ophthalmology**

**DAMAGE OF OCULAR FUNCTION BY VDU WORK**
**PROTECTION BY A COMPENSATION ANTENNA, TECNO AO.** *(Publication in progress)*

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**Object**

The object of the study was to assess the protective effect of Tecno AO against ocular function disorders such as corneal injury( Keratitis, estreme fatigue of accommodation, etc.

**Materials and Methods**

10 individals (10 healthy females, 20 eyes, without contact lenses, aged between 22 and 30 years) performed VDU work using a video game (CRT) continuously for 4 hours. The magnetic and electric fields at a distance

of 1.2 m from the screen were 58 nt and V/m (Genitron).
First Measurements session (A) : before starting the test with VDU and after 4 hours of video game play.
Second measurements sesion (B) : After 1 week, the Tecno AO antenna was installed on the VDU, measurements were made before the test was started and immediately after 4 hours of video game play.
Examination of corneal injury with a slit-lamp microscope using fluorescein dye.
Refraction examination by automatic measurement of refraction angles.
Near point of accomodation was examined by the Ishihara method near point measurement repeated 10 times.
Accommodation response against step stimulus repeated 10 times. (Right eye only)
Near sight pupil response against step stimulus repeated 10 times.

**Results**

There were obvious differences the first session (A) and the second (B), which took place after the group was protected with Tecno AO.
Scores of corneal injury (keratitis) after VDU work were (A) 1.400+0.955 and after VDU work with the protection of the device (B) 0.700+0.733. This data shows a significant difference of p.0.016
There was no difference between (A) and (B) regarding eyesight and far point.
Extension tendency of the near point was 0.083+1.169D (A) and 0.980+1.496D (B). These data show a significant difference of p.0.041
Speed of relaxing time was 0.827+1.11 (A) and -0.69+1.05 (B). These data show a significant difference of p.0.006.
Near sight pupil response for (A) : response disorder 6 eyes, no change 2 eyes, diffusion of pupils 4 eyes, contraction of pupils 1 eye
and for (B) : response disorder 2 eyes, no change 6 eyes, diffusion of pupils 2 eyes.

**Discussion**

The very significant difference between the amounts of corneal injury caused by VDU with and without the Tecno AO device indicates the protective effect of this device against corneal injury. Also, the ELF emitted by CRT screens seems to be a major factor in the development of corneal injury.
The result of the extension tendency of the near point when Tecno AO is used suggests that the device suppresses the extreme fatigue of the accommodation activities entailed in VDU work. The pupil is under autonomic control and its diffusion and contraction are considerd to be abnormal responses for an autonomic nerve.
The results for the near sight pupil response suggest that Tecno AO can prevent the disorder.

**VII. In human neurology** *(In progress)*

J. Catier, Clinical Neurophysiology Department, Avignon Teaching Hospitals (France)

**Introduction**

Measurements of effect of VDU non ionising radiation on brain activity and measurements of the corrective effect from a molecular magnetic oscillator emitting compensating ELF at ultra low intensity ( tecno ao antenna) Differencial analysis using quantified electroencephalograms of VDU working individuals. Analysis of the magnitude of alpha and beta waves and the effect of electromagnetic stress from a viewing screen on the latter; analysis of the change in the "total power" of the brain activity with Tecno AO ELF emitter restoring through a resonance effect the alpha rhythm of the brain.

**Material and method**

Quantified electroencephalograms on medical office secretaries working several hours a day on a computer were performed in two stages : Baseline on Friday=D 0 control electroencephalograms after several hours of computer work without electromagnetic protection; the following Monday =D+ 3 installation of the Tecno AO protection on the secretaries'computer. Second series of electroencephalograms on Friday=D +14 after several hours of computer work protected with Tecno AO since Day D+3

**Preliminary results:**

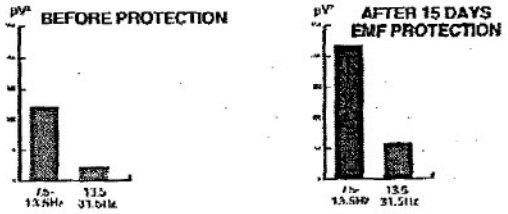
A marked increase in "total power" was observed for the closed eye, open eye and especially the SLI at 20 hertz sequences, on the total band of 0.5-31.5 hertz, and on the alpha (7.5 and 13.5 hertz) and beta (13.5-31.5 hertz) bands. Overall, it is a two fold increase ; in terms of the consistency levels for the posterior electrodes, a substantial improvement at the end of the tests for the same selected frequency bands primarily for the closed eye sequences and especially the SLI one.

Compared total power

| | | | | |
|---|---|---|---|---|
| With no protection on the computer: | alpha 123μ $V^2$ | beta 19,9μ $V^2$ | S.L.I.20Hz | 16,2μ $V^2$ |
| After 15 days with Tecno AO : | alpha 217 μ $V^2$ | beta 53,4 μ $V^2$ | S.L.I.20Hz | 20,9μ $V^2$ |

**Discussion**

The insignificant magnitudes measured at D=0, for the individuals tested prior to protection are the sign of chronic stress . The highly significant improvement of the EEG graphs after 14 days with the protective emitter demonstrate that the stress was of electromagnetic nature, therefore by emitting compensating ELF at ultra low intensity through a resonance effect, Tecno A.O. allow to eliminate this state of stress, objectified particularly by Alpha x 2 magnitude, Beta x 3 magnitude and an improvement of the consistency level. The differential analysis shows VDU disturbing stressing effect on the brain.




**VIII. In neuropsychlogy**

Extract from : **INVESTIGATING THE PSYCHOLOGICAL EFFECT OF TECNO AO ON VDU USERS.**

B.Hayes, K. Molloy under supervision of Prof. T. Canavan
University of Luton, Luton , UK

**Materials and Methods**

This experiment will attempt to determine any differences in mood between those using VDUs with electromagnetic compensating emission from Tecno AO antenna, and those without.
This experiment used an independent subject design. There were 2 groups, an experimental (Group 2), who had a Tecno AO antenna near their VDU screen, and a control (Groupl) who did not. The independent variable

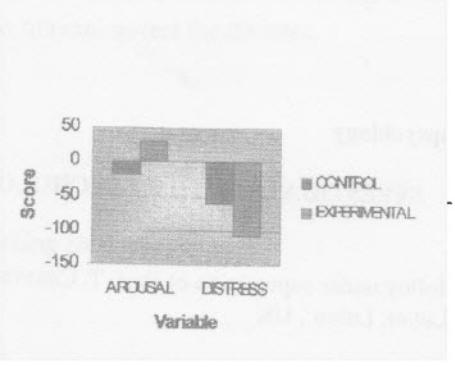
was exposure to the VDU screen with or without a device, and the dependent variable was the participant's arousal and distress as measured by scales in the Mood test.
100 undergraduates from the University of Luton, naÔve to the experimental design, with 50 in each group took part in this experiment. The participants were an opportunity sample of volunteers and were unaware of which group they were allocated to.
The computer centre at the University of Luton, with a large number of computers and VDU screens, was used as the location for this experiment. A number of VDU screens were left as normal, in one half of the room, whilst the rest were fitted with the Tecno AO Antennae. The devices were placed underneath the monitors, such that they were out of view, and in some cases, due to the design of the screen, they were placed behind them. Over a period of 2 weeks, Mood tests, in the form of questionnaires, were handed out to computer users in each group, at random. The questionnaire (12 parameters) was based on the one used in a study by Peveler and Johnston (1985). Participants had to mark along a visual analogue scale, (which was a 10cm line ranging from definitely do not feel to definitely feel) how they felt. The random trials ensured that + uneasy - peaceful - relaxed - calm.

**Results**

The mean score for each variable in each condition was calculated. The analysis shows that there is the greatest difference between the mean scores for Alertness, with Group 2, the experimental group with antennae, feeling on average 12.7% more alert than the controls. The second greatest difference extraneous variables were controlled, such as a particularly hard day in terms of assignments, as well as ensuring that a time of day effect did not occur. Once 50 sets of data for each condition were collected, the devices were removed from the monitors, and a debriefing notice was placed in the computer centre. The participants' responses were then measured and their scores converted to percentages, e.g. 6.5cm point on the line for relaxed was recorded as 65% relaxed. The variables were combined according to the formula provided by Peveler and Johnston (1985)
Arousal = alert + energetic + lively - sleepy - sluggish - drowsy.
Distress = worried + tense is in tension, with the experimental group feeling just over 10% less tense than the controls. The smallest differences lay in calmness, at just 1.6%. It should also be noted that on the variables measuring distress, the control group showed higher means than the experimental group, and on variables measuring arousal, the experimental group scored higher on average than the control group.
The variables were combined to give measures of arousal and distress. Table 1 below compares mean arousal and distress in the experimental and control group.

**Mean scores of AROUSAL and DISTRESS in each condition**

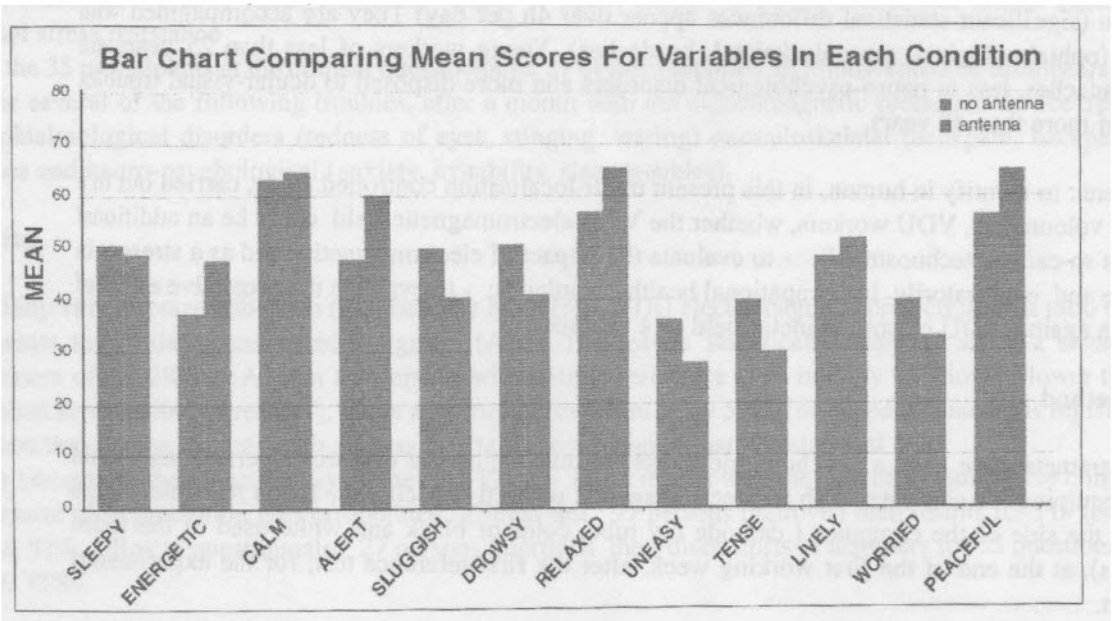
| Variable | condition | Mean |
|---|---|---|
| **AROUSAL** | No antenna | -18.1 |
| | Antenna | 30.0 |
| **DISTRESS** | No antenna | - 60.5 |
| | Antenna | -107.3 |




It can be seen that the mean arousal of the experimental group is higher than that of the control group. The mean distress in the experimental group is lower than that of the control group.
Inferential statistics
Independent t-tests were carried out to examine the significance of differences in means between the groups. When analysing the means for arousal and distress, again t-tests were used.

**Discussion**

The results show that the experimental group, those with the Tecno AO antennae, were significantly more alert ($p=0.009$) and less tense ($p=0.048$) than the control group. All the variables analysed were combined into the two formulae stated in the procedure, giving a mean score for arousal and distress in each condition. These scores showed that the expérimental groups were significantly more aroused ($p<0.033$) and less distressed ($p<0.03$) than the control group. This led to a rejection of the Ho on both occasions. It was concluded that:
HI: There was a difference in arousal between those who used VDUs with a Tecno AO antenna and those who used a VDU without an antenna ($t = 2.16$, $p< 0.033$, 2 tailed)
H2: There was a difference in distress between those who used VDUs with a Tecno AO antenna and those who used a VDU without an antenna ($t = 2.102$, $p<0.03$, 2 tailed).




The use of the compensation magnetic oscillator had a positive and immediate effect on the mood of VDU operators. With the device they are significantly more aroused and less distressed than users without it. It may be that compensating the EMFs has actually had a positive affect on people's mood rather than merely preventing a negative affect.

**IX. In psychophysiology**

Extract from : **IMPROVEMENT OF PSYCHOTECHNICAL PERFORMANCES AND STRESS RESISTANCE AFTER MODULATION OF THE VDT RADIATION BY AN OSCILLATING MAGNETIC FIELD* (Tecno AO : Magnetic Alpha Oscillator)**

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## Introduction

Working with video display units (VDU) more than two hours per day could be the source of several neuropsychological disorders (P.Loiret 1995). Smith and coll.(1981) and Johansson and coll.(1984) showed that the VDU users develop a higher level of stress compared with office clerks effecting similar tasks. Stress has also been shown to lower the efficiency of programmers (Zavala,1984)
Most VDU users show both emotional (irritability, anxiety, depression) and psychosomatical (insomnia, lack of appetite, perspiration) disorders (Amick 1992) .
The study "Work with video display units TEC-2" supervised by Loiret and coll.(1994) reports that the level of neuro-psychological disorders (irritability, anxiety, sleep troubles) of workers that stay at least two hours a day, continuously or discontinuously, in front of a display screen increases with the length of the presence in front of the screen (significant statistical differences appear over 4h per day) They are accompagnied with other complaints (ophtalmological, musculoskeletal, headaches). Young workers of less than 25 years are more prone to headaches, less to neuro-psychological disorders and more disposed to ocular-visual troubles than their elders of more than 45 years.

Our objectives were : to identify in human, in this present multi-localisation controlled study, carried out in a population of 119 volounteers, VDU workers, whether the VDU electromagnetic field could be an additional stress factor in the so-called "technostress"; - to evaluate the impact of electromagnetic field as a stressor in work performance and exploratorily in occupational health complaints; - to evaluate the protective effect of Tecno AO antenna against VDU electromagnetic field as a stressor.

## Materials and method

To study these parameters we used a psychometric stress test evaluating the operator's performance level before and after equiping the computer with an electromagnetic protective oscillator. Tecno AO antenna has been mounted at the side of the computer ( cathode ray tube, color or black and white used in the tested companies offices), at the end of the first working week, after the first reference test, for the experimental period of a month.

• Subjects surveyed in this study are 119 VDU workers of several French and Swiss Companies and Official Bodies, working at least two hours per day on computer : no other criteria as - age, sex, job responsability, profession, feelings of uneasiness or disconfort in front of the screen - has been used in the selection of the participants. Each of the 119 tested participants is his own control (Stoop Color test criteria)
• The psychometric test : STRESS TEST (Ed. Centre de Psychologie Appliquée, Paris) derived from Stroop Color-Word Test (Jensen A.R., Rohwer W.D. 1966 was used to assess the degree of stress resistance against interfering distractions before and one month after installing the EM protective device. The test consists of three exercises that estimates three variables: speed, vigilance and concentration.
The whole population (n=119) as well as two subgroups according to the degree of stress measured before the installation of the antenna were statistically analysed : the first subgroup (n=73) had a stress resistance lower than average, while within the second (n=46) the resistance was higher than average. The observed concentration score was compared to an ideal score proposed by the test authors, and based on a multiple regression estimation in which the independent variables were the scores obtained for speed and alertness (theoretical concentration = 0.16510* Speed + 0.48195* Alertness + 10.93454) Results are independent from learning effect (Jensen AR. 1965).
Additionally, a self-administered questionnaire, for evaluating development of complaints before and after a month, while electromagnetic protection was installed, was completed by 35 of the participants.

## Results

In the whole population (n=119), the mean ratio between the observed and ideal concentration scores before the experiment was 0.948±0.144 (Mean±SD), with a 95% CI: 0.92 to 0.97. Ratios below 1 indicate that the

person is less resistant to stress, while ratios above 1 indicate a higher resistance to stress. After the experiment it rose to 1.07±0.12 with a 95% CI: 1.05 to 1.09 and the mean individual gain was 14.9%±19.3 (p=0.0001, Student t test for paired observations), 95% CI:12% to 18%.
In the group less resistant to stress (n=73), the mean ratio between the observed and ideal concentration scores before the experiment was 0.86±0.11, with a 95% CI: 0.84 to 0.89. After the experiment it rose to 1.03±0.12, with a 95% CI:1.00 to 1.06 and the mean individual gain was 21.2% ±20.1 (p=0.0001, Student t test for paired observations), 95% CI:17% to 26%.
In the group more resistant to stress (n=46), the mean ratio between the observed and ideal concentration scores before the experiment was 1.09±0.07, with a 95% CI: 1.06 to 1.11. After the experiment it rose to 1.14±0.07, with a 95% CI: 1.12 to 1.16 and the mean individual gain was 5.1%±8.5 (p=0.0001, Student t test for paired observations), 95% CI: 2.6% to 7.6%.
Table 3. Statistic results of stress resistance Table 4. Mean change in psychometric test results Table 5. Individual stress resistance
Among the 35 participants at the clinical questionnaire, 27 of them reported an improvement or disappearance of one or several of the following troubles, after a month with the electromagnetic protection device Tecno AO : ophtalmological disorders (redness of eyes, stinging, tearing) musculoskeletal (neckpain, backpain), headaches and neuro-psychological (anxiety, irritability, sleep troubles).

**Discussion**

The initially very stressed subgroup (A1) benefits more from VDU electromagnetic protection (in a ratio of 4 to 1 against the initially unstressed subgroup (A2). The results statistically analysed show a sizeable improvement of 21,2% (for A1) for the persons with a stress resistance at an initially very low or lower than the standard level (called "stressed"), while a minor improvement (only 5,1%) of the performances is registred after protection for the persons with a stress resistance level higher than the standard (A2)
Globally compared, the objective psychometric STRESS TEST results with the data of the subjective clinical questionnaire after protection are corroborated : (Stress test : 97 persons improved their results for 119 tested ones, i.e. 81%. Clinical questionnaire: 27 persons improved their disconforts or disorders for 35 questionned ones, i.e. 75%)

**Conclusion**

That could mean that the stress state initially observed in clinical Medicine among the operators before protection is really related to the VDT radiation, unique factor which is modified by the presence of Tecno AO magnetic oscillator, everything beeing otherwise remained equal.
Ergonomics seeks to limit those factors known to cause fatigue and chronic stress during computer work. It does so by prescribing brakes, adapting ambient light, air humidity; and recommending appropriate sitting positions and screen optical quality. Dr. P. Loiret (in an 8 year study on 3000 VDU workers) has shown that after a threshold of two hours per day of VDU work, there is an observeable increase in neuropsychological disorders, ocular-visual affections and headaches.
In this psychometric study, the mean change in concentration scores in both subgroups was statistically significant (p=0.0001 Student t test), meaning that people less resistant to stress benefit more from VDU electromagnetic protection.
The results taken as a whole afford the possibility of identifying the stress effect from VDU radiation and show a significant improvement in stress resistance in the overall study population equipped with the electromagnetic protection antenna : VDU radiation could be a cause of what we suggest calling "electromagnetic stress".

**Table 4. MEAN CHANGE IN PSYCHOMETRIC TEST RESULTS**
(4 weeks after installation of Tecno AO antenna on the computer work station)

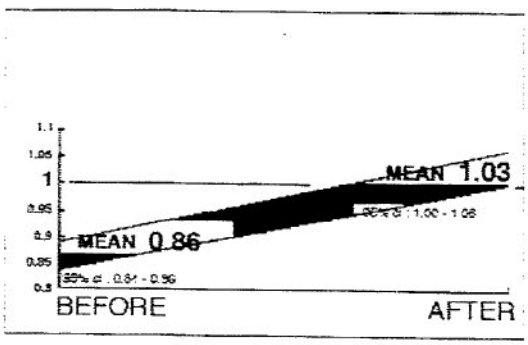
| | total group (n =119 individuals) | subgroup A1 (n=73 more stressed individuals) | subgroup A2 (n=46 less stressed individuals) |
|---|---|---|---|
| Increase in | | | |
| SPEED | +13% | +12% | +14% |
| ALERTNESS | +9% | +9% | +9% |
| CONCENTRATION | +23% | +30% | +14% |

**Table 3. STATISTIC RESULTS OF STRESS RESISTANCE**
(4 weeks after installation of Tecno AO antenna on the computer work station)

| | total group (n =119 individuals) | subgroup A1 (n=73 individuals) | subgroup A2 (n=46 individuals) |
|---|---|---|---|
| % IMPROVEMENT IN: | | | |
| RESISTANCE TO STRESS | +14.9% | +21.2% | +5.1% |

**STRESS RESISTANCE OF SUBGROUP A1 (N=73)**

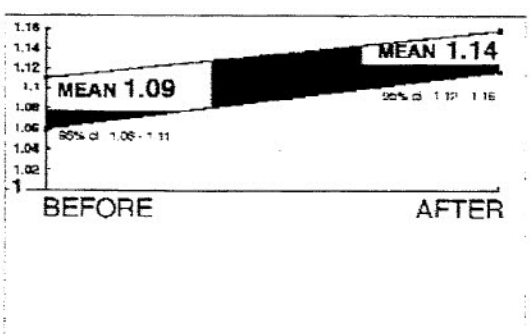
[A1 = 73 out of 119 studied cases were initially below (=more stressed than) the Stress Test standard]




**MAIN GAIN : + 21.2 %**

**STRESS RESISTANCE OF SUBGROUP A2 (N=46)**

[A2 = 46 out of 119 studied cases were initially above (= less stressed than) the Stress Test standard]




**MAIN GAIN : + 5.1 %**

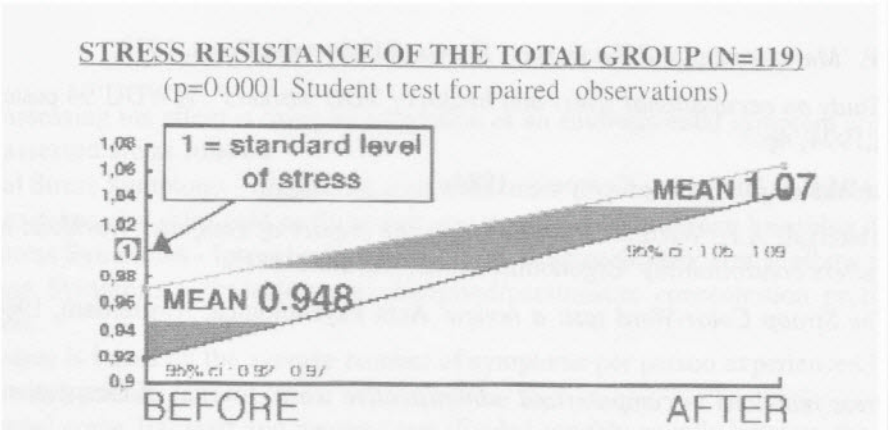
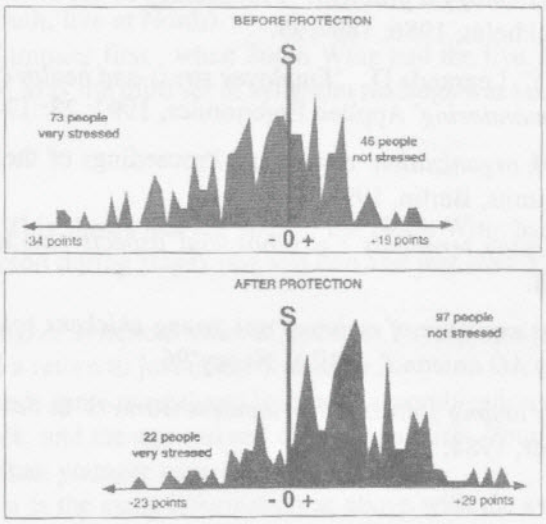



Table 5 . **INDIVIDUAL STRESS RESISTANCE**
(before and 4 weeks after installation of Tecno AO on the VDU)

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**X. In a clinical study**

Extract from : **DOUBLE BLIND CROSSOVER FIELD TRIAL OF THE EFFECTIVENESS OF TECNO AO : A TECHNOLOGY FOR PROTECTION FROM THE EFFECTS OF LOW FREQUENCY MAGNETIC FIELDS**

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**Optimum Workplace Environments Ltd

A double blind crossover field trial of the Tecno AO antenna device has been carried out at the Head Offices of the Southampton and South West Hampshire Area Health Authority.
This study is designed to assess the effect of the Tecno AO technology in a working office environment.

**Methodology**

The method of assessing the effect is using an adaptation of an environmental symptom scoring system .
The symptoms assessed are as follows:
1. Environmental Stress Symptoms - headaches; coughs/sneezes; dry, itchy, tired eyes; blocked or runny nose; tiredness/fatigue; itches, dry skin; cold or flu symptoms; dry throat; sore throat; breathing difficulties.
2. Ergonomic Stress Symptoms - lower back pain; shoulder pain; neck pain; arm & elbow pain;
3. General Stress Symptoms - irritable/tense; depressed/pessimistic; concentration problems; short term memory problems.
The scoring system is based on the average number of symptoms per person experienced by a group in any one two or four week period.
The study covered some 100 staff and management divided roughly equally between the two wings of the building(North and South Wings).
Stage 1: A symptom analysis was carried out on approximately 80% of the staff at the end of March to provide a base line. (see Table Stage 1= top line)
Stage 2: Two sets of antennae were fitted to all the VDU's in each wing, each had a different colour code. One set of antennae were dummies(North wing) and the other were live( South wing). At the end of April another symptom study was conducted. (Table : stage 2 =middle line)
Stage 3: the two groups of antenna were changed over. Whichever group had the live now had the dummy and vice versa (dummies at South, live at North).
In fact, North Wing had the dummies first , when South Wing had the live. But the assessors did not know which was which. At the end of May the third set of symptom readings was taken. (Table : Stage 3=down line)

**Results**

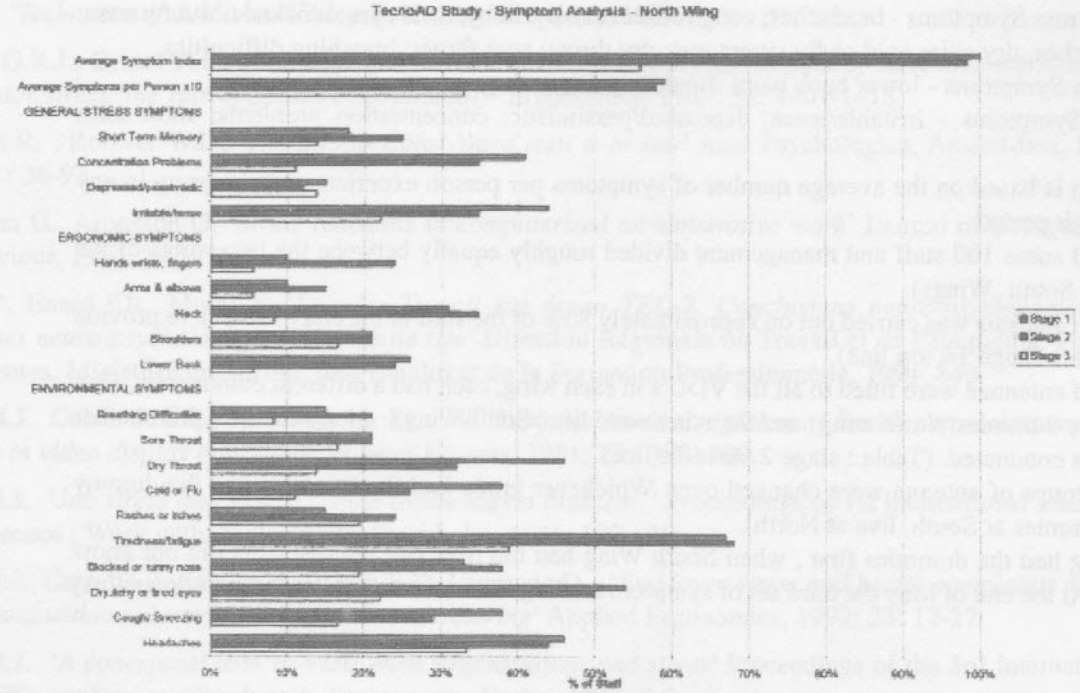
1. Average Symptom Score : This shows that the staff in the North Wing had an average symptom score of just under 6 symptoms per person during stages one and two and just over 3 symptoms per person for stage three.
The South Wing Staff have a higher symptom score of just over 7 symptoms per person and show a reduction to just over 5 in stage two and a return to just under 7 in stage 3.
The variation in symptom score is quite normal and is usually a combination of the variations in the building environment, nature of the work, and the age and sex of the population. Younger women for instance tend to have a higher symptom score than younger men.
2. Symptom Score Index : This is the same information as above with the symptom score for stage one for both North and South Wings assumed to be 100.
This shows that the North Wing symptom score reduced by 45% in stage three. The South Wing symptom score reduced by 27% in stage two and reduced to just under 5% in stage three.These results coincide with the symptom reduction range of 25-45% in the earlier smaller scale studies.
3. Percentage Improvement of Individual Symptoms : These results show that 23% of staff showed no reduction in symptoms; 40% of staff showed over 25% reduction in symptoms and 17% of staff showed a 100% reduction in symptoms.
4. Analysis of Individual Symptom Scores : This shows the distribution of individual symptom scores and shows the combined reduction in symptom scores for both wings from an average of 6.6 symptoms per person to 4.3, a reduction of some 36%. It shows a significant reduction in the high symptom scores i.e. 12-16 per person and an increase in the lower scores of 0-4 symptoms per person.

5. Symptom Analysis - North & South Wings

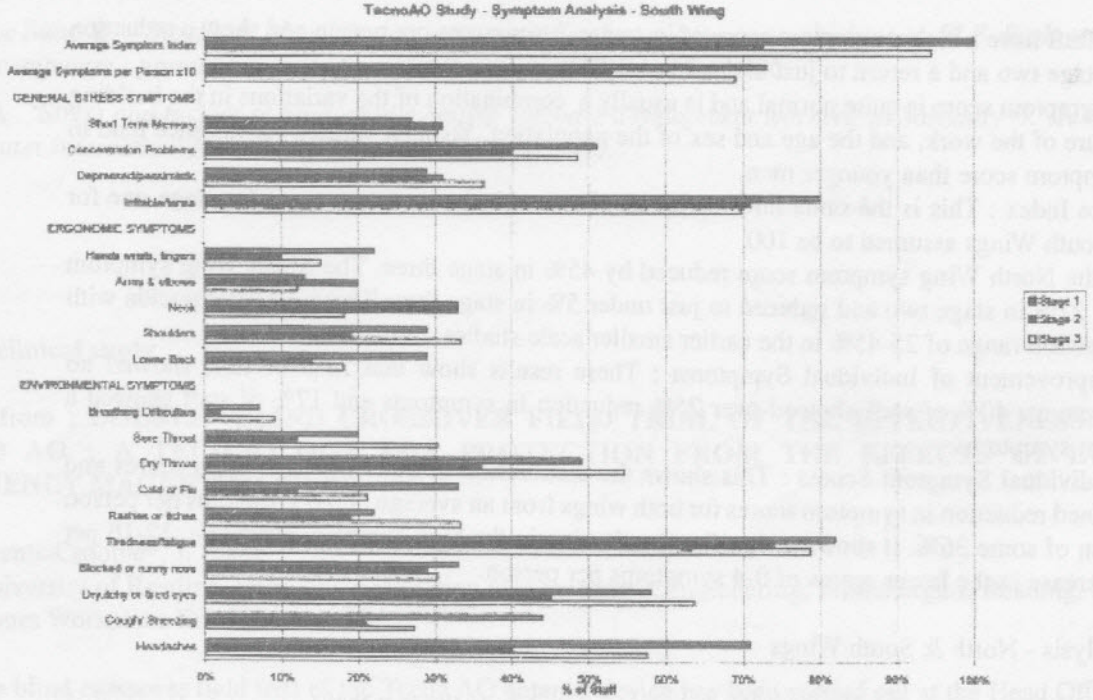
The basic similarities and differences between these two graphs relate to the fact that :
**in Stage 2** : the **North Wing** had the **dummy** antenna and the **South Wing** had the **live**
then the antennae were changed over and the situation reversed :
**in Stage 3** : **North Wing** had the **live** and **South Wing** had the **dummy**

On the following tables : Stage 1 = top line  Stage 2 = middle line  Stage 3 = down line

## Symptom Analysis - NORTH WING




## Symptom Analysis - SOUTH WING



**Appendix**

Comments on Teeno AO antenna

The data collected consisted of total scores from questionnaires designed to assess the effects of low frequency magnetic fields on building occupants health. The study was a double blind cross over study, and was looking at the effect of a device that claims to protect subjects from these magnetic fields. The study consisted of 107 subjects.

- Of the 107 subjects, 46 had baseline readings, readings for the *dummy* device and a third reading for the *live* device.
- To analyse the data, simple paired t-tests are used. Making use of the paired data will eliminate any variation due to the location of subjects in the building. A summary of the 46 subjects is given below.

| Questionnaire | Average Score | %Decrease From Baseline |
|---|---|---|
| Baseline | 6.652 | - |
| Live antenna | 4.457 | 33.0 |
| Dummy antenna | 6.152 | 7.5 |

The hypotheses considered were :

$H_o$: Baseline and other reading are the same

$H_A$ : Baseline reading is higher than other reading

Comparing Live with Baseline :

t = 6.00 p-value < 0.001 significant difference

Comparing *Dummy* with Baseline :

t = 1.64 p-value = 0.054 no difference (but very close)

- Thus the 33.0% decrease in the scores for the *Live* antenna is highly significant, whilst the decrease of 7.5% for the *Dummy* antenna is not different at the 5% level, but there is evidence of a difference to the baseline readings. This small difference is sometimes attributed to the *placebo effect.*
- The above tests assume the differences between the readings are normally distributed. This assomption was checked and it was seen the differences were normally distributed. However, as a "backup' non parametric tests (Wilcoxon Signed Rank Test) were applied to the differences and similar conclusions drawn.
- Finally, can we get an idea of how much faith we can put into these results? The correct answer is no, as power consideration should be dealt with before a study is conducted. However, as rough guide, power curves were obtained for one-sample t-test based on 46 subjects. The standard deviation of the data was assumed to be 2.2725 (very similar for the data used). It was assumed we are looking at a 5% significance level. The plot indicated that for a difference between means of about 1, we are 90% certain that we can believe the conclusion from the t-test. We observed a difference of 2.195, thus one can be quite certain (almost 100%) of a correct conclusion.

**Conclusion**

The study shows a significant reduction in average symptoms (between 27% and 44% with an average of 36%) for those staff with a live Tecno AO antenna. These results confirm that exposure to low frequency magnetic fields in offices can account for at least a third of the environmental health symptoms experienced by staff.
It indicates that the official attitude of the NRPB and the HSE which states that ELF fields can have no harmful effect on the body, needs revision. More importantly it does indicate that there is a practical solution to the problem.

## FINAL CONCLUSION

**The assessment of the protective effect given by the compensating emission shows that the EMF of actual VDUs and cellular telephones are harmfull for the health of users and that it is possible to make them electromagnetically biocompatible by the use of the above tested specific EM compensation technology.**