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# A TETRA installation in a town in Sussex. Follow-up survey

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In August 2004 a survey was undertaken to assess the perceived impact on health and well-being of residents living around a cluster of telecommunications masts sited at a sports facility. The survey was undertaken seven months after the onset of operation of TETRA because of persistent reports of common symptoms that had arisen from this date, and in a number of cases, starting on this date.

The 2004 survey report is available at [www.tetrawatch.net/papers/mast\\_survey.pdf](http://www.tetrawatch.net/papers/mast_survey.pdf).

Subsequent to the survey a further mast was added to the site, Orange operating both GSM and UMTS, and UMTS antennae were added to the O2 mast. (Sitefinder, the government website recording all mobile phone and TETRA mast locations and licence details ([www.sitefinder.radio.gov.uk](http://www.sitefinder.radio.gov.uk)), is incomplete and inaccurate on a number of points at this site, regarding location, height and existence of transmitters.) There are now eight transmitters sited around the ground, distanced from between 10m and 120m from each house surveyed here, with most houses with at least three of the transmitters within 50m range.

The previous survey highlighted that the addition of TETRA in February 2004 had made a very noticeable difference to health and well-being of local residents. It noted also that from levels of awareness encountered during the survey, this was not attributable to local hysteria, and that those using DECT phones in the home more frequently had problems.

This survey is almost two years on. It was performed among 170 residences only in the four roads adjoining the ground, and 60 responses were gained, one being non-resident due to a period of renovation. Responses were sought for symptoms beginning and persisting only since onset of TETRA. Therefore the effects may have been further exacerbated or prolonged by the introduction of further transmitters at the ground, increasing chronic exposure to microwave electro-magnetic fields (EMF). This time we asked more widely about use of wireless devices. Since these devices do not respect property boundaries, and many houses here are terraced, an EMF survey would better reveal the level of these influences.

## Profile of findings

- 5 respondents used a WiFi network, 3 had DECT phones and 9 were regular mobile phone users. 46 of the 60 total (77%) used none of these.
- 16 respondents reported no adverse health symptoms persisting since the onset of TETRA

- 19 respondents reported moderate headaches (7 reported mild and 1 severe)
- 17 respondents reported moderate fatigue (8 reported mild and 4 severe)
- 15 respondents reported mild memory or concentration problems (8 reported moderate and 3 severe)
- 13 respondents reported moderate sleep problems (6 reported mild and 10 severe)
- 12 respondents reported new health conditions since onset of TETRA
- 14 noted worsened pre-existing conditions

**Table 1: Reported symptom profile**

Symptom	mild	moderate	severe	all	
headaches/migraines	7	19	1	27	45.00%
nausea	3	1	3	7	11.67%
dizziness/disorientation	7	9	3	19	31.67%
memory/thinking	15	8	3	26	43.33%
skin irritations	8	5	0	13	21.67%
nosebleeds	3	2	1	6	10.00%
hum/ringing in ears	6	6	3	15	25.00%
fatigue/lassitude	8	17	4	29	48.33%
sleep/waking problems	6	13	10	29	48.33%
none	—	—	—	16	26.66%
<i>total</i>	<i>63</i>	<i>80</i>	<i>28</i>		

Of other conditions reported, some were new, other pre-existing. Clearly no direct attribution can be made as to cause; this is merely an observation, and everything has to coincide with something else. Nonetheless, the range of disorders continues to be interesting, not least in that they are all associated with biological effects observed as being stimulated by EMF (ie, all the EHS symptoms listed on the survey questionnaire *and* all these outcomes are associated with EMF exposure in experimental research outcomes).

It is impossible to prove a direct causality in any observation, and this survey does not pretend to do this, but the associations or correlations should again be noted. Nor is it an argument that there are no multiple causalities at play, of which chronic EMF exposure may be an element.

It is of increasing interest among researchers as to why what have been termed ‘idiopathic environmental intolerances’ (IDI) share such similar symptom profiles. Chronic fatigue syndrome, multiple chemical sensitivity and electro-hypersensitivity share most symptoms in common. One factor uniting all these is the stability of levels of nitric oxide (NO) in the body, and this remains a target for more incisive research. Suffice to say researchers have proposed stimulation of nitric oxide synthases (NOS) (the enzymes that produce NO on demand) as a common factor, and research studies

have indeed found that EMF in the microwave range stimulates production of NOS. What is self-evident is that the site has no other unusual environmental factors (including use of pesticides in the ground), but it does have a concentration of microwave EMF sources.

One point worthy of comment is the 'hum/tinnitus' question. It might be surmised that eight electronics cabinets anchored to the ground and with cooling fans running might be the source, and at sufficiently low volume that only a few people hear this. However, from previous research and experience this is experienced at distances of at least 120 metres, not just in the houses closest, it may be experienced in one ear only and only by certain family members, and for some is only felt in certain places in the home. The cabinet fans do not appear to be the cause of this 'hum' (an increasingly prevalent phenomenon throughout the world), which probably has multiple sources, but EMF resonances are still in the frame.

The profile of sleep disorders (the biggest issue reported in terms of prevalence and severity) was in the earlier study noted as of great concern, because of the role of sleep in health and well-being, the importance of the melatonin cycle and DNA repair from free-radical damage. Any suggestion that this is unimportant as a chronic condition is quite wrong, and the fine distinction made between 'biological effects and 'health effects' of EMF is disingenuous. The close-matched profile of fatigue may in large part be consequential (23 cases of both out of 29 with fatigue, and 29 with sleep problems). It is again noticeable that waking up every 2 hours is still a predominant feature of those with sleep problems, as it was in the previous survey.

This survey is not a cohort extension to the earlier survey, since no individuals were tracked. Nor is age noted. However, the population is of mixed age, from young families to elderly residents, and from remarks in the returns it is apparent that the response sample is of a full age range and is not primarily elderly.

#### **New disorders since TETRA (no.)**

Hypertension (3)

Type 2 diabetes (2)

Stroke (2)

Cancer (breast; unspecified) (2)

Brain tumour (middle age, not a mobile phone user) (1)

Miscarriage (1)

Odoema (1)

Blood count (low haemoglobin, elevated leucocytes) (1)

Asthma (1)

Deep vein thrombosis (1)

Depression (1)

#### **Worsened pre-existing conditions (no.)**

Multiple sclerosis (1)

Antiphospholipid Syndrome (APS, or Hughes syndrome) (1)  
 Arthritis (4)  
 CFS (1)  
 Fibromyalgia (1)  
 Lyme borreliosis (1)  
 Hypertension (1)

From conversation with a resident, three close neighbours in the same road have recently been prescribed warfarin, and the sports facility groundsman diagnosed with cancer.

The most interesting factor in these additional and worsened disorders is that NOS and the cycle of NO, is (as with EHS symptoms) associated in every case, so there is some commonality, though of course each occurs for its own causes. All that can be said is that if, as research findings show, NOS is stimulated by EMF exposure, then these outcomes would be consistent with that effect.

## Symptom scoring

Using none=0, mild=1, moderate=2 and severe=3 for each symptom, a total 'EHS symptom' score was applied to each respondent, taking no account at all of other diseases or disorders.

The score range was 0 to 18 (the theoretical max would be 27):

**Table 2: Symptom scores**

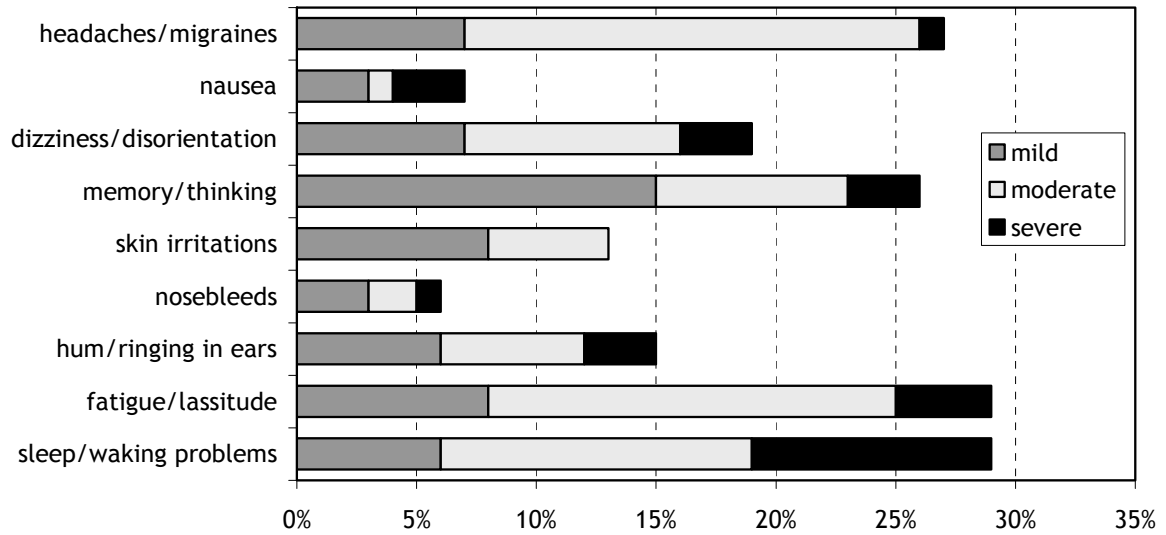
Score range	N <sub>1</sub>	%	N <sub>2</sub> : using wireless devices	ratio N <sub>1</sub> :N <sub>2</sub>
0-3	26	44.07%	3	8.7
4-6	13	22.03%	3	4.3
7-9	7	11.86%	1	7.0
10-12	8	13.56%	4	2.0
13-15	3	5.08%	2	1.5
16-18	2	3.39%	0	—
<b>59*</b>				

\* 1 respondent non-resident

Fifty-six per cent of respondents reported more than what might be regarded as negligible occurrence of symptoms in the range described on the questionnaire. (Compare 58.5% in the initial survey.) Obviously, since these symptoms are regular day-to-day occurrences, no attribution of cause can be attempted. If any significance pertains, it is that the profile emerging from the 2004 study is still here in the smaller sample, with persistent novel symptoms rather than occasional or 'normal'

occurrence. As regards 'normality', if these outcomes have nothing at all to do with environmental factors such as microwave EM sources, it should be of concern to see such prevalence of low-grade unwellness in any case.

**Fig. 1: Incidence of symptoms**



In the earlier study, it was noted that DECT phone users showed up as more likely to have developed persistent symptoms in the EHS range. This was asked again, along with WiFi networks and mobile phone use. The ratio of symptoms to wireless device use can be seen to reduce with increase profile of symptoms (Table 2, above). This may be a reflection of the issue of chronic exposure to general environmental levels of microwave radiation.

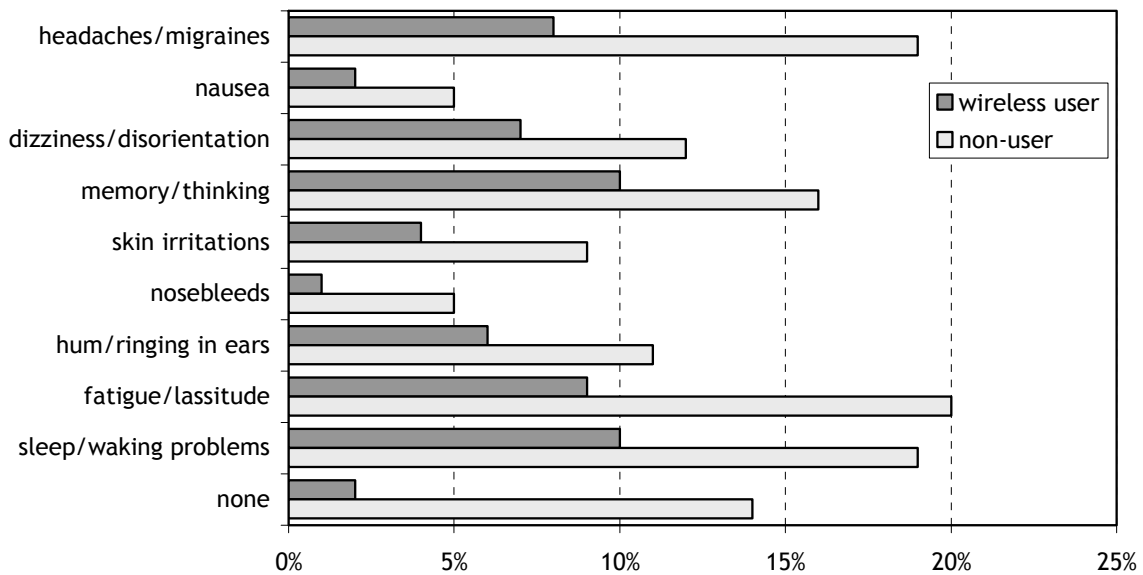
This residential group is not a big microwave wireless device user group: 77% used no device, and this included mobile phones. Therefore most with symptoms were also non-users (Table 3, Fig. 2).

**Table 3: Microwave wireless communications device users**

Symptom	wireless user	non-user	all
headaches/migraines	8	19	27
nausea	2	5	7
dizziness/disorientation	7	12	19
memory/thinking	10	16	26
skin irritations	4	9	13
nosebleeds	1	5	6
hum/ringing in ears	6	11	17
fatigue/lassitude	9	20	29
sleep/waking problems	10	19	29
none	2	14	16

Perhaps the only surprise is that of those with no symptoms at all, only 2 were users (12.5%).

**Fig. 2: Microwave wireless communications device users**



Source:

## Qualitative responses (what people wrote)

### Respondents' comments on symptoms:

#### Headache (16 comments)

- I still get headaches; daughter has developed migraine (person 1)
- Headaches: When mast first went up I thought it was the mast, but now I think it's something else (person 2)
- Headaches started after mast on different side of the head than usual. Less severe now than when mast first turned on (person 3)
- Headaches: occasionally for periods of several days at a time (person 8)
- Pressure feeling at front of head with spells of imbalance (person 8)
- Stabbing pain in side of the head now and again (person 7)
- Wake with a headache daily (person 9)
- Corona, disorientation, nausea (person 10)
- Headaches: Far more than usual, and painkillers daily help (person 12)
- Headaches constant and have increased (person 19)

- I never used to suffer from headaches (person 20)
- Optical migraine, ie vision disturbances and 'flashes' not always followed by headaches (person 21)
- Eye pain, tightness across head (person 29)
- Headaches: Take aspirins every day to numb pain (person 31)
- Headache: Behind ear and above eye (person 33)
- Headaches: Never suffered from headaches but now I'm getting more (person 35)

**Dizziness or nausea (9 comments)**

- Son complains of dizzy spells (person 10)
- Dizziness and disorientation; passing out (person 13)
- Nausea, dizziness, fatigue: Increased (person 19)
- Dizziness, memory, eczema rash, tinnitus, frequent waking: following stroke Oct 2005 (person 21, aged 78)
- I have had dizzy spells since TETRA mast was put up (person 31)
- Dizziness: First thing in the morning until about mid-day (person 33)
- Nausea: sometimes in the mornings (person 35)
- Dizziness, memory: Have put this down to age but now thinking otherwise (person 35)
- Feeling faint; can't sleep; aches in bones (person 31)

**Memory and concentration (10 comments)**

- Memory problems: Possibly old age (65) (person 7)
- Memory problems: fluctuates (person 19)
- My husband's memory has deteriorated badly (person 12)
- Can't remember [things] (person 13)
- Difficulty concentrating (person 10)
- I used to have an excellent memory (person 24)
- Quite forgetful; can't remember what I've done with things or names of certain things (person 30)
- Find it hard to concentrate (person 40)
- Seem to be more stressed than I was before (person 30)

- Sometimes forget where I am or what I'm doing. Have to stop and think for a couple of secs (person 31)

#### **Skin irritations (3 comments)**

- Irritations on arms and legs (person 17)
- I have been itching more since TETRA mast was installed (person (31))
- Slight general itchiness (person 16)

#### **Nosebleeds (3 comments)**

- Wake with nosebleed (person 9)
- My granddaughter aged 9 has suddenly developed [nosebleeds] (person 12; not stated where or where resident)
- Nosebleeds since 2004 (person 40)

#### **Hum or ringing in the ears (6 comments)**

- Hum and fatigue: only since TETRA mast went on (person 5)
- Mild tinnitus: possibly hereditary (person 7)
- Hum: Like an electric motor running all the time (person 12)
- Hum: Rather trying during night (person 24)
- Constant humming and ringing in my left ear (person 31)
- Hum: On and off all day (person 35)

#### **Fatigue or lassitude (13 comments)**

- Fatigue worsened since moving here 28 April 2006 (person 10)
- General fatigue (person 11)
- Can't walk very far (person 17)
- I have to force myself to get on with things (person 20)
- never quite well, but I can't pinpoint it (person 20)
- It's difficult to describe, but before the mast I was always very well. Now I'm just
- Very tired most of the time (person 24)
- Inability to feel really refreshed or invigorated (person 29)
- Do sometimes just feel very tired (person 30)
- No energy (person 33)
- Fatigue: Worse over the last two years (person 35)



- No energy, tired all the time (person 40)
- Takes more effort to do things which I would normally take in my stride (person 16)

### **Sleep problems (27 comments)**

- Wake up between 3 and 5am (person 13)
- Sleep: Now on medication (person 18)
- Cannot stay asleep for more than a few hours at a time (person 19)
- I wake up every 2 hours or so (person 20)
- Not sleeping very well; no better of worse since 2 years ago (person 6)
- Not getting a full night's sleep (person 7)
- Can't get back to sleep once woken (person 8)
- Disrupted sleep patterns difficulty getting back off [to sleep] (person 10)
- Waking up through the night at least 4 or 5 times (person 11)
- Sleep patterns bizarre, eg 5.15 up and wide awake, 5.15pm down – not my usual pattern or energy level (person 29) Notes: We moved bedrooms in 2004-5 to the back room nearest the TETRA mast and since then my sleep patterns and benefits have plummeted (we're probably the nearest sleepers to the mast!)
- Waking up two or three times a night (person 31)
- Have been prescribed sleeping tablets (person 33)
- Sleeping less hours in last two years (person 35)
- Sleep: uneven pattern (person 36)
- Unable to [get] deep sleep, unable to wake easily (person 37)
- Broken sleep every night (person 40)
- Wake up, but a job to get myself into circulation; still tired (person 41)
- On newly diagnosed conditions since February 2004
- Miscarriage (person 8)
- Stroke (person 9)
- Brain tumour, surgery shows it is in an advanced state (person 22, young father)
- Last year (2005) I had low haemoglobin and increase in white blood cells (person 24)
- DVT (person 28)

- Sometimes feeling depressed; taking antidepressants (person 35)
- High blood pressure (person 37)
- Cancer cells developed (person 37)
- Breast cancer diagnosed early 2006 (person 42)

### Respondents' comments on pre-existing conditions worsened since February 2004

- APS (person 9)
- MS (person 59, same household as 9)
- CFS, fibromyalgia, Lyme Borrelia: Increased a great deal (person 19)
- Blood pressure; now being tested monthly (person 13)
- High blood pressure over last 2 years (person 17, diabetic)
- Blood pressure (person 33)
- Arthritis (person 13)
- Arthritis; tablet dose has been increased (person 33)
- The last 2 years my arthritis has become much worse (person 24)
- Digestive problems now severe (person 24)
- Hum: Worse than pre-2004 (person 26, also comments works too hard and stress at work)
- Asthma (person 27)

### Other comments

- Baby monitor affected

(In the first survey, electrical interference was asked about, and was widely reported as a social issue – TVs are still inoperable on terrestrial ITV.)

## Conclusions and recommendations

### Why a survey?

Undertaking any survey like this in a superficial way can obviously be dismissed as uninformative, and in no way can this survey pretend to attribute any particular outcome to any particular cause with any certainty.

Surveys like this are undertaken because of the lack of interest on the part of better qualified authorities to follow up on community concerns. From the beginning of the mast issue at the location there have been noticeable detrimental trends in well-being. Are these some psychosomatic or hysterical response? The issue has not been a burning one for most residents, awareness is still only moderate, and with the extended time scale, common sense would suggest that this community is not living in an atmosphere of fear and apprehension. 'Interest and concern' rather than militancy and frantic action, has been the mood in this period.

### Finding a 'norm'

Is the profile illustrated once more in this follow-up survey a general population norm? It is difficult to find a pure control area any more, where EMF levels are so low that a wholly valid control can be assumed. Nor does this survey include hours at the mast location as against employment locations, for example. All that can be said is that an average ten hours per day minimum can be assumed for residents in their small houses, with all these microwave sources, of which maybe 8 hours are spent elevated in bedrooms, lying in static positions (whether asleep or not!).

### Allowing a cause

Further, there is nothing in the health and well-being profiles that is not indicated in EMF research of one kind or another. There is nothing to suggest that the masts, let alone the TETRA in particular, are a sole cause. But they do seem to have made a difference, and the TETRA, as the one source at the more penetrative lower microwave range with full power operation 24/7 and with extreme low frequency signal structure characteristics, seems to have tipped the balance more than any one other source over the last two years. Constant 'reassurances' that 'the overwhelming evidence' is that there is no link between EMFs and biological effects leading to health effects are plainly untrue when the research literature profile is examined. 'Overwhelming' is a weasel word, and the authors of this survey are far from being overwhelmed. On the contrary, the amount of research leading to an explanation of outcomes like these is very substantial indeed. Individual reactions to EMFs are not as straightforward as applying red paint to wood and obtaining a consistent effect. It is entirely likely that the environmental EMF burden at sports facility includes fields from electricity sources, and domestic appliances (indeed the ratio of symptoms to wireless device use is suggestive of this).

### Ignore-ance will not do

But if there is anything at all in the suggestion that chronic low-level exposure to microwave sources such as from the masts at the sports facility results in adverse health impacts, then the residents who report the symptoms revealed here deserve the full attention of our health protection and promotion agencies. If they do not get this, and the problem is indeed environmental EMF, then we are ignoring our future health at tremendous cost in productivity, general well-being, and direct health costs.

Our strong recommendation is that these two surveys should not be ignored, but taken up for in-depth investigation, in parallel with similar locations throughout the UK, by researchers who are neither campaigners nor defenders of the economic interests of communications companies. The lurking problem in finding out is not that we might all feel better but that if chronic low-level exposure to these transmitters is associated with adverse effects on well-being. It is that responsibility for the nation's health could be laid at the door of companies that have known about the potential risks, and hidden behind wholly inadequate and inappropriate international safety guidelines. The global economic consequences need no relating. Is our health worth it?

The questionnaire and letter of introduction:

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# Is Mast Radiation Making You Unwell?

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There is a great deal of controversy surrounding the safety of microwave radiation from mobile phones, masts and wireless networks. The official view, that there is no definitive scientific proof of harm, runs counter to what ordinary people experience and observe, all over the world. There is a substantial body of scientific research evidence that both indicates adverse effects with some people, even from the 'low' levels we experience, and which suggests reasons why this might be so.

We are simply keeping a record of people's experiences. We believe it is important to note, in terms of people's own health perceptions, the effects of the rapid increase in mobile phone masts and wireless devices.

The simple questions we ask here are related to commonly reported experiences, but it is important:

- a) not to automatically attribute signs or symptoms to the use of technology, where they are pre-existing, and yet:
- b) not to discount apparently minor but unusual experiences, simply because you think they are irrelevant.

We are especially interested in changes in well-being since late 2004 (when the previous local health survey was undertaken).

Our understanding of the effects of microwave radiation, whether from the use of mobile phones, living and working near to masts, working in wireless computer network environments, using DECT (cordless) phones etc., is that the effects may be small, but they are chronic and cumulative rather than occasional.

One simple example of judging the possible effect of nearby masts regarding problems with sleep, is if you have noticed a difference in sleeping patterns when you are away from the masts – e.g. on holiday?

Please answer as honestly as possible. All data is confidential, but feel free to contact us if you have any queries, or to do so if you feel there are relevant changes in the future. We intend to feed back the results in due course. At no time do we wish to over-concern you, but neither do we feel that we can neglect the collection and recording of people's experiences to inform the debate over planning and technology.

Thank you

Gaisford Residents & Friends

(PTO)

Symptom	none	mild	moderate	severe
Headaches and tensions etc.				
(describe)				
Nausea				
(comment)				
Dizziness				
(comment)				
Disorientation				
(comment)				
Memory/thinking problems				
(comment)				
Skin irritations				
(describe)				
Nosebleeds				
(comment)				
Hum or ringing in the ears				
(describe)				
Fatigue or lassitude				
(describe)				
Sleep or waking problems				
(describe)				
Any other medical condition (diagnosed since 2004) that you wish to mention				
Pre-existing conditions: is anything worse? (eg ADHD, ME, arthritis, fibromyalgia, MS, blood pressure etc.)				
(describe)				
Please note anything else that you have found unusual during this time				

Finally, do you spend much time with:

Wireless computer networks  DECT phones  using a mobile phone