PROTECTIVE EFFECT OF A DEVICE ("FOSTAC") CLAIMED TO REDUCE RADIATION FROM CELLPHONE HANDSETS.

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PROTECTIVE EFFECT OF A DEVICE ("FOSTAC") CLAIMED TO REDUCE RADIATION FROM CELLPHONE HANDSETS.

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INTRODUCTION

Large scale and rapidly increasing public demand for mobile telephony services has meant a proliferation of Cellphone handsets and their associated base stations throughout the united Kingdom, and indeed throughout the world. There are presently some 30 million UK users, a quarter of whom are under 18 years old, and some 500 million users world-wide. Virtually none of these existed a mere two decades ago, which in terms of human evolution is a negligible time period.

Ever since the introduction of radar in WW2 there have arisen concerns based on observation both public and scientific over the possible health hazards of exposure to the radiation inevitably emitted by these installations. Even by the 1970s a US Congress Committee (ERMAC) concluded that unless an urgent research programme was instituted industrialised societies may be exposed to adverse sequel affecting the entire population.

Many peer reviewed studies now confirm that RF/MW radiation at levels far below those needed for thermal insult and well below the present regulatory guidelines are capable of adverse effects on cells *in vitro*, on tissues and organs, on whole live animals, on human beings in a laboratory controlled environment, and on people in their epidemiological setting. (See Cherry, June 2000 for review). Such studies identify at least nine biophysical endpoints, namely:

Example studies

calcium ion efflux	Bawin & Adey, 1976; Blackman, 1985, 1990
melatonin reduction	Kolomytkin et al., 1995;Rosen, Barber & Lyle, 1998
DNA strand breakage	Lai & Singh, 1997a; Svedenstal et al., 1998
chromosomal aberrations	Garag-Vrhovac et al., 1993; Maes et al., 1993
leukaemia	Dolk et al., 1997a,b; Michelozzi, 1998
solid tumours of brain	Balcer-Kubiczek & Harrison,1991;Szmigielski, 1991
immune deficiency	Brueve et al., 1998; Dmoch & Moszczynski 1998
miscarriage	Lindbohm et al., 1992; Magras & Xenos, 1997
neurological effects	Lilienfeld, et al, 1978; Beale, 1997; Mild et al., 1998

These studies are merely representative of a much larger body of evidence. Nevertheless despite intensive and mainly industry-guided/funded research the regulatory authorities (ICNIRP, NRPB etc.), though accepting that there exist biological effects at lower than thermal levels, seem reluctant to recommend guidelines based on exposures at below thermal insult levels.

The Government-appointed Stewart Committee Independent Expert Group reported in May 2000 on the possible health hazards of handsets and masts. It recommended a policy of prudent avoidance, in line with European environmental legislation embodied in the 1993 Maastricht Treaty, which states:

Title XV1 Environment Article 130r

1. Community policy on the environment shall contribute to pursuit of the following objectives:

?? protecting human health

?? preserving, protecting and improving the quality of the environment

The Precautionary Principle is a risk management policy applied in circumstances with a high degree of scientific uncertainty, reflecting the need to take action for a potentially serious risk without awaiting the results of scientific research.

ALSO

For countries of the European Union, the Treaty of Rome states that

"Community policy on the environment….shall be based on the Precautionary principle".

As a result of the case Newport B.C v S.S. for Wales and Browning Ferris Environmental Services Ltd (1998) Env LR at 174 and (1998) JPL 377, health considerations and public concern can in principle be material considerations in determining applications for planning permission and prior approval. The present Government believes that the current ICNIRP guidelines are sufficient to comply with these concerns, but the history of radiation guidelines has been one of constant downward revision. Moreover the DETR's Consultation document of July 2000 has incorrectly interpreted the Stewart Committee's recommendation since in para 6.38 The IEGMP states "There is now scientific evidence however, which suggests that there may be biological effects occurring at exposures below these guidelines", and in para 6.39 "We conclude therefore that it is not possible at present to say that exposure to RF radiation, even at levels below national guidelines, is totally without potential health effects, and that the gaps in knowledge are sufficient to justify a precautionary approach".

In practise, local planning authorities and the Cellphone system operators could work with levels well below present guidelines. Based (perhaps erroneously) on power flux density, or its equivalent in specific absorption rates by the body's tissue (SAR) the present National Radiological Protection Board (NRPB) investigation levels for base station transmission frequencies are 36.9 to 100 Watts per square metre (W/m^2). These values are equivalent to electric field strengths between 100 and 194 Volts per metre (V/m). The former USSR recommended a limit of only 1 ?W/cm^2 at one time, but later modified it to 24 ?W/cm^2.

Another international regulatory body, the International Commission of Non Ionising Radiation Protection (ICNIRP) recommends much lower levels for public exposure than the NRPB, namely 4.5 to $10W/m^2$ and 35 to 61 V/m. These conflicting views were noted by the Stewart Committee, who recommended a change in the UK to align with the lower ICNIRP values.

One expert consultancy (Powerwatch) suggests a sensible practical level might be say 3 Volts per metre electric field strength. Commenting on the Stewart Group report they say:

(i) Council planning departments should work with local communities in identifying suitable sites for masts, usually away from sensitive sites such as schools and residential housing. Where masts need to be sited in residential areas, then the antennas should be mounted as high as possible, and in every case above the roof levels of nearby properties, in order to achieve exposure levels "as low as practicable".

(ii) Clause 1.43 of the Stewart Report states that "planning authorities should have the power to ensure that the RF fields to which the public will be exposed will be kept to lowest practical levels that will be commensurate with the telecommunications system operating effectively". In practice this is typically 500 fold less in power terms than ICNIRP guidance! Even the cellular telephony industry agree that they can work to 3 volts per meter (3 ?W/cm^2). approx.) or less, public exposure signal levels - at 1800 MHz this is about a 350 times lower maximum power than permitted by ICNIRP.

Low height street furniture (lamp post) masts near to houses will virtually never comply with the Stewart 1.43 advice. In many cases cellular operators are now installing many of these because of the difficulties they have had in the past in gaining approval for full size (15m or higher) masts. In almost all cases an appropriately sited full size mast or ones on the roof of a big building will offer lower levels of RF and microwave exposure to nearby residents. The Cellular Operators do have the right to have an adequate number of suitable located masts. It is vital that local planning authorities, in conjunction with local communities, identify suitable sites for masts to avoid these difficulties.

In June 2000 an international conference was held at Salzburg with 23 invited scientific speakers from at least eleven countries. This event arose out of a 1998 international conference in Vienna where a declaration was made that microwaves can cause biological effects below levels where thermal warming occurs (the so-called Vienna Declaration). At the Salzburg conference 19 of the invited speakers reached agreement on a maximum exposure limit for GSM base stations of 1?W/m^2 (0.1?W/cm^2), which is three orders of magnitude below the ICNIRP recommendations, and one order of magnitude below Powerwatch's recommendation. This scotches any suggestion that the concerns over masts originate solely from the lay public or the media.

Salzburg city has succeeded in achieving a level of less than the conference recommended level of 1?W/m^2 through extensive co-operation between the local government, citizen's groups, and two of the four GSM providers (source Gerd Oberfeld, Salzburg local govt. officer, in *No Place to Hide* 2(4), September 2000: article by Monica Kauppi).

METHOD AND MATERIALS

Human peripheral blood lymphocytes were isolated from a healthy 60 years old male donor by differential centrifugation on Histopaque (Sigma-Aldrich Chemicals ltd.) from 30 ml of whole blood obtained via venipuncture of *v.cubitale* into vacutainers containing anticoagulant (K2), and maintained in RPMI 1640 nutrient with antibiotics and antimycotics.. Four standardized samples of the culture were placed in 2ml phials sealed with a plastic cap and pre-sterilised at 121degrees C under pressure. There was about 0.5 of culture in each sample. All glassware and instruments were handled in a purified air laminar flow unit to avoid bacterial contamination.

The coded samples post exposure, awaiting trypan blue staining.

One phial was connected to a 30cm. gold wire which led to a fully charged and active Philips C12 GSM mobile phone set on stand-by, inside which, next to the battery, the FOSTAC chip had been applied in the way advised by the manufacturers.. This sample is called the **Protected** sample. It was exposed in this way for an 8 hrs period.

The second phial also had a gold wire insert but this was sealed into the cap. This is called the **Sham Exposed** sample, and for the duration of the exposure period it was confined in a double skinned mu metal container at the same ambient temperature.

The third phial was also connected by a 30cm gold wire to a Philips C12 GSM Cellphone, but had no FOSTAC chip attached. This sample is called the **Exposed** sample, and it was exposed for a simultaneous period of 8 hrs in a different room at some distance from the Protected sample.

The fourth phial was sealed similarly but was placed apart from any cell phone, in a different room. This was called the "**Control**".

After the exposure period the samples were coded and given to a colleague for staining with trypan blue dye to establish which were viable and blind counting under alight microscope (Olympus BX50) using a hemoctyometer (Sigma Brightline). Viable and non-viable cells in each sample was counted in ten hemocytometer squares according to recommended laboratory practise.

RESULTS

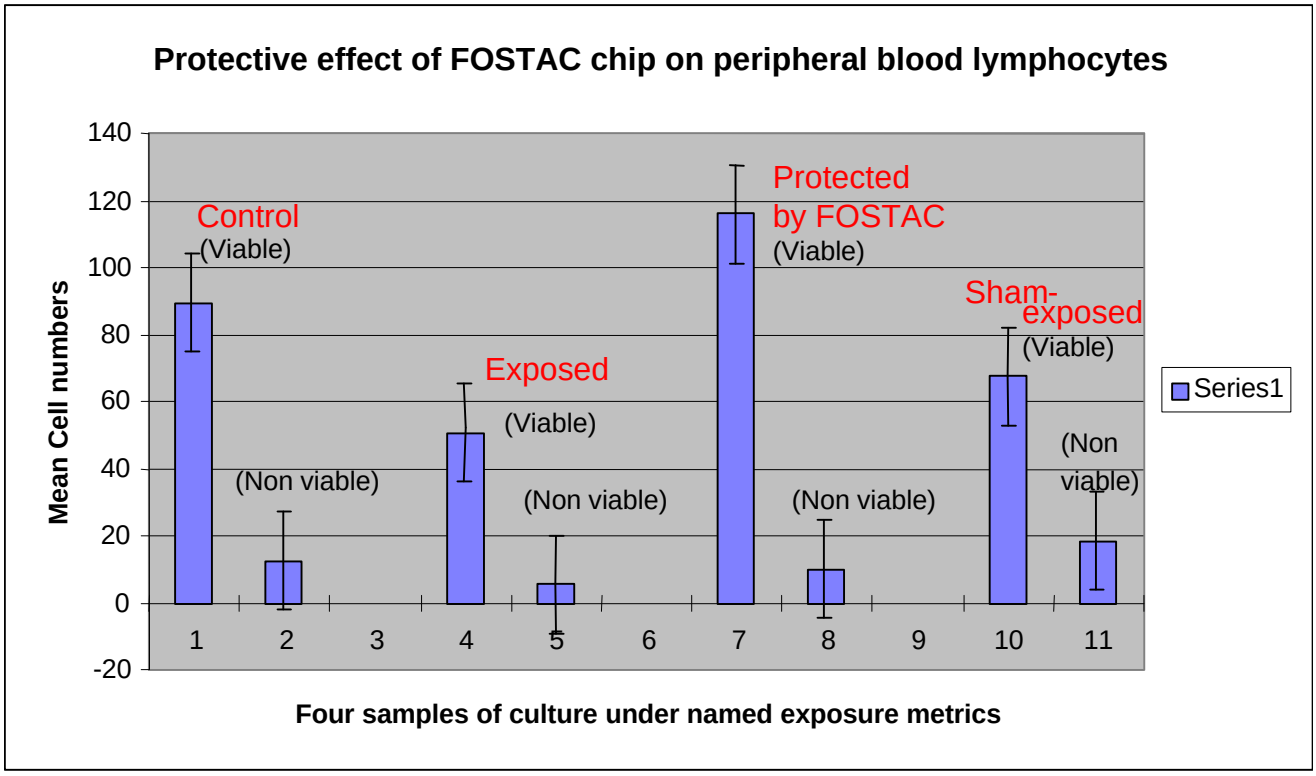
These are first given numerically below:

Table 1: Viability of Human peripheral blood lymphocytes exposed to Cellphone radiations

Run no. ***Control*** ***Exposed*** ***Protected*** ***Sham-exposed***

Code no.	1		2		3		4	
count	viable	nonviable	viable	nonviable	viable	nonviable	viable	nonviable
1	84	11	49	5	108	9	72	24
2	79	8	58	2	114	8	68	25
3	88	10	51	12	108	11	77	19
4	89	15	47	11	123	6	70	21
5	76	14	45	7	115	15	73	18
6	95	13	56	7	121	8	69	20
7	81	12	52	9	118	7	61	11
8	88	12	48	0	119	10	70	18
9	94	9	55	0	106	12	55	13
10	121	20	46	1	128	14	61	16
Totals	895	124	507	54	1160	100	676	185
Means	89.5	12.4	50.7	5.4	116	10	67.6	18.5
SDs	12.7	3.4	4.5	4.5	7.2	3	6.6	4.4
% viable	87.8		90.4		92.1		78.5	

These results are presented graphically below:



These results confirm that the FOSTAC device had a protective effect on human peripheral blood lymphocytes.

Since the relation between the exposed and protected samples is a linear one, (i.e. the data are not skewed) the standard test (the z test, see Colton, Statistics in Medicine, 1974, p138) for a difference between two means can be applied to these data to see if the results are statistically significant.

The calculation is :

$$z = \frac{\bar{x} ? \bar{y}}{\sqrt{\frac{? {}_2 x}{nx} + \frac{? {}_2 y}{ny}}}$$

Therefore z = (116-50.7/$\sqrt{}$ $4.5^2/10 + 7.2^2/10$ = 24.25 which is highly significant.

The standard z-test for significance (difference between means) therefore shows that comparing the protected cells with the exposed cells confirms a statistically significant difference. Moreover, the control and sham exposed samples were, as expected, relatively less and more viable as would be expected.

DISCUSSION

It would seem counter-intuitive for a small gold-plated disc inserted inside any Cellphone to have the capability of improving the viability of human white blood cells exposed to the cellophane's radiations. One has to ask what mechanism might be at work, understandable in terms of the normal life sciences and physics?
The Swiss producers of the FOSTAC provide some documentation about their device, stating *"The FOSTAC chips are treated with a special procedure and become a kind of antenna - receiving and passing on Tachyon energy. Tachyon energy changes negative into positive, creates order in disorder, so that … the microwaves are no longer harmful to living organisms"*.

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