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Calcite Microcrystals in the Pineal Gland of the Human Brain First Physical and Chemical Studies

Baconnier, Lang et al.

It should be noted that these are initial findings of an ongoing study. Given the proper opportunity this study may yield results that are of great significance in the area of mobile phones and health. One thing that could adversely affect the impact of any such results would be the exaggeration or misrepresentation of the findings so far, or premature claims relating to studies still under way. This could discredit the research and make it difficult to have genuine findings taken seriously.

The researchers have isolated and studied calcite microcrystals which they have found in human pineal glands.

Quotes from the paper:
"The pineal gland … converts a neuronal signal into an endocrine output. … [It] is located close to the anatomical centre of the human brain." "A total of 20 glands from [human] subjects ranging in age from 15 to 68 years were studied." "Microcrystals were found in every gland in quantities ranging from 100 to 300 crystals per cubic millimetre of gland. No attempt was made to correlate the quantity of crystals with either the age of the subject or pathological details." "Length dimensions of the crystals varied from 2-3 to about 20 micrometres." "These results (*referring to various forms of analysis described in detail)* and the electron diffraction measurements definitely prove that the microcrystals are calcite." "These calcite crystals bear a striking resemblance to the otoconia of the inner ear." "The calcite in otoconia has been shown to exhibit piezoelectricity." "If piezoelectricity were to exist [in the pineal calcite microcrystals], an electromechanical coupling mechanism to external electromagnetic fields may be possible."

"The possibility of nonthermal coupling of electromagnetic radiation to biological systems has been considered recently [Kirschvink, 1992]. Reiter [1993] has reviewed the literature on the possible effects of static and low frequency electromagnetic fields on the production of melatonin by the pineal gland. A study by de Seze, [1998,1999] showed no influence of microwave frequency radiation on melatonin secretion. However, Kirschvink et al. [1992] and Kirschvink [1996] have shown the presence of minute crystals of magnetite in the human brain and have suggested a mechanism for coupling of microwave radiation to them. Additional research on the nonthermal effects of microwave radiation is definitely warranted."

"In conclusion, we believe that even a very small risk of possible nonthermal coupling of radiation to microcrystals in the pineal gland merits further detailed study. Our future research will address these questions."

To my mind, the significant features that can be used in the current debate are:

The human pineal gland, in the centre of the brain, has been found to contain large numbers of calcite micro-crystals that "bear a striking resemblance" to calcite crystals found in the inner ear. The ones found in the inner ear have been shown to exhibit the quality of piezoelectricity. If those found in the pineal gland also have this quality then this would provide a means whereby an external electromagnetic field might directly influence the brain.

Both the Stewart Report and the NRPB Report consider at some length how it might be possible for non-thermal levels of microwave radiation to affect a living organism.

In the Stewart Report, Section 5 paragraphs 12 through to 26 detail the sort of requirements that might have to apply in order for an electromagnetic field to directly affect biological tissue – living cells. **Nowhere** in these paragraphs is the possibility considered of any form of crystalline deposit which might provide the 'missing link' between electromagnetic radiation and biological effects. It's interesting to note, though, that paragraph 18 does refer to a suggestion by Frohlich that a biological system might behave in some way like a radio receiver, amplifying a very small signal through a process of resonance; this idea is dismissed due to the unlikelihood of biological material resonating in this way – but of course one of the earliest types of radio was the 'crystal set', in which a mineral crystal was made to resonate (by tuning with a 'cats whisker') with an incoming radio wave, which is simply an electromagnetic wave of rather lower frequency than microwaves. The conclusion of this section was that "…there is little evidence to support resonant behaviour…". The existence in the pineal gland of crystals which may prove to exhibit piezoelectric properties puts the whole issue in a totally different light – particularly in a scenario where the absolute requirement is to 'play it safe' (Stewart's 'Precautionary Principle').

(It's worth noting that paragraph 5.6 of this report considers the possibility of the magnetite crystals (see above) providing a causal link, and discounts this on scientific grounds. It goes on to say: "Indeed, it seems to be generally agreed that any biological effects from mobile phones are much more likely to result from electric rather than from magnetic fields." Note that piezoelectric qualities do link electric fields to mechanical effects).

In the NRPB Report on TETRA, paragraphs 78 to 102 consider the effect of radiation, amplitude modulated (pulsed) at around 16Hz (cycles/second), on calcium efflux in the brain – the basis of the Stewart Report warning against using this pulsing frequency. Paragraphs 92-96, a substantial proportion of the latter half of this section, are devoted almost entirely to highlighting the fact that no clear mechanism has yet been identified to explain the effects observed by some researchers. The obvious inference that readers are expected to draw is that, because no clear explanation is apparent, these effects are highly questionable – indeed, one sentence in paragraph 95 almost says as much. Again, with the sort of causal link that may be provided by microcrystals interspersed among the organic matter of the brain, the perspective on this aspect of the issue is dramatically altered.

In brief, then ;

Two things can be definitively stated from this research so far:
1. Calcite microcrystals have been positively identified, in substantial quantities, in every one of 20 human pineal glands studied;
2. These crystals bear a striking resemblance to those found in the human inner ear, which have been shown to exhibit piezoelectric qualities.

These two facts alone are sufficient to call into question the basis of conclusions in both the Stewart Report and the NRPB Report on TETRA. Neither of these reports considered the possibility of the sort of coupling that might be provided through crystals of this type. The reassurances given in both of these reports are thus based on a false premise, that any coupling of microwave radiation to cellular activity in a living organism must be direct, acting through the medium of biological material. It is of course entirely possible that other similar phenomena exist elsewhere in the brain (and/or other parts of the body), as yet undiscovered.

Whilst the means by which microwaves might directly affect living cells are rather obscure, the interaction between electromagnetic radiation and certain types of crystal structures is well understood; the possibility of this then affecting living cells is very real.

The ICNIRP guidelines must therefore be considered inadequate, since they take no account of such a possible causal mechanism. The fact that such a mechanism has not yet been proved to operate in no way lessens the responsibility of those setting or implementing guidelines to allow for its possibility – a precautionary approach.

(Dr.) Grahame Blackwell.