An Electron Paramagnetic Resonance (EPR) and Antioxidant Efficiency Study of the Pinebark Phenolic Extracts Pycnogenol (R) and Enzogenol

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EPR and antioxidant efficiency measurements were done on both Pycnogenol(R) (P), (French Maritime pine) and Endogenol (E) (Pinus Radiata).The EPR signal from E was stronger than that from P, but the antioxidant efficiency of each was close to slightly more than 50% that of vitamin C. P is manufactured by Horphag, Germany, and E is a New Zealand product. Valuable results for customers!

1. Introduction

It is not only of community and scientific interest, but also necessary, for independent bodies to investigate the claims of 'diatary supplements' and 'herbal remedies' regarding their contents and effects.This is borne out by the recent formation of such a body, state and university funded, at Monash, (Centre for Drug Candidate Optimization) and by the results on Echinacea extracts of a commissioned study by ACS 'Choice' [1].

The term 'pycnogenols' was coined by Masquelier [2], the pioneer investigator of the antioxidant polphenol extracts from French Maritime pinebark, and from grapeseeds. The singular form is now owned by the German company Horphag, and refers to its French Maritime pinebark extract. Enzogenol is a Pinus Radiata pinebark extract, made in new Zealand by ENZO Neutraseuticals.

2. Materials and methods

Samples of P and E, prior to encapsulation and free of excipients, were kindly supplied by the manufacturers on request. Both were powders, of roughly equal density without tamping, and of a brownish red colour. For EPR, the samples were places in standard quartz tubes of matched diameter, and the spectra take in Varian E 12 X-band (~9.1 GHz) at room temperature. For the antioxidant efficiency measurement, the same mass of each powder was dissolved in an approproate phosphate buffer solution, and the measurement carried out as previously reported [3]: space does not permit a *detailed* description of the process, in which a free radical initiator oxidises linoleic acid in aqueous solution, and the oxidation product is spectrophometrically monitored at 234 nm. by a Carey100 UV-Vis. instrument. The efficiency of the antioxidant is measured by its ability to quench free radicals, and hence slow or stop the oxidation of linoleic acid. So far as we know, this is only the second application of the above method using linoleic acid in the food industry: the first was in [3], in which a detailed account of the method is given, with references.

3. Results

The free radical EPR lines from E and P were identical in shape and linewidth, with no observable hyperfine structure. Because of the detection system used, the actual absorption curve ('typically bell-shaped') is not recorded, but its first derivative is. At the same gain setting, the peak-to-trough height of the (first derivative) E signal was several times that of the P signal. This height is proportional to the free radical concentration in the sample.

The antioxidant efficiency of vitamin E was measured as 93%: that of P, 55 %; and that of E, 53%.

4. Discussion

It is clear that the antioxident efficiency, *as measured by the specific test,* is very similar for both products, being ~50% that of vitamin E. The EPR results require some clarification. EPR is a good comparative measure of polyphenol content and antioxidant activity *for the same system,* eg., that of ripening grapeseeds of the same grape variety in the same environment [6]. When the systems are different, as in the case of P and E, the comparison may well not be an accurate one. The content of different polyphenols will be different for the two cases: the tree varieties are different, as are the environments, and the extraction methods may differ. However, the important thing is that the EPR result is not inconsistent with the antioxidant efficiency result. Pycnogenol (R) was not obtainable commercially in Melbourne, though Enzogenol was readily available, so no comment on comparative prices can be made.

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