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Proanthocyanidins in Periodontics

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Abstract:
Considerable research on oligomeric compounds proanthocyanidins in particular had been explored as these are naturally occurring plant metabolites present in vegetables, fruits, nuts, seeds, flowers and bark. Proanthocyanidins are first and foremost known for their antioxidant capacity. These have anti-inflammatory activity, anti-philogistic activity, analgesic activity, antiviral activity
Proanthocyanidins, also known as condensed tannins, are flavonoid polymers that have a long history of use as tanning agents for animal skins, and are determinants of flavor and astringency in teas, wines and fruit juices. The chemistry of proanthocyanidins has been studied for many decades. Proanthocyanidins are oligomeric and polymeric end products of the flavonoid biosynthetic pathway. They are present in the fruits, bark, leaves and seeds of many plants, where they provide protection against predation. At the same time they give flavor and astringency to beverages such as wine, fruit juices and teas, and are increasingly recognized as having beneficial effects on human health. These are bioflavanols a group of antioxidants belonging to the bioflavanoid family known as "Vitamin P" and also known as OPC, proanthocyanidins, procyanidins, leucocyanidins, leukocyanidol and pycnogenols. Professor Jacques Masquelier the father of OPC: discovered OK, isolated OPC, named OPC, characterized OPC and invented the extraction techniques. He conducted and oversaw numerous clinical trials, tests and studies establishing the safety and efficacy of OPC. These are the most powerful free radical scavengers and vitamin C enhancers known. In France where research first began, OPC was the abbreviated name for "oligomeres procyanidoliques"[1]. Several excellent reviews on the subject of proanthocyanidins have appeared over the past 25 yr (Haslam, 1977; Foo & Porter, 1980; Stafford, 1988; Porter, 1989; Stafford, 1990; Scalbert, 1991; Schofield et al., 2001). The older reviews should not be passed over, as they document critical and original thinking on a difficult biosynthetic problem before the application of modern molecular tools (Haslam, 1977), and introduce concepts such as metabolic channeling (Stafford, 1983) that were several years ahead of their time. More recent reviews provide excellent summaries of the agricultural benefits (Aerts et al., 1999), chemistry (Ferreira & Slade, 2002; Ferreira et al., 2003), and biochemistry (Marles et al., 2003) of proanthocyanidins. Proanthocyanidins are commercially available as pycnogenol®

1. Properties of Proanthocyanidins

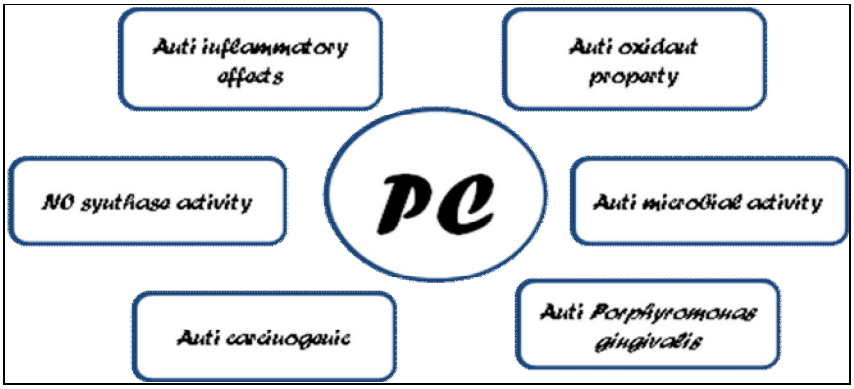

Figure 1: Properties of Proanthocyanidins

The improvement in the success rate of the treatment outcome in periodontitis can be enhanced by the enhancement of host resistance, inhibition of local and biological irritants which increases the progression of the disease. The supplementation of the plant extracts, selected coenzymes, antioxidants, and vitamins enhances the host resistance, strengthen and supports the periodontal tissues. The proanthocyanidins have antioxidant property, free radical scavenging property, anti carcinogenic and anti inflammatory properties, antimicrobial, antiviral, anti allergic, anti Porphyromonas gingivalis, nitric oxide synthase activity and effectively reduces the hyper-pigmentation of women with chloasma.

2. Anti- Oxidant Property

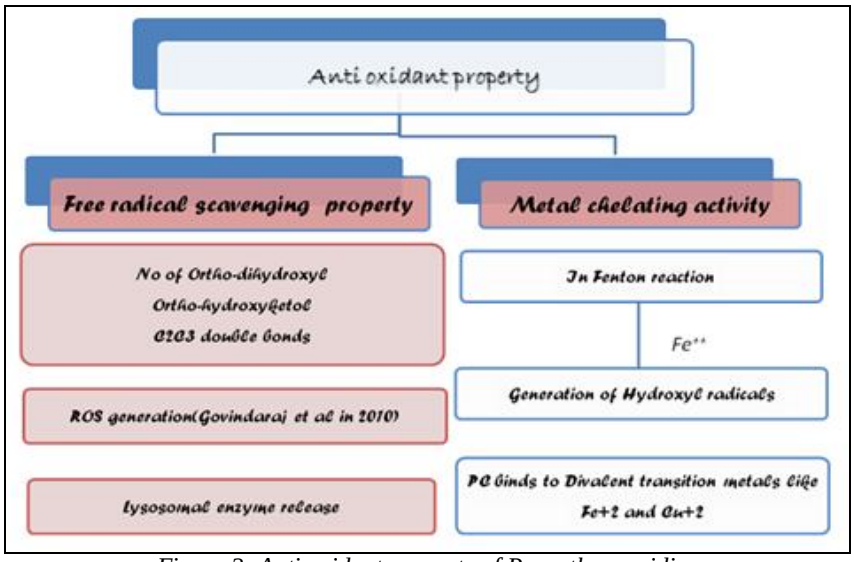

Figure 2: Anti oxidant property of Proanthocyanidins

In the recent years, there has been a tremendous stress on free radicals and antioxidant defense mechanisms. Antioxidants either block the initiation of free radical formation or act as scavengers to free radicals further terminating the radical damage. The antioxidant capacity of proanthocyanidins can be explained by two mechanisms 1. Free radical scavenging property 2. Metal chelating activity

2.1. Free Radical Scavenging Property

The scavenging capacity of the PC depends on a number of other-hydroxyl and other-hydroxyketol groups and C2-C3 double bonds due to their hydrogen donating ability. The antioxidant capacity is directly proportional to number of hydroxyl groups in the flavonoid nucleus. Proanthocyanidins have an inhibitory effect on the reactive oxygen species generation and are more effective than vitamin C in trapping oxygen radicals.

2.2. Metal Chelating Activity

The presence of free state iron and copper in biological systems catalyses free radical reactions such as Fenton and Haber-Wiess reaction

3. Anti- Carcinogenic Property

A crop *Vaccinium macrocarpon* belong to *Ericaceae* family, known to possess anti cancer activity. the earlist report on anti cancer activity of these proanthocyanidins was in 1996 in a University of Illinios in Vaccinium species. A study by Guthrie in 2000 reported that cranberry juice inhibited breast tumor growth. (Guthrie N. Effect of cranberry juice and products on human breast cancer cell growth. san Deigo: Experimental Biology: 2000) and in 2004, Ferguson and his associates showed that an extract of cranberry presscake inhibited proliferation of MCF-7 and MDA-MB-435 breast cancer cells.(Ferguson P, Kurowska E, Freeman DJ, Chambers AF, Koropatnick DJ.A flavonoid fraction from cranberry extract inhibits proliferation of human tumor cell lines. J Nutr. 2004;134:1529–35.)

4. Anti- Inflammatory Property

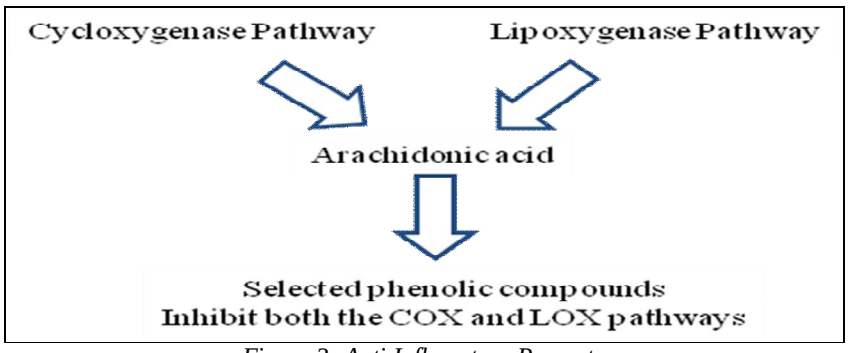

Figure 3: Anti Inflamatory Property

5. Anti- Microbial Property

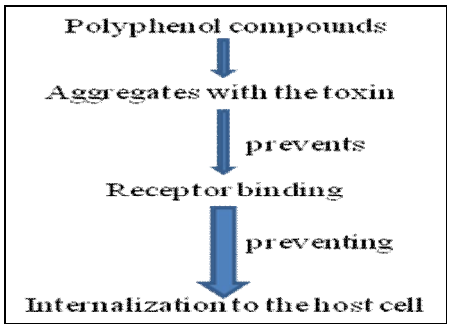

Figure 4: Anti microbial property

It has other properties like anti-viral property, anti- allergic property, anti Porphyromonas gingivalis,
Nitric oxide synthase activity:

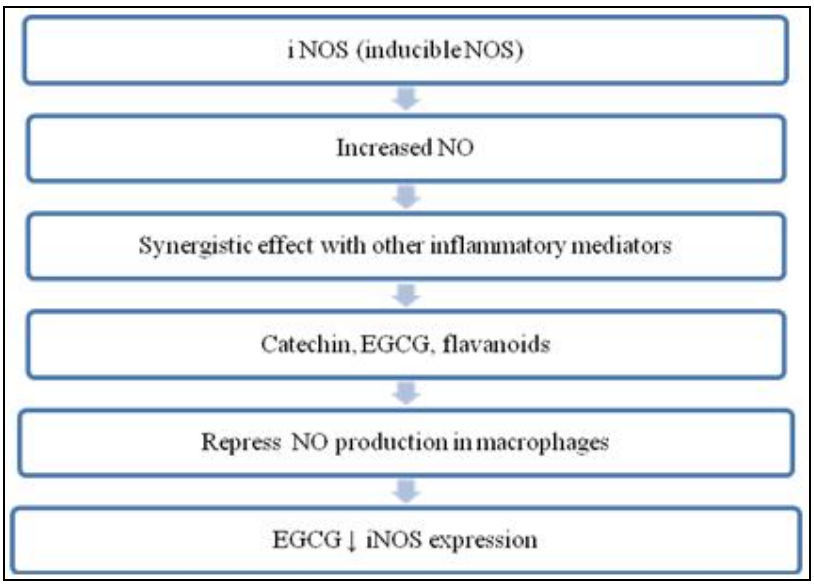

Figure 5: Nitric oxide synthase (NOS) activity

Reduces the hyper-pigmentation in chloasma

6. References

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