The anti-ageing and anti-tumour effects of Fermented Papaya Preparation (FPP®)

A new neo-adjuvant cancer therapy?

When one hears the term ‘antioxidant’, it may bring to mind the virtuous feeling associated with a fresh kale and blueberry smoothie — and with good reason. Antioxidants are abundant in fruits and vegetables and include vitamins A, C, and E, beta-carotenes, lycopene, and polyphenols, also present in other food products such as coffee, green tea, nuts, and dark chocolate.

Antioxidants are compounds that defend our cells from oxidative stress (DNA damage inflicted by Reactive Oxygen Species (ROS) leading to oxidation, which is when a molecule loses an electron, thus becoming ‘unstable’). Chronic, accumulative, oxidative stress increases the risk of age-related diseases such as cancer, diabetes, and heart disease, as well as neurodegenerative conditions such as Parkinson’s disease and Alzheimer’s.

FERMENTED FOODS: SUPERHEROES OF THE ANTIOXIDANT WORLD

A somewhat unexpectedly rich source of dietary antioxidants comes from fermented foods. Fermentation is a natural process that usually takes place in anaerobic environments and utilises the by-products created by bacteria (such as Lactobacillus buchnerii), moulds (eg, Penicillium roqueforti), and yeasts (such as Saccharomyces cerevisiae) to produce alcohol or acid, commonly lactic acid, from sugars. The fermentation process increases the antioxidant capacity of foods such as fruit, vegetables, milk, and fish, and preserves food products, increasing their nutritional value and giving them pleasantly tangy flavours. Fermentation has come back into vogue in recent years, as pleasingly tangy flavoured 'gami' is produced from the roots of the cassava plant, which is poisonous without proper fermentation.

Furthermore, fermented foods are an excellent source of probiotics (living strains of ‘good’ bacteria) and prebiotics (including the pH, nutrient profile and participating cells) is vital. Using the power of these in combination with other good habits like exercise, stress management and a balanced diet can help to fight age-related conditions.

Administering FPP® three days before inoculation with melanoma provided dramatically preventative effects.

To investigate the tumour-fighting and anti-ageing applications of papaya, Professor Stefano Fais and colleagues at the NIH have probed further into the health benefits of Fermented Papaya Preparation (FPP®), yielding some very promising results.

It is worth noting that the FFP used in Professor Fais’ experiments undergo a long fermentation period (around nine to twelve months) and as such, it is highly likely that this ‘superfood’ not only contains the fruits’ plentiful natural benefits, but is also a bountiful source of secondary metabolites (a substance that aids growth, development or immune function but is not essential for survival) which makes them an excellent source of pre-biotics.

FERMENTED PAPAYA AND MELANOMA

In the growth and metastasis (spreading) of a tumour, the tumour ‘micro-environment’ (including the pH, nutrient profile and participating cells) is vital. Using the power of these in combination with other good habits like exercise, stress management and a balanced diet can help to fight age-related conditions.

The fruit of the Carica Papaya plant has long been celebrated as a champion of traditional indigenous practices for its potent antioxidant, anti-inflammatory and anti-ageing properties. Additionally, papaya has been shown to have potential oncological applications, fighting accumulation of cancer-causing free radicals. To investigate the anti-cancer and anti-ageing properties of this fascinating fruit, Professor Stefano Fais, head of Research at the department of Oncology and Molecular Medicine at the Italian National Institute of Health, has conducted research into the beneficial effects of Fermented Papaya Preparation (FPP®), commercial name Immun'Âge®, Osaka Research Institute, Gifu, Japan) in mouse models.

Fermentation is a critical method for ensuring food safety and preservation. Fermentation is also important for removing toxins; in modern West African cultures, a starchy flour called ‘garri’ is produced from the roots of the cassava plant, which is poisonous without proper fermentation.

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The antioxidant effect of FPP® to stimulate possible future approach may be to use and destroy tumour cells – therefore a decrease in ROS and an increase in antioxidants in the plasma. The build-up of free radicals during the development of a tumour may dramatically inhibit the health benefits of FPP® in mice inoculated with B16 melanoma (an aggressive form of skin cancer) – prior to this study there was little research on the anti-tumour applications of FPP®.

To quantify the anti-tumour effect of FPP®, blood was taken from the mice and the levels of ROS were measured. The results demonstrated that FPP® mechanism of action was associated with a decrease in ROS and an increase in antioxidants in the plasma. The build-up of free radicals during the development of a tumour may dramatically inhibit the immune system’s ability to recognise and destroy tumour cells – therefore a possible future approach may be to use the antioxidant effect of FPP® to stimulate the immune system into fighting the cancer cells more effectively.

Treatments were delivered sublingually (a tablet placed under the tongue) and by oral gavage (feeding through a needle passed down the oesophagus into the stomach). Sublingual proved the most effective, as well as proving less distressing for the murine (rodent) participants.

The study demonstrated that the optimal dose of FPP® in mouse models was 200 mg/kg per day, with treatment starting seven days after inoculation with the melanoma cells. This achieved a significant reduction in tumour size compared to untreated mice controls, and reduction in the tumour size was observed 13 days after inoculation, with as little as six consecutive days of treatment with FPP®.

Using FPP® as a neo-adjuvant therapy looks to be very promising in improving prognosis and treatment effectiveness. Prevention and early diagnosis of melanoma are the most promising therapeutic strategies, as late-stage melanomas carry with them a poor prognosis. Using FPP® as a neo-adjuvant therapy (treatment given as a first step, before surgery or chemotherapy) looks to be very promising in improving prognosis and treatment effectiveness.

THE ANTI-AGEING EFFECTS OF FERMENTED PAPAYA
Professor Fais and his colleagues at the NIH conducted further research into the health benefits of FPP® in 2020, investigating its therapeutic effects on age-related degeneration and oxidative stress.

Fermented foods – such as sauerkraut (German fermented cabbage) and kimchi (Korean fermented vegetables) – are a rich source of dietary antioxidants.

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References


Personal Response
What further research would you like to conduct into the anti-cancer and anti-ageing properties of FPP®?

We are performing new in vivo experiments in a model of ‘induced ageing’ by daily treatment with hydrogen peroxide, with the aim to investigate the potential effects of FPP® in treating acute intoxication. In these experiments, the effect of FPP® will be tested in the ability of cells obtained from haemopoietic organs, such as spleen and bone marrow, to release immunoglobulins, in order to definitively show a direct effect of FPP® on the immune response. To date, this research area has not been studied in much detail and therefore lacks scientific data.