Green tea component may help preserve stored platelets, tissues

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In two separate studies, a major component in green tea, epigallocatechin-3-O-gallate (EGCG), has been found to help prolong the preservation of both stored blood platelets and cryopreserved skin tissues.

Published in the current double issue of *Cell Transplantation* (18:5/6), now freely available on-line at http://www.ingentaconnect.com/content/cog/ct, devoted to organ preservation and transplantation studies from Japan, the two complimentary studies have shown that EGCG, known to have strong anti-oxidative activity, can prolong platelet cell "shelf life" via anti-apoptosis (programmed cell death) properties and preserve skin tissues by controlling cell division.

Dr. Suong-Hyn Hyon, lead author on both studies and associate professor in the Institute for Frontier Medical Sciences in Kyoto, Japan, says that EGCG, a green tea polyphenol, is a known anti-oxidation and anti-proliferation agent, yet the exact mechanism by which EGCG works is not yet known. However, some of the activity of EGCG is likely to be related to its surface binding ability.

Enhanced platelet preservation

Using standard blood banking procedures, the storage duration for platelet cells (PCs) is limited to five days internationally or three days in

Japan. During storage, PCs undergo biochemical, structural and functional changes, and PCs may lose membrane integrity and haemostatic functions, such as aggregability and affinity for surface receptors. Thus, PC shortages often occur. When EGCG was added to blood platelet concentrates, aggregation and coagulation functions were better-maintained after six days, perhaps due to EGCG's anti-oxidative ability. Researchers suggested that EGCG inhibited the activation of platelet functions and protected the surface proteins and lipids from oxidation.

"Functions were restored by the maintained surface molecules with the detachment of ECGC by washing," noted Dr. Hyon. "EGCG may lead to an inhibition of platelet apoptosis and lower rates of cell death, offering a potentially novel and useful method to prolong platelet storage period."

EGCG enhances life of cryopreserved skin grafts

Another team of Japanese researchers studied the effects of using EGCG on frozen, stored skin tissues. As with platelet storage, the storage of skin tissue for grafting presents problems of availability and limitations on the duration of storage.

"To provide best outcomes, skin grafts must be processed and stored in a manner that maintains their viability and structural integrity until they are needed for transplantation," explained Dr. Hyon. "Transplant dysfunction often occurs as the result of oxidation. A better storage solution could prevent this."

It is known that polyphenols in green tea promote the preservation of tissues, such as blood vessels, cornea, islet cells, articular cartilage and myocardium at room temperature. Also, it is known that ECGC has stronger anti-oxidant activities than vitamin C because of its sterochemical structure and is reported to play an important role in

preventing cancer and cardiovascular diseases.

This study examined how EGCG might help extend the preservation duration of frozen rat skin tissues and found that skin grafts could be protected from freeze-thaw injuries when EGCG was absorbed into various membrane lipids and proteins. Results of the study showed that EGCG enhanced the viability and stored duration of skin grafts up to seven weeks at 4 degrees C.

"The storage time of skin grafts was extended to 24 weeks by cryopreservation using EGCG and the survival rate was almost 100 percent," noted Dr. Hyon."

"These studies highlight the benefits of using natural compounds such as ECGC to enhance the preservation of stored tissues, possibly due to their anti-oxidative properties," said Dr. Naoya Kobayashi, guest editor of this double issue of *Cell Transplantation*.

Source: Cell Transplantation Center of Excellence for Aging and Brain Repair