

# Does green tea shrink cancer cells?

A number of scientific studies shown evidences of EGCG's anti-metastatic and anti-cancer activities at numerous points regulating cancer cell growth, survival, and metastasis, including effects at the DNA, RNA, and protein levels.

"Green tea constituent (-) epigallocatechin-3-gallate (EGCG) has shown remarkable cancer-preventive and some cancer-therapeutic effects. This is partially because of its ability to induce apoptosis in cancer cells without affecting normal cells."\*1

Apoptosis is a programmed cell death. This anti-tumor mechanism of green tea has been observed at various levels, including inhibition of cell-cycle progression, activation of caspases as enzyme helping apoptosis, regulating activity of other enzymes such as mitogen-activated protein kinases, etc. \*2

Also, green tea catechins prevented cancer cells from the penetration through the basement membrane. "EGCG inhibited the adhesion of cancer cells to endothelial cell layers." \*2 In a separate study, "metastasis was inhibited via effects on urokinase and matrix metalloproteinases (MMPs)."

\*3 EGCG inhibited the gene expression of MMPs as well. \*4

Much scientific attention has been paid to the anti-cancer activity of green tea. PubMed.gov is the website run by US National Library of Medicine National Institute of Health. When I entered "green tea apoptosis" as keywords in the search query today, the web showed 551 studies. When I entered "green tea cancer" as keywords, the site had over 1,000 studies. Go to <http://www.ncbi.nlm.nih.gov/pubmed> to do your own research.

## References:

\*1 "Essential role of caspases in epigallocatechin-3-gallate-mediated inhibition of nuclear factor kappa B and induction of apoptosis" Gupta S, Hastak K, Afaq F, Ahmad N, Mukhtar H. (2004) Dpt. of Urology, Case Western Reserve University, Cleveland, OH

\*2 "Health-promoting effects of green tea" Yasuo Suzuki, Noriyuki Miyoshi, Mamoru Isemura (2012) Faculty of Human Life Sciences, Nagoya Keizai University

\*3 "Mechanisms of cancer prevention by green and black tea polyphenols" Beltz LA, Bayer DK, Moss AL, Simet IM. (2006) Dpt. of Biology, University of Northern Iowa, Cedar Falls, IA

\*4 "Association of suppression of extracellular signal-regulated kinase phosphorylation by epigallocatechin gallate with the reduction of matrix metalloproteinase activities in human fibrosarcoma HT 1080 cell" Maeda-Yamamoto M, Suzuki N, Sawai Y, Miyase T, Sano M, Hashimoto-Ohta A, Isemura M. (2003) J. Agric. Food Chem.

## Cancer Research Terms Glossary

### RNA

Like DNA, RNA is made up of a long chain of components called nucleotides. Unlike DNA, most RNA molecules are single-stranded and can adopt very complex three-dimensional structures. RNAs can achieve chemical catalysis, like enzymes. (by Wikipedia)

### Apoptosis

The process of programmed cell death (PCD) that may occur in multicellular organisms. Biochemical events lead to characteristic cell changes and death. These changes include blebbing, cell shrinkage, nuclear fragmentation, chromatin condensation, and chromosomal DNA fragmentation (by Wikipedia)

### **Caspase**

Caspases are essential in cells for apoptosis, or programmed cell death, in development and most other stages of adult life, and have been termed "executioner" proteins for their roles in the cell. Some caspases are also required in the immune system for the maturation of lymphocytes. Failure of apoptosis is one of the main contributions to tumor development and autoimmune diseases. (by Wikipedia)

### **Mitogen-activated protein kinases**

Protein kinases and other messenger systems form highly interactive networks to achieve the integrated function of cells in an organism. To understand the signaling mechanism for any agent, its repertoire of signal transducers and their interactions within this network must be defined within the cellular context. This includes the production of second messengers, activation of protein kinases, and the subcellular distribution of these transducers to bring them into contact with appropriate targets. Within the repertoire of signaling molecules in the network is a family of protein kinase cascades known as mitogen-activated protein (MAP) kinase modules. These cascades contain at least three protein kinases in series that culminate in the activation of a multifunctional MAP kinase (1, 2, 3). MAP kinases are major components of pathways controlling embryogenesis, cell differentiation, cell proliferation, and cell death. *"Mitogen-Activated Protein (MAP) Kinase Pathways: Regulation and Physiological Functions"* <http://edrv.endojournals.org/content/22/2/153.full>

### **Basement membrane**

A thin sheet of fibers that underlies the epithelium, which lines the cavities and surfaces of organs including skin, or the endothelium, which lines the interior surface of blood vessels. (by Wikipedia)

### **Metastasis:**

1. The process by which cancer spreads from the place at which it first arose as a primary tumor to distant locations in the body.
2. The cancer resulting from the spread of the primary tumor. For example, someone with melanoma may have a metastasis in their brain. And a person with colon cancer may, fortunately, show no metastases. (by MedicineNet.com)

### **Matrix metalloproteinases (MMPs)**

Play a central role in many biological processes, such as embryogenesis, normal tissue remodeling, wound healing, and angiogenesis, and in diseases such as atheroma, arthritis, cancer, and tissue ulceration. Currently 23 MMP genes have been identified in humans. (by American Heart Association Circulation Research. 2003 Review *"Matrix Metalloproteinases and Tissue Inhibitors of Metalloproteinases Structure, Function, and Biochemistry"*) <http://circres.ahajournals.org/content/92/8/827.full>