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Effects of Sulforaphane, Glycine and FOLFOX on both human colorectal cancer and endothelial cells

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FOLFOX is standard chemotherapy in colorectal cancer. However, severe side effects as well as tumor recurrence limit outcome after FOLFOX. Thus, this study was designed to evaluate effects of phytochemical Sulforaphane and the non-toxic amino acid Glycine as substances with properties that are potentially chemopreventive and chemosensitizing:

This study clearly demonstrated that both Sulforaphane and Glycine do not harm human non-malignant cells such as fibroblasts and endothelial cells at doses being effective to treat colorectal cancer; however, Sulforaphane was non-toxic to fibroblasts if used in doses high enough to address colorectal cancer.

Results presented here confirm activation of a disintegrin and metalloproteinase-17 (ADAM-17). Further up-regulation of ADAM-17 is also associated with both colony and sphere formation which is a marker for cancer stem cells. FOLFOX does not have impact on both colony and sphere formation; however, decreasing ADAM-17 with Sulforaphane significantly decreases colony and sphere forming of cancer stem cells. Further ALDH and CD44 both markers for cancer stem cells have been influenced likewise.

Sulforaphane together with FOLFOX decreases cell viability of colorectal cancer via mechanisms including ADAM-17 which is involved in chemosensitization.

FOLFOX increased soluble growth factor shedding derived from colorectal cancer. This is of great importance for neo-angiogenesis further promoting tumor growth. Most interestingly both Sulforaphane and Glycine synergistically blocked VEGF signalling in endothelial cells.

Clinical trials are warranted to confirm the phenomena studied here. If confirmed in humans Sulforaphane would increase anti-cancer effects of FOLFOX including chemosensitising of both colorectal cancer and cancer stem cells. Alternatively the dose of FOLFOX could be reduced if combined with Sulforaphane to lower side effects. Further the non-toxic hepatoprotective Glycine would further reduce tumor growth with decreased neo-angiogenesis.