An Exploration of the Effects of Diet on Liver Cancer and Angiogenesis

Beck, Skye (School: International School of Luxembourg)

Angiogenesis is the process of blood vessel growth in the body. It was recently discovered that angiogenesis is the root of over 70 major diseases affecting over 1 billion people worldwide, one of which is cancer. With diet being the leading cause of liver cancer, the aim of this narrative was to see how diet impacted angiogenesis, and subsequent liver cancer. In research, the main key words were: Cancer, US, Diet, Angiogenesis, Anti-Angiogenic Foods, Obesity, Resveratrol, Ellagic Acid, Genistein, Energy Density, and Culture. Data was only collected from papers dated from 2000-2021 for relevance and reliability, and both short and longitudinal studies were analyzed. In vitro and in vivo studies showed that the chosen dietary factors: ellagic acid, genistein and resveratrol all inhibited angiogenesis. Phenol functional groups in the factors decreased levels of PKG-1 kinase proteins in the blood, and also augmented levels of MMP-2, -9 secretion and activity from genistein. Factors were also found to inhibit VEGFR-2 pathway signaling. Research was based on liver cancer, but was applicable to nearly all cancers. Foods high on the glycemic index, like processed fats and sugars had the inverse effect. Saturated and unsaturated-trans fats increased energy density in fat storage, thus increasing angiogenesis and the risk of cancer. When comparing different US cultures, higher energy density positively correlated with cancer, some with 33% higher rates. Conclusions found positive and negative effects of diet on angiogenesis and subsequent cancer. Data suggested diet has a more negative impact but there is not enough data in the field presently to draw accurate conclusions. This opens up to a whole field of epigenetics and gene expression with endless future work.

Awards Won: