Role of PUFA in cancer:

A Handout prepared by Prof. S.P. Trivedi, Department of Zoology University of Lucknow, Lucknow-226007

Polyunsaturated fatty acids (**PUFAs**) are amphipathic fatty acids that contain **more than one double bond** in their backbone. They include two series of fatty acids: omega-6 and omega-3.

Biological Action of PUFAs:

- Maintaining cell-membrane fluidity, inhibiting inflammatory processes
- Decreasing secretion of pro inflammatory cytokines by monocytes/macrophages
- Decreasing susceptibility to ventricular rhythm disorders of the heart
- Improving functions of vascular endothelial cells, inhibiting blood platelet aggregation and decreasing triglyceride synthesis in the liver.

In an organism, aracidonic acid (ARA) is converted to prostanoids series 2 (PGE2, PGI2, TXA2) and leukotrienes series 4 (LTB4, LTC4, LTD4) which are endowed with pro-inflammatory potential and are able to induce platelet aggregation and vasoconstriction. The metabolism of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) gives prostanoids series 3 (PGE3, PGI3, TXA3) and leukotrienes series 5 (LTB5, LTC5, LTD5); this group of eicosanoids shows anti-inflammatory, antiplatelet and antiarrhythmic properties.
Cancer

Cancer, also called malignancy, is an abnormal growth of cells. There are more than 100 types of cancer, including breast cancer, skin cancer, lung cancer, colon cancer, prostate cancer, and lymphoma
1975 – correlational study of incidence of 27 cancers in 23 countries and dietary intake
Further Evidence:
Case-Control and Cohort Studies
Doll and Peto (1981) 35% of cancer deaths may be attributed to dietary factors
Doll R, Peto R. The causes of cancer. JNCI 1981; 66:1191-1308
World Cancer Research Fund (1997) Cancer incidence can be reduced by 30%-40% with diet, physical activity and appropriate body size.
World Cancer Research Fund,. Food, Nutrition and the Prevention of Cancer: a Global Perspective. Washington DC (USA): American Institute for Cancer Research; 1997: 310-323.

CONCLUSION

- Polyunsaturated fatty acids derived from marine sources, including EPA and DHA, are widely consumed as supplements within the community, including cancer patients.
- The prescription of n-3 LCPUFAs in a therapeutic context is also increasing in patients receiving treatment for a range of cancer types. There is also now sufficient literature to suggest that the use of supplements containing EPA and DHA may have potential as an effective adjuvant to chemotherapy treatment and may help ameliorate some of the secondary complications associated with cancer.
- Supplementation with fish oil (>3 g per day) or EPA/DHA (>1 g EPA and >0.8 g DHA per day) is associated with positive clinical outcomes. However, other components of fish oil may be detrimental to cancer treatment, and further research is still required to

determine the mechanisms by which both marine-derived n-3 PUFAs and other fish-oil derived compounds are mediating their effects.