More omega-3, less omega-6 better for prostates

22/06/2007 - **Increasing omega-3 fatty acid levels, and decreasing levels of omega-6, could reduce the risk of prostate cancer risk in individuals with a genetic predisposition to cancer, if results from an animal study can be translated to humans.**

"This study clearly shows that diet can tip the balance toward a good or a bad outcome," said researchers from Wake Forest University School of Medicine. *"It's possible that a change in diet could mean the difference between dying from the disease and surviving with it."*

Over half a million news cases of prostate cancer are diagnosed every year world wide, and the cancer is the direct cause of over 200,000 deaths. More worryingly, the incidence of the disease is increasing with a rise of 1.7 per cent over 15 years.

The new study adds to a growing body of evidence linking an increased omega-3 to omega-6 intake ratio to improved health. In August of last year, researchers from the David Geffen School of Medicine at UCLA reported that changing the ration of omega-3 to omega-6 in the typical Western diet might reduce prostate cancer tumour growth rates and PSA levels (*Clinical Cancer Research*, Vol. 12, Issue 15).

Moreover, researchers from the Paterson Institute, a cancer research institute funded by British charity Cancer Research UK and affiliated with the University of Manchester reported that omega 6 fats increased the spread of prostate tumour cells into bone marrow, while omega-3 fatty acids were seen to block this invasion (*British Journal of Cancer*, doi: 10.1038/sj.bjc.6603030).

The new research, published in the July issue of *Journal of Clinical Investigation*, used mice engineered with a genetic defect that caused prostate cancer - *Pten*-knock-out mice. The Pten gene - a tumour suppressor gene - results in the spontaneous development of prostate cancer. The Pten gene is reportedly absent in 60 to 70 per cent of metastatic cancers in humans.

From birth the mice were randomly assigned to eat one of three diets with differing omega-6 to omega-3 ratios - one to one (high omega-3), 20 to one (low omega-3), or 40 to one (high omega-6).

Lead author Isabelle Berquin and co-workers report that mice with the tumour suppressor gene did not develop tumours and had 100 per cent survival, regardless of diet. In mice with the gene defect, on the other hand, survival was 60 per cent in animals on the high omega-3 diet, 10 per cent in those on the low omega-3 diet and 0 per cent in those on the high omega-6 diet.

"This suggests that if you have good genes, it may not matter too much what you eat," said researchers. *"But if you have a gene that makes you susceptible to prostate cancer, your diet can tip the balance. Our data demonstrate the importance of gene-diet interactions, and that genetic cancer risk can be modified favourable by omega-3 PUFA."*

The researchers wrote that the mechanisms behind such observations remain elusive.

"It remains to be determined whether there is a critical omega-6/omega-3 ratio threshold for achieving maximal tumour suppression," wrote researchers.

"Clinically, prostate cancer is usually diagnosed in men age 60 or older, and cancer cells proliferate slowly. Therefore, dietary and/or chemoprevention are of particular importance for the management of prostate cancer. Our data imply a beneficial effect of omega-3 PUFAs on delaying the onset of human prostate," they added.

Previously, researchers from other groups have proposed the role of metabolites of omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), and the omega-6 acid, arachidonic acid as playing a important role in carcinogenesis. These three fatty acids compete to be converted by cyclooxgenase enzymes (COX-1 and COX-2) into prostaglandins, which can become either pro-inflammatory and increase tumour growth, or anti-inflammatory and reduce growth.

Commenting independently on the researcher, researchers at British Charity Cancer Research UK, said: "*These results are interesting and throw more ideas into the pot about the link between diet and cancer. Although this work is at a very early stage, it raises the possibility that omega-3 might help delay or prevent the onset of prostate cancer, although this is by no means conclusive.*

"This study has helped shed light on the molecular processesinside our cells that might underlie this effect," they added.