Alpha-tocopherol status in patients with rheumatoid arthritis: Relationship to antioxidant activity.

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Free radical damage has been implicated in many pathological conditions including rheumatoid arthritis (RA). In patients with sero-positive RA, the serum and the synovial fluid contain an antibody (rheumatoid factor), directed against the Fc portion of the heavy chain of immunoglobulin G. The antigen-antibody complexes so formed can initiate an Arthus reaction within the joint, leading to an influx of polymorphonuclear leucocytes (PMN). During ingestion of the complexes the PMN can release both proteolytic enzymes, (elastase being the most important) and oxidants such as hydrogen peroxide, superoxide and the hypochlorite. These oxygen derived species can damage cartilage and other joint components (1), and can also cause peroxidation of membrane lipids (2). The action of elastase is normally opposed by serum inhibitors, of which the most important is probably alpha-1-proteinase inhibitor (API). API itself can be inactivated by oxidants (3) the action of which can be enhanced by the presence of iron complexes and opposed by extracellular antioxidants such as caeruloplasmin (2, 4).

We have previously demonstrated that API in the serum from patients with RA is much more readily inactivated by H2O2 as compared to normal subjects (5). This has subsequently been shown to be due to a decreased serum ratio of catalase to haemoglobin in RA, probably reflecting a greater rate of oxidative inactivation of this enzyme (of erythrocytic origin) in the patients (6). We have also shown that the ratio of functional to total API in RA is significantly reduced as compared to controls (7).

In the light of such evidence of enhanced oxidative challenge in RA, we have also investigated the level of alpha-tocopherol (AT) in the serum and the synovial fluid of RA patients and in the serum of control subjects. This was of interest, since AT is the major (but not the only) lipid-soluble chain-breaking antioxidant in the serum. Blood samples were collected from 11 sero-positive and 11 control subjects. Synovial fluid (SF), from 7 of the RA patients and 7 synovial fluid samples from RA patients and 11 serum samples from control subjects.

The concentration of AT in the synovial fluid varied markedly. This might relate to the severity of the disease, although it is not possible to say whether low levels of AT in the synovium contribute to oxidative damage of the joint or are an indirect marker of the local oxidative stress.

Alpha-tocopherol level in serum and synovial fluid from patients with rheumatoid arthritis and in the serum of control subjects. Results presented as mean +/- SD for 11 serum and 7 synovial fluid samples from RA patients and 11 serum samples from control subjects.

References: