ALLERGY, VITAMINS

VITAMIN A AND ALLERGY

28.09.2007

No, I am not confusing here vitamin A and vitamin D as done in the early days of vitamin research. This post is really about vitamin A (but with similar nomenclature problem as with vitamin D). Retinol is ingested in a precursor form; animal sources like liver (–>cod liver oil) contain retinyl esters, whereas plants like carrots contain carotenoids. Wikipedia has the formulas

> Hydrolysis of retinyl esters results in retinol while pro-vitamin A carotenoids can be cleaved to produce retinal. Retinal, also known as retinaldehyde, can be reversibly reduced to produce retinol or it can be irreversibly oxidized to produce retinoic acid.

I am primarily interested in retinoic acid as – in analogy to cholecalciferol – this substance has now well documented immunological effects. Just visit JEM for a recent editorial and several original papers. The editorial demystifies oral tolerance. Provitamin A is transformed into retinoic acid by gut-associated DCs and enhances the conversion of T cells into FoxP3+ T reg cells by a TGF-ß-dependent mechanism.

So certainly, a good time to ask if excess consumption (or deficit) of vitamin A may be related to allergy. Here are few snippets what's being already known about vitamin A and allergy – and my interpretation of the vitamin A effect

- Retinyl palmitate, a retinol ester, can lead to contact dermatitis link
- Vitamin A levels in children with asthma were found to be lower than in controls link1 + link2
- Vitamin A deficiency promotes bronchial hyperreactivity in rats link
- an European Community Respiratory Health Survey (ECRHS) meta-analysis showed reduced sensitization risks for vitamin A intake link
- Retinol concentration in young infants is inversely associated with the subsequent development of allergic symptoms link
- Increased intake of retinol reduced the risk of atopic dermatitis link
- lower alpha-carotene intake in asthmatics link1+link2
- Vitamin A treated mice were less capable of resolving the inflammatory response elicited during sensitization link

Somewhat confusing low exposure/low levels bringing up an allergy risk – contrary to the general opinion but may be assumed from some model experiments.

Addendum

16 Oct 2007 Found the abstract #318 in JACI Jan 2002; S114

318 Vitamin D3 (VD) and Retinoic Acid (RA) Inhibit IgE Production In Vitro From Normal and Atopic Donors

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the nucleus of CD40+IL-4 stimulated B cells. To finally study VD and RA as a therapeutical agents for IgE mediated diseases, IgE production in PBMC from atopic donors was analysed in the presence of VD and RA. PBMC were cultured with VD and RA (10e8-10e6M) and IgE production was modestly inhibited in these patients. Maximal inhibition of baseline IgE production occurred at 10e6M of each component, however, when VD and RA were combined (10e6M) inhbition of IgE production reached up to 42% (n=3). In conclusion, we show that RA and VD are potent inhibitors of IgE production in vitro. Their possible therapeutical role is indicated by the

Addendum

Vitamin A content in cod liver oil may be enormous: 5 ml may contain 1,000 ug/3,300 IU vitamin A which is now gradually reduced.

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Injection of liposomal retinoic acid increases OVA induced IgE – ag-

onistic effect to vitamin D.
Retinoic acid imprints gut homing specificity of T cells – clearly antagonistic.