11.61 Carotenoids

Beta-carotene  
Alpha-carotene  
Beta-cryptoxanthin  
Lutein  
Zeaxanthin  
Lycopene

Many carotenoids are pigments, meaning they are colored. The table below gives the color of some of these carotenoids, as well as some food sources.

Table 11.611 Carotenoids’ color and food sources

<table>
<thead>
<tr>
<th>Carotenoid</th>
<th>Color</th>
<th>Food Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta-carotene</td>
<td>Orange</td>
<td>Carrots, Sweet Potatoes, Leafy Greens</td>
</tr>
<tr>
<td>Lycopene</td>
<td>Red</td>
<td>Tomatoes, Watermelon, Pink Grapefruit</td>
</tr>
<tr>
<td>Lutein/Zeaxanthin</td>
<td>Yellow</td>
<td>Kale, Corn, Egg Yolks, Spinach</td>
</tr>
</tbody>
</table>

Carotenoids can be further classified as provitamin A or non-provitamin A. Provitamin A carotenoids are those that can be cleaved to form retinal, while the non-provitamin A carotenoids cannot. The structure and classification of the 6 major carotenoids is shown below.

Figure 11.611 Structure and classification of the 6 major carotenoids
After provitamin A carotenoids are taken up into the enterocyte, some are cleaved to form retinal. In the case of symmetrical beta-carotene, it is cleaved in the center to form 2 retinal molecules as shown below.

Alpha-carotene and beta-cryptoxanthin are asymmetrical, thus they can be used to form only 1 retinal.

To help account for the fact that retinol can be made from carotenoids, the DRI committee made retinol activity equivalents (RAE) that take into account the bioavailability and bioconversion of the provitamin A carotenoids.

1 ug RAE

= 1 ug of retinol
= 2 ug of supplemental beta-carotene
= 12 ug of dietary beta-carotene
= 24 ug of alpha-carotene or beta-cryptoxanthin

References & Links