

Carrots and Vision

Children are told to eat their carrots so they can see better. This is a plausible story because carrots contain lycopene which our bodies can convert beta-carotene, then to retinol (vitamin A) and finally to retinal, the key light-detecting chemical in our eyes. In fact, however, we get vitamin A from lots of other foods as well.

The source of this story, however, is quite interesting. During World War II as the Germans were bombing England, the English anti-aircraft gunners were quite successful at hitting German airplanes at night because the allies had just invented radar and were using it. To throw the Germans off, the story was put out that our gunners were so good because they ate lots of carrots and had better night vision as a result.

The diagram at the right shows the molecular structures of some key molecules associated with vision in animals. Eating tomatoes, carrots and other colored vegetables give us lycopene which our bodies can convert to beta-carotene and then into retinol, also known as Vitamin A.

Retinol and a closely related chemical, retinal, are used in a cyclic process taking place in the rods and cones of our eyes. That process converts light energy of individual photons into electrical energy to be sent to the brain and experienced as vision.

Many proteins assist in this process as enzymes, but one called rhodopsin is particularly important. A bent form of retinal, 11-cis retinal, is attached to rhodopsin, and upon absorbing a photon changes to the straight form, full-trans retinal. This change induces a change in the rhodopsin that in turn initiates a cascade of molecular changes that ends with a nerve impulse being sent.

All intermediate forms of the molecules are then reset to their original form to be ready for another photon. The chemistry of it is a marvelous process that has only recently been fully understood.

