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## **Researchers Determine That Golden Rice Is an Effective Source of Vitamin A**

**Background** Vitamin A is essential for a plethora of functions including eyesight, reproduction, growth, and immune function. Despite current interventions, vitamin A deficiency (VAD) remains a serious problem worldwide. Rice-consuming populations are especially vulnerable to VAD because regular rice does not contain vitamin A or its precursors, and intake of vitamin A-containing meat is low. An alternative to animal products as a source of vitamin A is the provision of provitamin A carotenoid-rich foods, because the body makes vitamin A from some of these compounds. Unfortunately, results from several recent studies in which the effects of increased consumption of selected carotenoid-rich food on vitamin A status were measured suggest very little effect on vitamin A status. Golden Rice is genetically modified rice created to address VAD-related morbidity and mortality in rice-consuming populations. However, the extent to which  $\beta$ -carotene from Golden Rice can be converted to vitamin A was not known until researchers very recently studied this in humans. Their results are published in the June 2009 issue of *The American Journal of Clinical Nutrition*.

**Study Design** Golden Rice plants were grown hydroponically in water enriched with deuterium, the naturally occurring, nonradioactive isotope of hydrogen. This resulted in the incorporation of small amounts of stably labeled hydrogen atoms in the rice's  $\beta$ -carotene molecules. This state-of-the-art technique allows researchers to "follow" nutrients as they are absorbed by and used in the body. When the rice was mature, it was harvested and processed. Five healthy volunteers (2 men and 3 women; mean age: 59 y) were then recruited for a 36-d trial consisting of 2 main parts. First, they consumed a supplement containing stably labeled vitamin A along with a rice-based breakfast. Eight days later, they consumed a similar breakfast except that stably labeled Golden Rice (providing 0.99–1.53 mg  $\beta$ -carotene) was used instead of regular rice. Blood samples were then taken repeatedly for measurements of stably labeled  $\beta$ -carotene and vitamin A (retinol), and conversion rates were calculated.

**Results** The data from this study indicate that, after consumption, the stably labeled  $\beta$ -carotene from the Golden Rice was absorbed intact in the gastrointestinal tract. Subsequent conversion of  $\beta$ -carotene to vitamin A was estimated to occur at a rate of 3.8 to 1. This is much better than the rates of 10:1 to 27:1 estimated previously for colored vegetables such as spinach and carrots.

**Conclusions** These results show the potential for a much more advantageous bioconversion rate than achieved from any other known crop-based source of  $\beta$ -carotene. Furthermore, they imply that Golden Rice could probably supply 50% of the Recommended Dietary Allowance (RDA) of vitamin A from a very modest amount—perhaps a cup—of rice, if consumed daily. This amount is well within the consumption habits of most young children and their mothers.



Reference

Tang G, Qin J, Dolnikowski GG, Russel RM, Grusak MA. Golden Rice is an effective source of vitamin A. *American Journal of Clinical Nutrition* 2009;89:1776–83.

**For More Information**

For the complete article, please go to the following URL:

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