

WebQuest: Beta-What?

A look at carbohydrates and our immune system

Teacher Resource

This activity will assist in meeting the following Prescribed Learning Outcomes in the British Columbia Integrated Resource Package (2006) for Biology 11/12:

- A3 Interpret data from a variety of text and visual sources
- B4 Analyse the structure and function of biological molecules in living systems (carbohydrates)
- C7 Describe the inter-relationships of the structures of the lymphatic system

This activity requires students to do some research, on prescribed websites, regarding a class of carbohydrates known as beta-glucans. These are important carbohydrates in human immune response. Students will read articles, and watch videos from a wide variety of sources. There is some controversy in the medical field about the trend for some people to focus exclusively on diet modification as a method of treating cancer. Students will be presented with the question: “Should diet modification replace traditional medicine as a cancer therapy?” Students will be required to create an infographic to present their findings.

Link to WebQuest:

<http://betaglucansandimmuneresponse.weebly.com/>

A summary of the science behind beta-glucans is included below.

1. What are beta-glucans?
Beta-glucans are polysaccharides of glucose. These glucose molecules are bonded together with beta-glycosidic bonds, usually at the 1,3 carbons. There is much variability in the chemical characteristics of these molecules.
2. What types of food contain beta-glucans?
The bran of cereal grains (in particular oats, rye, and barley), cell walls of baker’s yeast, fungi and mushrooms (shiitake), as well as some bacteria contain beta-glucans.
3. How do beta-glucans assist the immune system?
Beta-glucans act as immunomodulator agents. This means they trigger events that help regulate the immune system. For example, they activate macrophages, which in turn release cytokines. Cytokines are important for cell-to-cell communication.

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Additional Teacher Resources

Teachers may wish to refer to the following papers to review the information with their students, or to use as reference material. These references are included to provide additional background information or enrichment opportunities for advanced students.

Chan, Godfrey Chi-Fung, et al. "The effects of B-glucan on human immune and cancer cells." *The Journal of Hematology and Oncology*. 2:25 2009. Web.
<http://www.jhonline.org/content/2/1/25>

Goodridge HS, Wolf AJ, Underhill DM "Beta-glucan recognition by the innate immune system." *Immunology Review*. Volume 230. 2009. Web
<http://www.ncbi.nlm.nih.gov/pubmed/19594628>

Project Details

This task will likely take at least 2 hours of class time, if students are expected to complete their research at school. Once students have completed their research, they will need additional time to create their infographic. [Piktochart](#) is suggested as a means to create the infographics. This site is very easy to work on and students should have no trouble creating a user account, uploading their pictures and text, and submitting their finished project. It is up to the teacher whether or not to have the graphics printed and displayed, or just marked digitally. There is a page (TAKE AWAY) on the WebQuest site that invites reflection on the learning process and whether students feel differently about their diet now that they've learned more about their immune system and the effect of some carbohydrates on it. This could be done as a classroom discussion, essay response, or Twitter feed, depending on teacher preference.

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