

## BarleyMax Protects DNA from Oxidative Damage

A recent test revealed that BarleyMax prevents DNA damage. A Comet assay of colon cancer cells found that a dilute solution of BarleyMax was able to protect the cells from DNA damage induced by hydrogen peroxide.

It is believed that DNA damage is one of the initiating steps of many disease processes, including cancer. Our bodies have a three-fold defense against DNA damage—enzymes which disarm free radicals, small molecules which absorb free radicals (like uric acid), and dietary antioxidants to boost protection of DNA, lipids, and proteins.

The cells of our bodies are constantly bombarded with free radicals produced from the “fire” of oxygen-based metabolism. These free radicals cause biological “rust,” making the systems of the body seize up and grind to a halt. Free radical damage plays a major role in disease and untimely deaths.

In this study, the HT29 cell line, a human colorectal adenocarcinoma cell line widely used as a colon cancer model, was selected. HT29 cells were incubated with BarleyMax at various concentrations along with hydrogen peroxide for 1 hour. After thorough rinsing the cells were mixed with agarose gel and laid onto a microscope slide. Cells were then lysed, electrophoresed, the DNA was stained, and then individual cells were scored. Damaged DNA is shorter than intact DNA and moves quicker under the electrophoresis field, forming a tail that appears like a comet when visualized with fluorescent dye. The amount of DNA in the tail is quantified compared to the amount remaining within the cell nucleus. A bigger tail indicates greater DNA damage.

As shown in Figure 1, BarleyMax at 0.03% significantly reduces DNA damage. At 0.25% BarleyMax or higher the cells were almost completely protected; damage was reduced to about 10% of the negative control value.

This was an *in vitro* experiment, so the data cannot be directly applied to DNA protection in people. The Comet assay is widely used and accepted as a very sensitive method to detect DNA damage in single cells. *In vitro* results like these with BarleyMax do correlate well with DNA protection of white blood cells in volunteers who consume kiwifruit juice<sup>1</sup>, and broccoli sprouts<sup>2</sup>. Also, the Comet assay was able to detect DNA protective effects of eating spinach and tomato puree<sup>3</sup>, and blood orange juice<sup>4</sup>. Whole diet effects can even be captured. The fecal water of volunteers who ate a diet low in fat and meat, when compared to a high-fat, high-meat diet, caused twice as much DNA damage in a Comet assay<sup>5</sup>.

So, BarleyMax has DNA-protective properties, possibly by multiple mechanisms. For maximal protection an optimal diet and lifestyle must be followed. BarleyMax can be part of that protection.

*BarleyMax is the dehydrated juice from young barley grass and alfalfa. It is the juice from a whole food, replete with all of the vitamins, minerals, antioxidants, and enzymes of these very potent green foods. It has been carefully processed so that as much as possible of the vibrancy, taste, and life of the fresh juice is preserved for convenient consumption.*

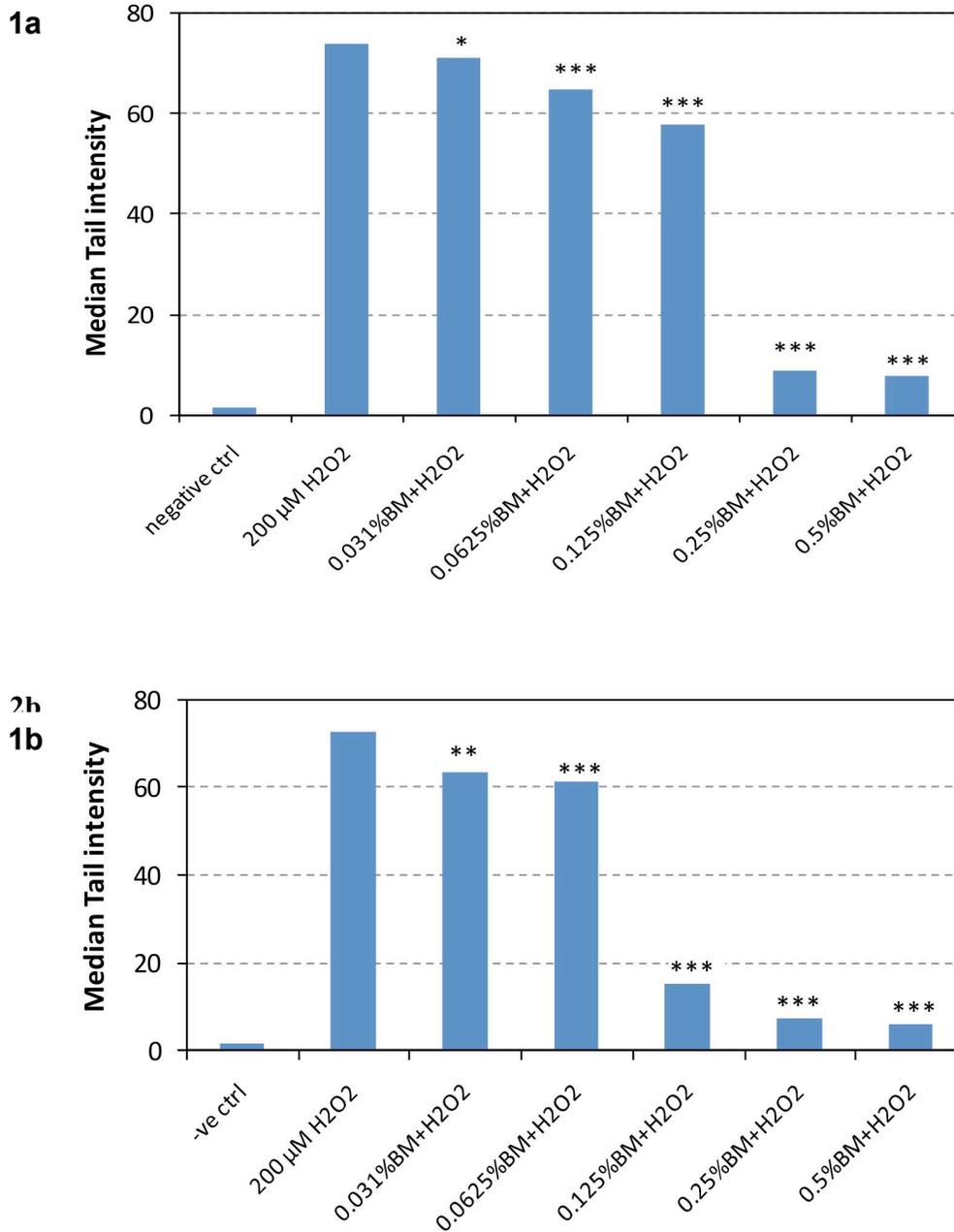
#### **References**

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**Figure Effect of BarleyMax on H<sub>2</sub>O<sub>2</sub>-induced DNA damage in HT29 cells in Comet assays<sup>#</sup>**



<sup>#</sup>: Fig 2a and Fig 2b represent two independent experiments. Levels of significant difference between H<sub>2</sub>O<sub>2</sub> treated controls and asterisk sign indicated BarleyMax/H<sub>2</sub>O<sub>2</sub> treatments: \* = p < 0.05, \*\* = p < 0.01, \*\*\* = p < 0.001, in Mann-Whitney test.

Damaged DNA is shorter than intact DNA and moves quicker under the electrophoresis field, forming a tail that appears like a “comet” when visualized with fluorescent dye. A bigger tail indicates greater DNA damage; this is indicated by the height of the bar on the graph; the taller the bar, the more DNA damage.

- The first column is a negative control, a "vehicle" control; the experiment procedure itself does not induce noticeable DNA damage.
- The second column is a positive control, where the cells are incubated with hydrogen peroxide. Concentration of the hydrogen peroxide is 200 micromolar. Clearly there is a lot of DNA damage.
- The next columns are cells incubated with the same amount of hydrogen peroxide and increasing amounts of BarleyMax.
- As the amount of BarleyMax was increased the cells were protected more and more until there was almost no damage of the DNA, compared to the “vehicle” control.
- Each treatment with BarleyMax is twice as much as the next column on the left.