Cytotoxicity of Microwaves on Probiotic Bacteria

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**PURPOSE:** Microwaves, gas-stoves, and convection-ovens are used daily to warm up food. We sought to determine the toxic effects of these heating methods on the growth of probiotic bacteria.

**METHODS:** Probiotic bacteria growth was determined by using the effectiveness of bacteria to turn milk into yogurt. Eighteen culture cups were prepared, each with one tablespoon of yogurt and four ounces of milk. For each heating method, six random cups were heated to the determined time it took to heat one culture to 115°F. For the control, no bacteria were exposed to direct heating, as one tablespoon of yogurt was added to four ounces of milk after heating the milk to 115°F (via gas-stove). All cultures were placed at room temperature. The conversion of milk into yogurt was measured, after 32 hours, by the amount of liquid left and the pH of the culture.

**RESULTS:** The time to heat one culture to 115°F was 27, 117, and 350 seconds for the microwave, gas-stove, and convection-oven. Each of the cultures had different amounts of liquid left (microwave=46±2.3mL, gas-stove=54±2.2mL, convection-oven=37±2.0mL; p<0.05 ANOVA), suggesting different toxic effects of heating methods. The control had the greatest amount of liquid (58±1.1mL). The pH of all cultures was 6.0.

**CONCLUSIONS:** There was less growth of probiotic bacteria when heated in the microwave than the convection-oven. Gas-stove heating led to minimal growth, but sudden heating in the control group led to the least growth. In conclusion, slow heating (convection-oven) appears to be the safest to probiotic bacteria, while microwaves and rapid heating have toxic effects.