

Heat Treatment of Soy Flour and Its Effects on Isoflavone Conversion

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Isoflavones, phytochemicals readily found in soy, have been associated with reducing the risk of disease. Food scientists at OSU have developed soy bread that can be readily integrated into Western diet and contains isoflavones that are suggested to be more easily absorbed by the body. However, conversion of the isoflavones from their native form into the bioactive form by β -glucosidase, the enzyme intrinsic to soy and almond responsible for this conversion, needs further investigation. Previous studies in our lab suggested that the extent of this conversion may be affected by the heat treatment of soy ingredients. Therefore, this study was designed to investigate the role of heat treatment in affecting β -glucosidase activity. Crude enzyme extracts from raw almonds and raw or heat-treated soy flour-soy milk mixtures were obtained using a sodium phosphate buffer at pH 5.0. The heat treatment consisted of roasting, steaming, or fermenting. Protein content was quantified using the Bradford and bicinchoninic acid methods, which indicated that almond and raw soy mixture contained the most protein, while the steam contained the least. When the β -glucosidase activity of the extracts was measured using p-nitrophenol- β -D-glucopyranoside, almond extract showed the greatest activity, the roasted and steamed extracts showed the next highest activity, followed by fermented and raw. Activity was also measured with isoflavone extracts from the soy ingredients. Reversed phase HPLC showed changes in isoflavone profile in all soy flour variables. No enzyme activity was detected in finished bread. It appears that water plays a key role in the mechanism of conversion of isoflavones into bioactive forms, while protein content is less relevant. Such findings are critical when tailoring foods to contain high levels of phytochemicals that are potentially more bioactive by either modifying the crops that provide the raw ingredients or the processing that leads to the desired outcome.