

## **PRO1530 Quantification and Bioassay Development for Toxicity Testing of Faba Bean Varieties**

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Faba bean production on the Canadian Prairies is quickly gaining the interest of the farming community because of the high protein and high yielding qualities of this crop. There is one problem associated with this otherwise very attractive pulse crop, faba beans contain variable concentrations of two compounds, vicine and convicine (V-C), that cause a very serious health problem in a low percentage of people who have a genetic deficiency of the enzyme, G6PD in the red blood cells (RBCs). When these individuals consume faba beans, the V-C in the beans destroys their RBCs causing acute hemolytic anemia. This condition is known as favism.

To address this seriously limiting feature of faba beans, we have developed and validated an efficient, reliable, and cost-effective bioassay to determine the potential toxic effects of V-C in the faba beans, their protein extracts, and food products. The study employed bis-chloroethylnitrosourea (BCNU)-treated RBCs to determine and predict the low, medium, and high VC faba beans, the relative toxicity of food products made from faba beans such as muffins, pancakes, and energy bars, and the relative effectiveness of different V-C elimination processing methods

The results validated and demonstrated oxidant-sensitized (BCNU- treated) RBCs are a good alternative for G6PD deficient blood, and they can be used to assess hemolysis induced by toxic components of faba beans and their food products. The decreases of GSH and hemoglobin breakdown products are good hemolytic (toxicity-index) biomarkers.

- BCNU-treated RBCs can be used to estimate low, medium, and high VC faba beans
- BCNU-treated RBCs can be used to determine the relative toxicity of food products made from faba beans
- BCNU-treated RBCs can be used to determine the relative effectiveness of different V-C elimination processing methods in the food industry.
- Therefore, the oxidant-sensitized RBCs are a good alternative for G6PD-deficiency related hemolytic drug or favism studies