

Effect of Wheat Germ Oil (WGO) from Oklahoma Red Winter Wheat on Inflammation, Gut Integrity, and Microbial Population in Obese Mice

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Low grade chronic inflammation is a common underlying mechanism implicated in the pathogenesis of obesity and obesity-related chronic conditions such as type 2 diabetes (T2D), and cardiovascular disease (CVD). Obesity, T2D, and CVD are all major health issues in the US particularly in Oklahoma.

One of the natural products that can be tapped for its health benefits is wheat and its by-products. Oklahoma is one of the largest wheat growing states in the country. Most of the wheat grown in the state is the red winter wheat and currently traded as grain for its flour (protein and starch). Wheat germ contains about 8-14% oil. Wheat germ oil (WGO) contains policosanol and vitamin E which have been shown to have cholesterol-lowering, anti-oxidant, and anti-inflammatory properties.

To the best of our knowledge, the aforementioned studies on WGO overlooked the importance of variation in content and composition of the bioactive compounds naturally present in WGO. It has been demonstrated that wheat varieties grown in Oklahoma under identical growing conditions and management differ significantly in policosanol content and composition. A study examining the effects of WGO from Oklahoma grown red winter wheat containing known amounts of n-3, as well as vitamin E and policosanol on inflammation and its relationship to gut integrity and microbial population is warranted. Therefore, we propose to study the effects of WGO from Oklahoma red winter wheat, the variety most commonly grown in Oklahoma, on gut integrity and bacterial population and examine its relationship with inflammation and body weight and composition.

The **objective** of this proposed study is to investigate the effects of dietary supplementation of WGO from Oklahoma red winter wheat on gut integrity and microbiome and the corresponding changes in inflammatory markers and clinical parameters in ob/ob mice, a genetically obese mouse. The **hypothesis** to be tested is that WGO supplementation will maintain gut integrity and enhance beneficial microorganisms in the gut which will modulate pro- and anti- inflammatory markers and clinical parameters in obese mouse. It stands to reason that the bioactive compounds in WGO particularly n-3 PUFA, policosanol and vitamin E are the major contributors to this health effects.

Aim 1: To determine the effects of WGO (from Oklahoma red winter wheat) supplementation on maintaining gut integrity and bacterial population

Aim 2: To correlate changes in gut microbiota and mucosal immunity associated with WGO supplementation with circulating pro- and anti-inflammatory markers and clinical parameters (i.e. body weight and composition, lipid and glucose parameters) in genetically obese mouse.