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An innovative method for the detoxification of gluten proteins from grains of cereals

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Celiac disease is a life-long intolerance to gluten proteins present in most cereals. In these subjects the consumption of cereal containing gluten causes a chronic inflammatory process leading to lesion in the small intestine and a dysfunction in nutrient absorption. The celiac disease treatment is based on a strict gluten-free diet throughout the patient's lifetime. Though this dietary regimen guarantees the full recovery of small intestine architecture and functions, for many patients it is strongly restrictive, especially for social events and during travelling. In addition, this dietary therapy has often low content of vitamins and ions, such as vitamins B, calcium, iron, zinc and magnesium as well as fiber. Furthermore, one of the major risks is to develop obesity and diseases related to metabolic syndrome. To solve these issues, numerous studies are currently devoted to the use of *in vitro* detoxified flour in the formulation of pasta and baked goods. At the best of our knowledge, until now, the detoxification process have been carried on wheat flour and by using enzymes and with strong limitation such as the excessive cost of the process, the difficulty of application on an industrial scale, and finally but not least the reduced technological properties (viscoelasticity) of dough and consequently the sensory properties of pasta or baked goods. Recently we have developed a new and innovative detoxification method with the purpose to overcome the disadvantages of the prior methods. The method is based on the application of microwave energy for few seconds to hydrated wheat kernels; the treatment induces modifications of endosperm components which dramatically reduce the immunogenicity of the most common epitopes involved in celiac disease, without compromising the technological properties necessary to process flour into bread and other baked goods. A first advantage of this new detoxification method is that from wheat grains and flour it will be possible to produce non-toxic food for people with celiac disease, with sensory characteristics equivalent in taste and appearance to those commonly used in the Mediterranean alimentation. The second advantage is an economic advantage, due to the raw material used, but also for the use during detoxification treatment of only mains water and electromagnetic waves for a short time; consequently, the products for celiac patients will not be longer expensive as they are now. The third advantage is the simplicity of the procedure, easily applicable also to other grains including, for example, the barley to produce beer or oats for make products for breakfast, on an industrial scale. The fourth advantage is the production of foods that determine, through their use in time and by large numbers of the population a reduction in the incidence of celiac disease in the population due to the smaller immunogenic effect of the detoxified product.

Biography

Carmen Lamacchia has completed her PhD from Bristol University, Department of Agricultural Science. She is a Senior Researcher in Food Science at the University of Foggia, Department of Agriculture, Food and Environmental Sciences. She has published more than 30 papers in reputed journals and she is one of the inventor of the patent "Method for the detoxification of gluten proteins from grains of cereals" PCT n. PCT/IB2013/000797: www.wipo.int/pctdb with the number WO 2014053891.

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