Appendix 1: The Gluten Glossary

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Source: Wikipedia, April 2015

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What is Gluten

Gluten is a protein composite found in gluten grains, such as wheat, etc. Gluten gives elasticity to dough, helping it rise and keep its shape. There are four major classes of so-called 'seed storage proteins': albumins, globulins, prolamins and glutelins. Within wheat, prolamins are called gliadins and glutelins are called glutenins. These two protein groups form the classic glutens. Thus wheat gluten consist of two major fractions:

- the gliadins which are the soluble aspect of gluten;
- the glutenins which are insoluble and responsible for the strength and elasticity of dough.

Which Foods Contain Gluten

Foods which contain gluten are either foods which contains gluten grains or foods to which gluten was added as an additive. Gluten grains are wheat, spelt, kamut, emmer, einkorn (and other varieties belonging to the wheat family), barley, rye, and triticale. The gluten used as additive is a powdered, concentrated form of the gluten called *vital wheat gluten*, made by washing wheat flour dough with water until the starches dissolve. What is left is gluten. There are hundreds of modern food products containing vital wheat gluten, including all kinds of industrially made whole-grain breads. Vital wheat gluten is used as thickener even in food products which don't contain wheat or other gluten grains.

The Spectrum of Gluten Intolerance

From the available literature it is obvious that authors report about various types of responses of the human organism to the ingestion of foods containing gluten. There are different terms used by different authors which describe similar or different intensities of intolerance to the consumption of gluten. In this investigation the expression 'gluten intolerance' refers to the whole spectrum of disorders linked to consumption of gluten containing foods. In the diagram *Gluten Related Disorders* (see below) we can see three various types of disorders. What is lacking is the distinction of their intensities. Though in real life situations there are always cases in between or with overlapping characteristics, we can nevertheless distinguish three types of gluten intolerances with different (ascending) intensities:

1. **Gluten sensitivity** (also called non-coeliac gluten sensitivity) is a disorder of the lowest intensity without involvement of the immune system. There is no current scientific consensus that this is a genuine pathological condition and the mechanism by which this could occur is unknown. The symptoms include chronic digestive discomfort, lethargy, and fatigue.
2. **Coeliac disease** (or American celiac disease) is the most common type of autoimmune disorders which involve more intense reactions of the human organism, including tissue

damage in specific parts of the human organism. For example, in the case of coeliac disease the intestinal villi are slowly atrophying which is obstructing proper food absorption. This process of tissue damage can vary from one location to the next, and with the passage of time. In individuals with coeliac disease consumption of gluten causes adverse health issues ranging from abdominal bloating, gas, diarrhea and vomiting to migraine headaches and joint pain.

3. **Allergic reaction** is the form of the strongest intolerance to gluten (or any other protein) in grains. In the case of such a response the person needs to strictly avoid any ingestion of even a small amount of gluten.