



The secret to success of gluten-free special products

This article provides a schematic overview of the ingredients used in the production of gluten-free food and illustrates their physical and nutritional properties.

Gluten, an environmental trigger responsible for celiac disease, is a complex of proteins (glutenins, prolamins) from particular cereals (e.g. wheat, barley, rye, spelt and kamut). People with celiac disease cannot eat any food containing flours or ingredients made from these cereals. Gluten, which is formed in the first phases of dough production due to chemical reactions between flour and water, plays an important part in the production of bread and pasta as well as sweet and savoury baked goods.

Numerous studies have proven that, due to its special structure made up of amino acids, gluten contributes to the rheological and or-

ganoleptic properties of the food. When making gluten-free products, completely omitting gluten often results in poorer sensory (colour, taste, volume), rheological (consistency, crumbliness, crispiness) and functional properties in comparison with traditional products which contain gluten.

The preparation of dough and the production of food using gluten-free flours is also a challenge from a technological point of view and it is necessary to adjust the recipes for the production of gluten-free baked goods accordingly. Thanks to improved knowledge about technological aspects and the nutritional properties of ingredients that

individuals with celiac disease can eat, there has been a considerable improvement in the range of products in the gluten-free sector over the last few years and decades. Different combinations of ingredients have also helped to enhance the taste and the nutritional properties of gluten-free foods and to extend their shelf life.



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In gluten-free recipes, the combination of flours and starches, protein sources, prebiotics, fiber and emulsifiers are used in order to achieve the required results (see table).

Flours and starches

Flours and starches are widely used to give products particular organoleptic properties. Flours containing gluten such as wheat, barley and rye flour, are replaced by flours made from gluten-free cereals (corn, rice, millet, buckwheat) or from defatted oilseeds (soya, peanuts) and other types of starches (corn, rice, potato, cassava). The ratio between the amylose and amylopectin components of the starch influences the digestibility and the glycemic index (GI) of the flours and starches that are used. In fact, amylose is harder to digest than amylopectin. Earlier studies proved that the starches of cereals (rice, corn, wheat) have a higher GI than those of cassava and beans. These differences are dependent on the varying amylose/amylopectin ratio.

Thickening agents and hydrocolloids

Thickening agents and other polymers, which behave like hydrocolloids due to their

chemico-physical properties, are also widely used when making gluten-free products. These ingredients are based on polysaccharides and are obtained via extraction from plants, algae or microorganisms, such as guar gum. Hydrocolloids have a distinct affinity for water, and the addition of low concentrations (0.5 %) of hydrocolloids means that different dough consistencies and better organoleptic product qualities can be obtained, for example improved taste and increased shelf life. Hydrocolloids are not exclusively used for gluten-free products, they can be

found in numerous foods such as desserts, snacks, sweet and savoury baked goods as well as ice cream.

Fats and oils

Oils and fats are mainly made up of the triglycerides of fatty acids from plant or animal sources. They have numerous and important technological roles in the products because they have chemical and physical interactions with the other ingredients (such as starches,

Table
Ingredients in gluten-free production processes

Flours made from cereal (*rice, corn, locust bean*) **and flours made from pulses** (*lupin, chickpeas, soya*) **and chestnut flour**

Starches (*rice, corn, potato, tapioca*)

Fats and oils (*butter, vegetable fats and oils (e.g. palm oil), margarine*)

Fiber (*psyllium, peas, turnip*)

Isolated proteins (*e.g. isolated soy protein, lupin, peas, rice*)

Thickening agents/hydrocolloids (*carrageen, guar flour, xanthan gum, cellulose, methyl cellulose, hydroxypropylmethyl cellulose, modified starches, acetylated starch*)



proteins) even in the initial phases of dough production. The macroscopic result of these interactions can be seen in the finished products in properties such as the desired texture and the taste.

The technological functions can be carried out both by the endogenous lipids, which are naturally contained in the flours, and also by those that are added in the preparation phase. The main advantage of using them is that they have an active effect on surface tension. They help bring air into the dough, retain gasses, keep the products fresh for longer and improve the sensory properties. This is a characteristic ability of the polar lipids in particular, because they have an amphiphilic chemical structure, meaning that they are made up of both hydrophobic groups, which are able to bond the non-polar molecules, and hydrophilic groups, which can produce compounds with water and other polar molecules.

The main criteria when selecting the fats are therefore achieving the desired rheological properties, for example the crumbli-ness (tarts, cakes, snacks) and the crispiness (baked goods, crackers, breadsticks, croissants), producing the specific sensory properties (aroma, appearance), making the dough good to work with and having a stabilising effect. In this case, fatty substances such as but-

ter, lard, palm oil, and margarines have the best properties in terms of surface tension.

In addition, it has been proven that the oxidation processes are slowed down, particularly when saturated fats are used (butter, palm oil, and margarines), the effect is reduced in the case of unsaturated fats (oils). Among the molecules which are able to simulate the functional properties of gluten, the polar lipids and emulsifiers play an important role. By forming bonds between starches and proteins they help increase the dough volume and retain gasses.

Fiber

Unprocessed fruit, vegetables, cereals and beans are optimum food sources of fiber which are said to have numerous preventative qualities against the occurrence of pathological metabolic disorders.

In the past, gluten-free products were mainly produced from refined flours or starches with no significant fiber content. With the aim of adding fiber to the diets of people with celiac disease, ingredients, such as fiber from various plant matrices (e.g. psyllium, peas and turnips) and inulin, a polymer of fructose (which has interesting nutritional and physical properties), have been used for several years.

Inulin can be extracted from chicory, but can also be chemically synthesised. Some clinical studies have shown that inulin has prebiotic qualities. In fact, adding it simplifies the development and the growth of the bifidobacteria, special intestinal flora microorganisms which play an important role in human health.

Protein sources

Protein fractions from beans (soy, lupin, peas) or rice are also used in the development of gluten-free products, partly for nutritional and functional reasons but also due to economic considerations. In addition, animal proteins have also been successfully used (such as protein from milk or eggs).

Alternative raw ingredients

The interest in new raw ingredients, which allow the development of gluten-free products, such as bread, pasta and crackers, that are better from a nutritional point of view, has led to the examination of the physical and nutritional properties of various foods.

One field of research relates to the use of alternative raw ingredients, such as flours made from pigmented rice varieties, sorghum, flours made from beans (lupin, peas, chickpeas, soya) or chestnut flour. Due to the interesting nutritional properties, there is increasing focus on additional cereal and flours made from fonio (white and black), teff, millet, teosinte, coix seeds), pseudo-cereals (buckwheat, quinoa, amaranth).

Flours made of amaranth, quinoa and buckwheat have already been successfully used in making gluten-free products and result in a significant improvement in the protein and fiber content.

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PRACTICAL INFORMATION

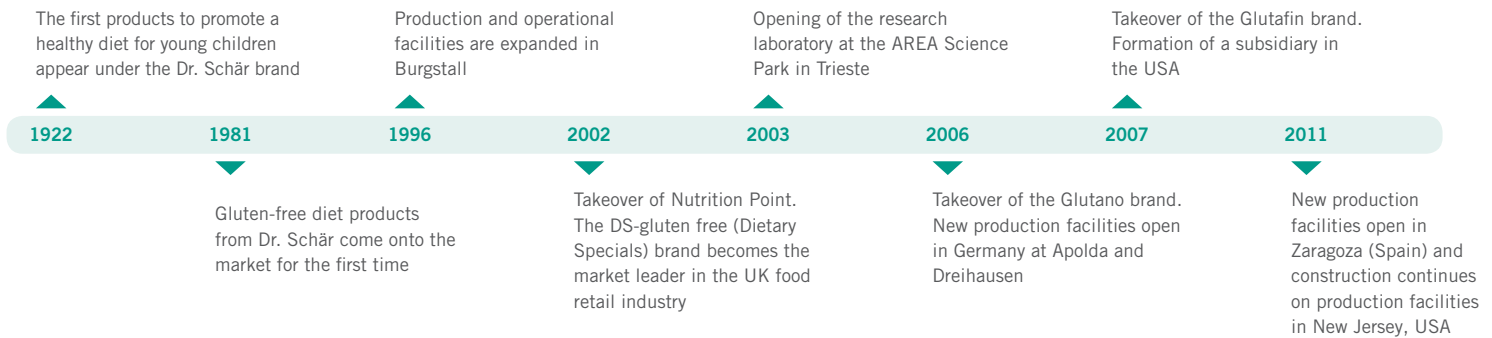
30 years of Dr. Schär – here for you for 30 years



To mark Dr. Schär's 30th anniversary we have designed a special edition of the Dr. Schär Institute Forum which, for once, is not about celiac disease and gluten-free food. Instead, we are taking you on a journey through the last 30 years of Dr. Schär where we will give you an insight into the company and introduce you to our employees, products and services.

The milestones in the company history

There have been many milestones in Dr. Schär's 30-year history, which we would like to look back on. We would like to pick out a few highlights, in particular from the recent past which may be interesting to you as a health care professional.



Gluten-free World Summit 2011

On the occasion of the 30th anniversary of Dr. Schär, the first Gluten-free World Summit was held on April 12th and 13th 2011 at the company's headquarters in South Tyrol. For two days, the Dr. Schär Scientific Committee dedicated itself to everything related to intolerance reactions to gluten. In addition, as part of the event the Dr. Schär Institute was presented for the first time. This is one of the Dr. Schär initiatives which in future will also deal with the extended spectrum of reactions to gluten, known as gluten sensitivity.



The Gluten-free World Summit also provided an opportunity to welcome the new members of the scientific committee. Since the start of 2011, the graduate (university) nutritional specialist Christof Meinhold has been supporting Dr. Schär on matters concerning nutrition and ingredients in particular.

Accumulated expertise

In order to promote an exchange with the scientific community and increase awareness of celiac disease, in June 2009 Dr. Schär formed a scientific committee, a team of internationally renowned medical and nutritional opinion leaders.

The committee is the official, independent scientific voice of Dr. Schär, and the multidisciplinary background of the members guarantees authority and expertise in all fields which deal with celiac disease and other reactions to gluten.

The members of the scientific committee are:



PROFESSOR CARLO CATASSI

Professor of paediatrics at the Università Politecnica delle Marche in Ancona, Italy



PROFESSOR ALESSIO FASANO

Head of the Mucosal Biology Research Center and the Celiac Research Center University of Maryland's School of Medicine, Maryland, USA



ANNA SAPONE

Researcher in the department for clinical and experimental internal medicine "Magrassi-Lanzara", section for gastroenterology of the agency for digestive endoscopy, Naples, Italy



GIUSEPPE CAULA

Gastroenterologist at Valdesse Hospital in Turin, Italy



CHRISTOF MEINHOLD

Freelance nutritional consultant and therapist in Cologne, Germany



LETIZIA SATURNI

Expert for nutritional science at the Università Politecnica delle Marche, Italy



JERNEJ DOLINSEK

Paediatrician at the University Medical Center Maribor, Slovenia



PROFESSOR DAVID SANDERS

Consultant Gastroenterologist, Royal Hallamshire Hospital & University of Sheffield, Great Britain



DR. MED. MICHAEL SCHUMANN

Gastroenterologist at Charité in Berlin, Germany

Schär for you. For 30 years

Using this motto, Schär sent out invitations to two large birthday parties in Rome and Berlin.

On October 1st, individual with celiac disease were invited to a talk-show with the AIC (Associazione Italiana Celiachia, the Italian celiac society) in Rome. The two professional chefs Andy Luotto and Gianfranco Vissani worked their magic in a cooking demonstration to produce a fantastic gluten-free dinner and spoiled the guests with their creations.

In Berlin on October 8th, more than 200 guests were able to experience an amusing and informative cooking demonstration with TV chef Christian Henze and enjoy a gluten-free menu. Olympic biathlon champion Andrea Henkel explained how she has become a top international athlete in spite of gluten intolerance. The evening included an educational presentation by a dietician, who gave the guests background information on celiac disease and the gluten-free diet.



A quick trip through the Dr. Schär product world

Dr. Schär President Ulrich Ladurner started to develop a range of gluten-free products **30 years ago**. At that time the awareness of celiac disease was comparatively low and the subject of intolerances was just slowly beginning to become an area of growing concern. Individuals on a gluten-free diet mainly ate simple recipes using rice, corn and potatoes. The situation today is completely different: People with celiac disease can choose from an extensive range of the most diverse gluten-free products and do not have to go without tasty food.



However this all came from quite humble beginnings. The first Dr. Schär gluten-free flour was launched onto the market in **1982**. **Six years** later the range was expanded to include cookies and snacks. The first cookies were Lady fingers – and these gluten-free delights are still available today.



In **1990** the Dr. Schär product catalogue already included around 20 products. The company has been supplying the international market since **1992**, and it was also in this year that Schär introduced the first baking mixes, Mix A and Mix B. In **1997** the Magdalenas cakes and brioches were added to the range. A further addition to the range in **2005** was Pane Casereccio, which is now Schär's best-selling bread product. In **2007** the Ciabatta was the first part-baked roll to be launched.



And these are the **newcomers**: Cereal Flakes (crunchy breakfast cereal), Cerealito (gluten-free cereal bar with fruit, coated in milk chocolate), Disco Ciok (gluten-free chocolate biscuit with cream filling), Choco Cake Mix (gluten-free chocolate cake mix), Piadina Wrap (gluten-free flat bread) and crispbread.

The range **now** includes more than 150 different products from the bread, pasta, flour, snacks, sweet products and cereals as well as a range of frozen products. In comparison with Dr. Schär's origins 30 years ago, the consumer now has a very diverse range of products which includes everything from wholegrain bread to puff pastry right through to mini pretzels. Thanks to the many years of experience and the technological improvements, gluten-free products compare to products containing gluten in terms of taste, aroma, appearance and consistency and fit in with the demands of a modern lifestyle. Ultimately, both today and in the future Dr. Schär is completely committed and is dedicating its expertise to helping people with special dietary requirements to enjoy a full life life.



mct as a new focus of expertise

Dr. Schär has now been offering gluten-free foods, which are sold under the brand names Schär, DS gluten free and Glutano, for 30 years. This year, the company is expanding these many years of expertise on celiac disease and gluten-free nutrition to include another dietary segment: medium-chain triglycerides (also known as mct). Ultimately, the company's aim is to use special products and services for patients and Health Care Professionals to become the leading food producer for special dietary requirements.

The mct products under the brand name Ceres fit in perfectly with this corporate strategy. The new sector is recommended in particular for individuals who have problems with fat digestion and metabolism and therefore have special dietary requirements. This includes, for example, chronic inflammatory bowel diseases and disorders of the lymph glands, bile duct glands and pancreas. They can also provide benefits for digestion problems, type 2 diabetes, and for people who are overweight.



In dialogue with specialists throughout the world

Whether it is in Germany or Italy, in France or the Netherlands, in Switzerland or the USA – Dr. Schär is represented at the largest and most important Health Care professional conferences around the world. This gives us a unique opportunity to develop personal contact with nutrition experts, doctors and other specialists working in our field and to give them the possibility to become acquainted with our training documents and the wide range of products we offer. Thanks to this direct exchange and large amounts of feedback, we are able to continuously improve and expand our range of services.

However, not only do we host an exhibit booth at conferences, we also use the opportunity to increase awareness of celiac disease for the Health Care Professional through lectures, workshops and symposiums. A particular highlight in the calendar every two years is the International Celiac Disease Symposium (ICDS), in which the Dr. Schär Professional Team is regularly involved. In 2011 in Oslo we arrange a pre-conference workshop specifically on the new subject of gluten sensitivity, where prestigious scientists in this field presented the current status of research. More than 200 visitors used the unique opportunity to get up-to-date information about gluten sensitivity, which is considerably more widespread than celiac disease, first hand from two pioneers in the field of this intolerance reaction, Dr David Sanders, Sheffield, UK, and Dr Alessio Fasano, Baltimore, USA. Case reports on this area of science, which is still in its infancy, completed



the specialist presentations from the speakers and served as a basis for the lively discussion which followed in the assembly hall. During the ICDS, one session also focussed completely on the topic of gluten sensitivity, and as part of this, among other things, the possible diagnostic algorithm for the condition was presented.





Services for you and your patients



The 30 years of experience and research in the field of celiac disease and gluten-free nutrition which Dr. Schär is now able to reflect on means that

the company is not only able to develop delicious gluten-free food but has also developed useful information and resources for nutritional specialists and doctors.

All of the activities are combined in the Dr. Schär Institute, which was established to mark Dr. Schär's 30th birthday. The Dr. Schär Institute website (www.drschaer-institute.com) is a comprehensive knowledge platform and provides a wealth of information and services for experts.

The website can also be used to order the varied resources and materials, which start with an information sheet with the most important points about celiac disease and gluten-free nutrition and continue with more detailed materials, information on diabetes and celiac disease and even materials for children. In addition Dr. Schar offers a welcome package program for Health care practitioners to provide

to their patients. The Health Care Practitioner is given a sign up card to provide to their patients. The patients then log on to the Schar website and will receive a free Welcome Package with information, samples and coupons. It is just another way Dr Schar provides for the transition to a healthy, happy gluten-free lifestyle.



Scientific exchange on gluten sensitivity

Since the start of 2011, the Dr. Schär scientific committee has been working intensively on the subject of gluten sensitivity, which is different from celiac disease and wheat allergy and is probably also much more widespread.

The prelude to these activities was provided by the “First International Consensus Conference on Gluten Sensitivity” in London, to which Dr. Schär invited opinion leaders on celiac disease and gluten-free nutrition in February 2011. At the conference, 14 international opinion leaders from the field of research into celiac disease, including Prof. Carlo Catassi, Prof. Alessio Fasano, Dr Anna Sapone and Dr Michael Schumann, discussed new scientific developments and disease patterns related to the intake of gluten.

During the conference, the international experts developed the definition and a diagnosis algorithm for gluten sensitivity, which registered users can access on the Dr. Schär Institute homepage (www.drschaer-institute.com/us/our-specialist-areas/glutensensitivity/).



International advice and information

Some materials are now available in a number of languages and may also be very helpful for the treatment of foreign patients. Additionally, the following materials are available: Living with Celiac Disease, Quick Guide to Carbohydrate Counting, Food Service materials, Gluten-Free Diet, Safe Gluten-Free Substitutions, Avoiding Cross Contamination of Gluten-Free Foods.



Quick Guide

available in 21 languages:
Arabic, Bulgarian, Croatian, Czech, Dutch, English, Estonian, French, German, Greek, Italian, Latvian, Lithuanian, Macedonian, Polish, Romanian, Russian, Serbian, Slovakian, Spanish, Turkish



Milly – First Steps

in 10 languages:
Czech, Dutch, French, German, Italian, Latvian, Polish, Russian, Serbian, Spanish



Patient brochure – “First Steps to a healthy Gluten-Free Lifestyle”

available in 23 languages:
Bulgarian, Croatian, Czech, Dutch, English, Finnish, French, German, Greek, Hungarian, Italian, Norwegian, Polish, Portuguese, Romanian, Russian, Serbian, Slovakian, Slovenian, Spanish, Swedish, Turkish

By experts for experts – the Dr. Schär Professional Team

Eight nutritional specialists in Italy, Great Britain, Eastern Europe and the USA make up the international Dr. Schär Professional Team.

They are the point of contact for nutritionists and doctors, they organize Health Care Professional conferences and are continuously developing the extensive range of services and materials.

You can contact the Dr. Schär Professional Team using the following details:
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