

Eggs: a new way to take your medicine



A group of researchers has been formed to link egg research efforts throughout Europe, with the aim of discovering new uses for hen eggs and increasing egg consumption. The final meeting of the group's European 'multidisciplinary hen egg research' project highlighted the roles eggs can play in human health.

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COST (Co-operation in the field of scientific and technical research) is one of the longest-running instruments supporting co-operation among scientists and researchers across Europe. Action 923, an offshoot of COST consisting of specialists from research bodies as well as from companies working in this field, was formed to help connect the research being conducted in different European countries. The group's goal is to find novel uses for, and increase utilisation of, hen egg products as functional food ingredients, as well as to encourage new non-food uses.

Many studies have been carried out to identify and characterise the biologically active components of eggs and their shells. New ways of using hen eggs should help to increase egg consumption and use, combating the effects of overproduction which is common in Europe, both in European Union member states and non-member states.

The egg is an important source of nutrients, containing all of the proteins, lipids, vitamins, minerals and growth factors required by the developing embryo,

as well as defense factors against bacterial and viral infections. Numerous biological activities are now associated with egg components, including antibacterial and antiviral activity, immunomodulatory activity, and anti-cancer activity, indicating the importance of eggs and egg components in human health and disease prevention. The potential of some of these biologically active components has already been realised, including egg white lysozyme and avidin, and yolk IgY, which are currently produced on an industrial scale, and have been applied for the prevention and treatment of various medical conditions. The information presented at the final meeting of the European project on "multidisciplinary hen egg research" (COST Action 923), held at the University of Turku, Finland, June 2006, serves to demonstrate the significant potential of biologically active egg components, for medical and food-fortification applications.

Bioavailability of egg components

Eggs are a source of various nutrients such as proteins, lipids, vitamins and minerals, but eggs also contain other sub-

stances with biological functions. Dr. P Surai of Glasgow in the UK explained that egg proteins contain all essential amino acids, and therefore egg protein is used as standard for measuring the nutritional quality of other food products. Eggs also contain carotenoids such as lutein and zeaxanthin, known for their anti-oxidative properties. Egg yolk lipids are necessary for the efficient absorption of vitamin E and lutein in the human intestine. Lutein, vitamin E and also Selenium are the substances in eggs which can easily be increased (as an example Selenium content can be increased from 7.1 µg up to 30.7 µg) by dietary measures and which are highly absorbed. In this respect, eggs have become very important in providing the human diet with substances with anti-oxidative and other properties.

Functional egg products

Although in nature eggs already contain considerable amounts of various nutrients, most of the functional egg products on the market are enriched with other substances such as lutein (a derivative of vitamin A), vitamin E, folic acid and polyunsaturated fatty acids (PUFA). The addition of these functional substances is often accompanied by a reduction in cholesterol or fat in the products, said Dr. M Wenzel, of Fulda, Germany. He spoke about the future of functional egg products and explained how the addition of lutein to egg products could help reduce the risk of age-related macular degeneration. Folic acid plays an important role in detoxification processes in the human body. Vitamin E is used because of its an-

ti-oxidative properties, which may help prevent cancers and heart disease. Polyunsaturated fatty acids (omega-3, omega-6) and also some other substances such as choline and herbs or herbal extracts are used for this purpose.

Dr. A Yannakopoulos of Thessaloniki in Greece explained how enhanced egg production, omega-3 eggs enriched with herbals, works in practice. He discussed the health benefits, PUFA, eggs with omega-3 and eggs with herbals, and herbals in the animal diet. He noted, however, that the future of these functional egg products depends on the acceptance of the health claims by regulatory agencies.

Egg medicines

Eggs may have potential for applications in human and veterinary medicine. Dr. R Schade of Berlin in Germany, described an experiment by Klemperer in 1893, which demonstrated that the immunisation of a hen resulted in the transfer of specific antibodies in the yolk. This experiment gained interest in the early 1960s, as animal welfare aspects in the relation to the production of antibodies by using rabbits became a serious ethical concern.

Nowadays IgY, egg yolk antibodies, have a broad spectrum of applications as a result of the improved IgY technology. The

main developments came in 1990-1996. In the presentation several applications were shown. IgY-based immunoassays are used for the detection of viral, bacterial, plant and animal antigens, and the contamination of foods with toxins and drugs. In veterinary medicine, the treatment of intestinal infections is known, as well as the application in aquafarming for fish diseases. In human medicine the treatment of intestinal infections in children, the treatment of Helicobacter pylori, colitis and cystic fibrosis, and the prophylactic use in dental caries, are just some examples of the broad range of applications. More applications are expected as research on the development of specific IgY against pathogenic microorganisms will be increased, due to the increasing resistance of microorganisms to antibiotics.

Cardiovascular activity

Numerous biological activities are now associated with egg components, including antibacterial and antiviral activity, immunomodulatory activity, and anti-cancer activity, showing the importance in human health and disease prevention. R López-Fandiño from Madrid, Spain discussed the value of egg derived peptides at the meeting.

In the fight against high blood pressure

as the main risk factor for stroke, coronary heart disease and renal vascular disease, the control of hypertension through the diet is a focal point of public health and attracts a lot of mass media attention. Food proteins and peptides are, apart from their basic nutritional function, capable of modulating specific biological functions in relation to blood pressure.

The most common mechanism underlying the blood pressure-lowering effect of food peptides seems to be the inhibition of the activity of angiotension-I-converting enzyme (ACE). ACE is an important drug target in the treatment of cardiovascular diseases, especially hypertension. Antioxidant deficiency has also been implicated in the occurrence of hypertension. In fact, it has been reported that some ACE inhibitors have notable effects on oxidative stress and may also contribute to the control of blood pressure by improving endothelial dysfunction. Thus the search for ACE inhibitory activity in vitro is a widespread strategy in the selection of antihypertensive hydrolysates and peptides.

It has been demonstrated that the administration of an egg white hydrolysate with pepsin decreased arterial blood pressure in spontaneously hypersensitive rats during a 20-week study. ■