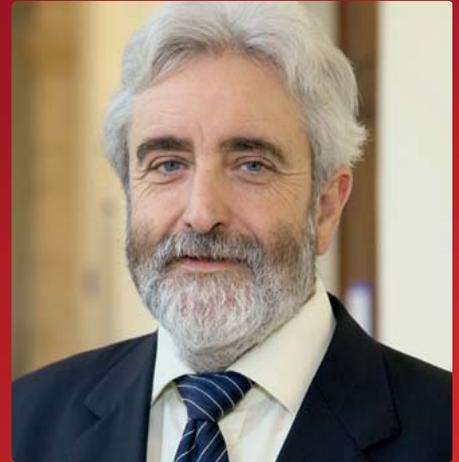


# The keys to healthy ageing

**Professor Andreu Palou** presents the BIOCLAIMS project, a five year European research effort looking into the effects of food on health and ageing through biomarkers



## What are the main objectives that you hope to achieve through the project?

BIOCLAIMS seeks to deliver a series of robust biomarkers predictive of a healthy metabolic phenotype during ageing, based on stressors of homeostasis. These biomarkers will be fully characterised and evaluated for practical application in human nutrition, and compared to traditional ones.

## What is the main use of identifying biomarkers?

The identification and validation of robust biomarkers is crucial for assessing the potential effectiveness and benefits of health-promoting food compounds. This is the basis for new and competitive economic health developments in the food sector following recently harmonised legislation in Europe.

## There has been considerable controversy regarding misleading health claims and false advertising recently. How can BIOCLAIMS help to deliver trustworthy policies?

The overarching aim of the project is to translate the data generated from large-scale efforts in biomarker research into information of relevance for supporting health claims for foods, and supporting new or existing EU directives and policy decisions. This message must be substantiated by scientific evidence in the framework of the new EU Regulations.

The identification, characterisation and validation of robust biomarkers will be the main support for the consolidation and expansion of the health claims-based added values in the food sector.

## How will you identify targets for, and create, biomarkers?

BIOCLAIMS develops new biomarkers by exploiting the new concept of 'health biomarkers' through quantification of the robustness of the homeostatic mechanisms involved in maintaining optimal health. This is based on the assumption that the ability to maintain homeostasis in a continuously challenging environment and changing physiology is key for healthy ageing.

## What methods will you use to investigate the homeostatic mechanisms?

Mechanisms involved will be investigated through a series of food interventions in animal and human models using 'predisposed' conditions.

Human models of presumed impaired robustness in maintaining metabolic and vascular health (caloric restriction, obesity, pro-inflammatory genotype, impaired renal function, or a combination thereof) will be employed to study the responses of established and novel biomarkers to the challenge of homeostasis and to selected food interventions.

BIOCLAIMS also uses a variety of animal models chosen because they reflect human conditions and differ in their tendency towards obesity, longevity, and related metabolic and vascular disorders. They consist of either genetic or intervention-dependent models of healthy or altered ageing or metabolic profile, and of different responses to high-fat-diet feeding. Many of these models have been established through the work of the BIOCLAIMS partners.

The overall strategy is to build a large collaborative research effort integrating both animal and human studies.

## Will BIOCLAIMS be working in direct contact with the consumer as well as policy makers to ensure the results are put to best use?

Yes it will. Importantly, BIOCLAIMS will try to cooperate with consumer associations and set up links with policy makers, as well as with industry and industry associations or foundations, like ILSI-Europe. Some links have already been established.

To promote the societal and economic impacts of BIOCLAIMS, integrative efforts are planned for the dissemination, exploitation and transfer of the project results to all stakeholders in close connection with the coordination and management of the project.

## What has BIOCLAIMS achieved to date?

The big success so far is that the project is fully up and running and there have not been any major deviations from the scheduled plans. In addition, food companies and foundations have already expressed their interest in the project and its follow up.

## What are your hopes for the rest of the project?

It can be expected that, even in the medium term, a wide range of European scientific collaborations will evolve from the BIOCLAIMS consortium, transforming the current research structure into a nucleus of a bigger one with parallel developments, pooling human resources, competence and technology within Europe and ensuring that the BIOCLAIMS action will be both durable and useful at a European level.

# Policing false food advertising

European legislation aiming to eradicate confusing and misleading information about food health benefits has floundered amid controversy. However, Professor Andreu Palou, project coordinator of the EU project, **BIOCLAIMS**, hopes that results from their project will reshape European policy on this important issue

**ROUGHLY 30 PER CENT** of health problems experienced by people throughout the world are directly related to food. Obesity is a growing concern in both developed and developing nations, whilst conditions such as strokes, heart disease and diabetes are increasingly becoming a burden on medical services.

At the same time, interest in healthpromoting foods is rising, particularly in the developed world. Many foods such as soy, brussel sprouts, alfalfa, broccoli, wheat germ and low fat yogurt are actively promoted as having health benefits. Yet these claims have not been evaluated by any respected national or international bodies.

Some companies promote their products with sometimes overstated or even untruthful claims about their potential benefits. For example, foods that do not normally contain cholesterol are nevertheless advertised as being cholesterol free. In contraposition, other foods or ingredients, such as margarines enriched with phytosterols (plant sterols) are well proven to decrease LDL-cholesterol ('bad' cholesterol) and these foods are really decreasing the risk factor for coronary heart disease.

As a reaction to this, in 2007 new European legislation was introduced on 'health claims made on food'. The main aim of the legislation was to eradicate the anarchy, confusion and misleading information surrounding advertising statements made about different foods in relation to health, based on the viewpoint that only a food whose health benefits are understood and successfully advertised in a meaningful and truthful manner is of benefit to the consumer.

But controversy surrounds the enforcement of this legislation for two reasons. Firstly, it has become clear that there is no definitive way of assessing whether or not a particular health claim has any basis in truth. Secondly, loud voices in the industry are opposed to the legislation's strict rules, with some withdrawing their products for fear of non-compliance.

## BIOMARKERS – NEW SCIENTIFIC EVIDENCE

One way to scientifically substantiate any health claim is to measure the effect on the biomarker(s) associated with the particular condition or health attribute in question. A biomarker, in this context, is information consisting mainly of levels of gene expression, proteins or metabolites that reflects

the health status of a given physiologically relevant process.

Using appropriate, reliable and measurable biomarkers should lead to clarification on the validity of health claims made by companies. However, there is a fundamental problem with this strategy in that for many functions or risks of diseases there are no generally agreed appropriate biomarkers.

The BIOCLAIMS project – BIOMarkers of robustness of metabolic homeostasis for nutrigenomics-derived health CLAIMS made on food with the added possibility of the potential use of its results. It is coordinated by Professor Andreu Palou from the University of the Balearic Islands (UIB), and CIBER Fisiopatología de la Obesidad y Nutrición (CIBERObn), in Palma de Mallorca, Spain. This project looks into finding new, robust and agreed biomarkers. Palou details the central difficulty in biomarker-based health claim validation and refutation: "For a number of physiological functions affected by food compounds there are no useful biomarkers described and for other functions there is a

need for earlier biomarkers of dysfunction and, especially, of biomarkers of proper function," he explains. "This problem is the main bottleneck for the consolidation and expansion of the health claims-based added values in the food sector."

## SEARCHING FOR NEW BIOMARKERS

Not only are there not enough biomarkers for them to be used to validate health claims but, as Palou outlines, biomarkers that have been discovered are not fit for purpose: "So far, most biomarkers quantify (intermediate) disease endpoints or damage, but there is a lack of good biomarkers of health". This has led to major problems in demonstrating health benefits and establishing health claims. Palou believes that this project will be, at least in part, the answer to these problems: "BIOCLAIMS seeks to fill this gap, by identifying and validating robust biomarkers of healthy ageing and of metabolic health," he explains.

To identify new biomarkers of the effects of food and food components on health BIOCLAIMS will use methods based on new biological



## INTELLIGENCE

# BIOCLAIMS

### BIOMARKERS OF ROBUSTNESS OF METABOLIC HOMEOSTASIS FOR NUTRIGENOMICS-DERIVED HEALTH CLAIMS MADE ON FOOD

#### OBJECTIVES

To develop new biomarkers by exploiting the new concept of health biomarkers through quantification of the robustness of the homeostatic mechanisms involved in maintaining optimal health.

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technologies, in particular, those of nutrigenomics, a field assessing how different foods may interact with specific genes to increase the risk of common chronic diseases such as Type 2 diabetes, obesity, heart disease, etc. In particular, stress is put in non-invasive samples, such as blood cells, as a potential source of new biomarkers.

Funded by the European Commission, the project has been granted 6 million euros for the next five years (2010–2015) with the specific aim of using the research results to contribute a scientific basis for reshaping current European legislation.

There are three main stages to the project:

- Identifying and characterising nutrigenomic-based, early, robust biomarkers predictive of a healthy metabolic phenotype during ageing and/or facing stressors to homeostasis
- Comparing and validating these novel, emerging biomarkers against traditional markers
- Testing the response of the new biomarkers to bioactive food components, using animal and human models

Although still in its early stages, 11 universities and institutions in seven European countries are already involved and cooperative links with consumer associations, policy makers, companies and industry associations are being forged.

#### TESTING AND MODELLING

Advanced analytical methodology will be used including nutrigenomic tools such as transcriptomics, metabolomics, fatty acid composition analysis, adipokine profiling and macromolecular damage analysis. In addition, 'whole body' physiological assessments will be exploited to derive a series of new biomarkers

through food interventions in animal and human models using 'predisposed' conditions. Responses depending on genetic/epigenetic features and sexes will be studied and unveiled.

Animal models include mice strains with different spontaneous propensity to obesity, transgenic mice which constitute a model of healthy ageing, mice subjected to calorie restriction, rats known to be protected against weight gain and co-morbidities in adulthood, rats from mothers subjected to calorie restriction during either pregnancy or lactation (which are conditions with negative and beneficial outcomes in adult life, respectively) and hamsters fed with a diet rich in sugars and saturated fat early in life, which models dietary-induced dyslipidemia, hyperglycaemia and moderate obesity. These animal studies are considered essential as they provide the possibility for highly controlled and wider systemic analysis.

The project contemplates human studies, which Palou states are crucial to the main aim of the project: "Results from animal models will be compared with studies on humans, using different approaches. Human studies are crucial for biomarker research and for any applicability in the context of the European Health Claims Regulation."

#### EXPLOITING RESULTS

Identifying biomarkers for health will have additional practical societal and economic use with the application of this knowledge to foods being promoted to the consumer. Once the results have been collated, validated and assessed, a big challenge will be to incorporate biomarkers into health claim validation throughout Europe. If achieved, this will contribute to customer confidence and to trustworthy policies regarding health claims.



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