The prevalence, cost and basis of food allergy across Europe

Final Report Summary - EUROPREVALL (The prevalence, cost and basis of food allergy across Europe)

The main objective of the EUROPREVALL project was to ‘examine the complex interactions between food intake and metabolism, immune system, genetic background and socioeconomic factors to identify key risk factors and develop common European databases’. Over the course of four years and seven months it has sought to deliver the information and tools necessary for policymakers, regulators and the food industry to effectively manage food allergies across Europe and hence deliver an improved quality of life to food allergic consumers.

The outcomes of the project will thus directly provide scientific data to expert committees in DG SANCO and European food safety authority (EFSA) to regularly update the list of most common food allergens to guarantee a reliable protection of allergic consumers in the EU (Mills et al 2007).

The research team have sought to do this by:
1. establishing the prevalence of food allergies in adults and children, and the patterns of reactivity to the five main allergenic foods across the major climatic and cultural regions of Europe;
2. investigating the relationship between genetic and environmental factors, such as allergies to pollen, food consumption patterns, and the development of food allergy;
3. provision of a platform of highly characterised, authentic food allergens to facilitate the development of novel diagnostic and predictive tools/methods to enable effective management of food allergy;
4. providing information regarding the effect of the food matrix and the role of food processing in modulating the allergenic properties of foods;
5. ascertaining the socioeconomic impact and cost of food allergies and their treatments, to the European community.

Since the prevalence of food allergies is age dependent, particularly affecting infants and young children, cohorts were set up in
different age groups with a birth cohort covering children from birth to the age of 2.5 years with complimentary community surveys in school age children and adults. Studies in unselected populations were complimented by a cross-sectional study in the allergy out-patient clinics. This also provided the project with a cohort of individuals with well characterised food allergies which were necessary for developing and validating new diagnostic tools and led to the development of the EUROPREVALL serum bank (EPSB) (Vieths et al 2008). The centres were chosen to represent different geographical and climatic regions of Europe.

Birth cohort: Focused on infants and young children the birth cohort was co-ordinated by Kirsten Beyer and Doreen McBride at the Charity in Berlin and run in Germany (Berlin), Poland (Lodz), Iceland (Rekjavik), Spain (Madrid) and Greece (Athens) with European Union funding with additional centres in the UK (Southampton), Italy (Milan) and The Netherlands (Amsterdam) funded by third parties. It was designed such that if parents report any symptoms of either an atopic disease (such as eczema in children or recurrent gastrointestinal problems without fever) or immediate reactions after eating a particular food, the child is evaluated by the study centre.

Community surveys: Studies in unselected populations were eventually undertaken in 8 centres from Alpine (Switzerland), Mediterranean (Spain, Greece), Central European (Bulgaria, Poland, Lithuania), Nordic (Iceland) and Maritime (the Netherlands) regions, a ninth centre (UK) dropping out due to changes in principle investigator.

Out-patient clinic studies: In order to better describe food allergies a large cohort of food allergic individuals was developed through an outpatient clinic study co-ordinated by Dr Montserrat Fernandez-Rivas at Clinico san Carlo in Madrid.

Extra-European studies: In addition to studies in Europe, the EUROPREVALL project has extended its investigations in to Africa (Ghana), Asia (India) and the Far East (China). The Ghana study was undertaken in rural and urban environments to investigate the role of infections, particularly parasites, in the development of allergies to peanut, a food widely consumed in Ghana. Community surveys have also been run in parallel in both adults and children in India (Mysore, Bangalore), and children only in China (Hong Kong, Beijing) and Russia (Tomsk) (Wong et al 2009).

From the perspective of the food-allergic patient, food allergy can be difficult and time-consuming to manage because sufferers may react to extremely small amounts of problematic food. The only available treatment for food allergy is avoidance of problematic food and (consequently,) the implementation of effective allergen labelling strategies is essential. It is not possible to protect the allergic consumer from all risks. Further research concerning threshold levels of the different allergens in daily practice is necessary.

The identification of thresholds can provide a basis for risk assessment, which can be used for guidance on the need for precautionary labelling, as has been done for gluten, lactose and sulphite. Precautionary labelling, may lead to anxiety and an unnecessarily restricted choice of products. Parents or patients need coaching about how to deal with food allergy in daily life. Preparing meals, shopping and social activities need new strategies. This can be realised by training, often from a specialised allergy dietician in allergen avoidance (whilst maintaining a balanced diet) and also from a specialised nurse or support staff member in managing emergencies and administering emergency medication. This has to be understood by other people in a range of situations.

A key contribution of EUROPREVALL is the provision of good quality data to characterise the risk from allergenic foods. Epidemiological data are already providing a clearer picture of the size of the population at risk in Europe and an indication of the relative importance of different foods. Data from the birth cohorts and particularly the clinic surveys are already revealing distinctive patterns of food allergy prevalence. These data indicate that some allergens for which labelling is mandated and for which management measures are therefore instituted (e.g. soy, mustard), appear to have a lower public health impact than some which are not required to be declared (e.g. some fruits).

This knowledge, if corroborated by the community surveys, will provide a scientific rationale for re-ordering allergen management priorities to maximise beneficial effects on public health. Significant amounts of data on thresholds of reactivity to different allergenic foods are now emerging through highly standardised low dose DBPCFCs. These data are now being used to develop and refine dose-distribution models for several foods. Better knowledge of the numbers at risk from defined amounts of allergenic food will not only provide a sounder scientific basis for regulatory and allergen management decisions, but will also inform the wider debate among stakeholders, for instance on issues such as tolerable risk.

A correct diagnosis is essential for the food-allergic patient. Food allergies can result in uncomfortable, severe or potentially fatal responses. Asthma has been shown to be a risk factor for more severe anaphylaxis and infections, alcohol, medication, stress and exercise may exacerbate food allergy. Today double-blind placebo-controlled food challenges remain the "gold standard" for diagnosis.
This is because both the skin prick tests and blood tests, although indicative, are not sufficiently reliable on their own to diagnose food allergy in all cases. The food challenge test is time consuming and more stressful for the patient than the other tests. New tests which are lower in costs and more patient friendly should be developed.

EUROPREVALL data and knowledge will have significant impact on diagnostic testing for food allergy at several levels. Firstly, currently available IgE screening tests with mixtures of five to six foods have been compared to three custom-made mixes, followed by testing of individual foods in twelve European and three non-European countries. Together these data will allow design of novel more efficient screening mixes, where needed adapted to national requirements.

Secondly, the approach of molecular 'component-resolved' diagnosis has been evaluated in depth for 10 foods in well-characterised and challenged patients and has established its potency to improve the clinical relevance of diagnostic tests for food allergy to a level unattainable for food extract-based testing. This will pave the way for increased use of component-based diagnostic tests.

Thirdly, EUROPREVALL has performed an evaluation of a multiplex approach using a microarray chip with >50 purified food allergens. This new-generation test for food allergy has proven to be an extremely powerful tool to characterise a food allergic patient with only a tiny amount of serum (small children). Patterns of IgE recognition of a broad panel of major food allergens, complemented with the most relevant cross-reactive inhalant allergens, allow identification of the source of sensitisation and help to better inform the patient about the risk of severe reactions. Microarray tests have proven to be a promise for the future that can significantly improve management of food allergy.

EUROPREVALL has achieved its overall aims and objectives and has delivered a large amount of data, collected in standardised ways which has been groundbreaking. A crucial activity for the partnership in the coming years will be to realise this potential through effective data analysis. This will be a challenge since the tools for such large scale data analysis spanning population level data, genetics and other phenotyping methods, together with socioeconomic data are only now becoming available. The tools and approaches are already feeding in to studies around the world, notably the quality of life instruments are now being applied in studies in relating to immunotherapy for food allergies as part of a collaboration between the Irish team and clinical researchers in the USA (Dunn Galvin 2009), whilst the DBPCFC matrices are being used for oral immunotherapy and have potential both as a standardised challenge material in clinical diagnosis and as a clinically validated reference material for allergen analysis in foods.

In addition to the data and biological resources the EUROPREVALL project has formed a network of pan-European (and beyond) researchers spanning disciplines from epidemiology to economics, from molecular genetics to clinical science, risk management to food science.

This is unique and necessary to realise the potential of the data and resources, in particular to ensure its delivery in a form which can be used by risk assessors and risk manager, such as the European food safety authority and DG SANCO. It is also important with respect to maintaining competitiveness of European industry spanning food safety and allergen management issues in the food industry to exploitation of new knowledge in the development of improved diagnostics and treatments for allergic disease.

As part of ensuring a cohesive transition and effective use of the resources developed by the project, the partnership has developed and implemented a plan under which the collective value of the EUROPREVALL outputs, particularly in terms of shared biological resources and other know-how, can continue to be accessed. A workable management system has been put in place in order that the project’s collective resources can be assessed in a way that maximised their value to the allergy scientific community. This has led to the establishment of a EUROPREVALL Resource access committee (RAC) and agreed mechanisms for partners and third parties to use the RAC to access the projects outputs for further allergy research.

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