

Search, significantly decreased methylation of *ORMDL3* was also found in asthmatic children and the CpG site correlated with mRNA levels. Also, we discovered that the 5'UTR of *ORMDL3* harbors a differentially methylated region in CD8<sup>+</sup> T cells.

**Conclusion:** In addition to genetic effects, differences in DNA methylation on the promoter region of *ORMDL3* might influence the susceptibility to childhood asthma and severe asthma. Since DNA methylation on the top asthma-associated CpG site was similar among sorted leukocytes we consider this a disease-related signal rather than an artifact due to differential cell counts. The observation of differential methylation for the same region in two independent cohorts is reassuring.

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## 2007

### Monitoring immune modulation by nutrition in allergy: identifying and substantiating health effects

Albers, R<sup>1</sup>; Bourdet-Sicard, R<sup>2</sup>; Braun, D<sup>3</sup>; Calder, PC<sup>4</sup>; Lambert, C<sup>5</sup>; Lenoir-Winjkooop, I<sup>6</sup>; Herz, U<sup>7</sup>; Meheust, A<sup>8</sup>; Ouwehand, A<sup>9</sup>; Phothirath, P<sup>10</sup>; Sako, T<sup>11</sup>; Salminen, S<sup>12</sup>; Siemensma, A<sup>13</sup>; van Loveren, H<sup>14</sup>; Sack, U<sup>15</sup>  
<sup>1</sup>Nutrileads BV, Rockanje, The Netherlands; <sup>2</sup>Danone Research, Palaiseau Cedex, France; <sup>3</sup>Institut Merieux, Lyon, France; <sup>4</sup>University of Southampton, Faculty of Medicine, Southampton, UK; <sup>5</sup>CHU Saint-Etienne, University Hospital – Center for Health Engineering, Saint-Etienne, France; <sup>6</sup>IDF – ILSI Liaison Officer, Palaiseau Cedex, France; <sup>7</sup>Mead Johnson Nutrition, Nijmegen, The Netherlands; <sup>8</sup>International Life Sciences Institute, Europe, Brussels, Belgium; <sup>9</sup>Dupont Nutrition and Health, Active Nutrition, Kantvik, Finland; <sup>10</sup>Nestle Research Center, Vers-chez-les-Blanc, France; <sup>11</sup>Yakult Europe, en Almere, France; <sup>12</sup>University of Turku, Functional Foods Forum, Turku, Finland; <sup>13</sup>FrieslandCampina, Leeuwarden, The Netherlands; <sup>14</sup>National Institute of Public Health & the Environment, RIVM, Bilthoven, The Netherlands; <sup>15</sup>Universitat Liepzig, Liepzig, Germany

**Background:** Inappropriate immune responses to allergens could contribute to the pathological processes underlying various noncommunicable diseases. Nutrition may be important in avoidance or mitigation of an allergic response. At the same time, there is a need for guidance on the assessment and interpretation of immune modulation by nutrition. In the generally healthy population, biological markers have to be employed to evaluate the impact of nutrition on prevention or mitigation of allergy.

**Objectives and method:** ILSI Europe commissioned an Expert Group (EG) comprising specialists from academia, government and the food industry to prepare a guidance document on immune markers. An early draft was discussed at a workshop involving additional experts to refine the recommendations.

**Results:** The EG first agreed upon scaled criteria to evaluate usefulness of allergic

response markers in a structured manner. The most useful markers were classified depending on whether by themselves they signify clinical relevance AND/OR involvement in the allergic response. In addition, five theoretical scenarios were drafted describing potential changes in marker values compared to relevant reference ranges, including (significant) modulation within the reference range; modulation from outside the range back into the range; modulation from within the range out of the range; prevention of modulation induced by other factors; and modulation from a less favourable range to the reference range of a comparator group with a more desired immune function. Finally, all elements were combined providing a framework to aid the design and interpretation of studies assessing effects of nutrition on several aspects of immune function, including the allergic response.

**Conclusions:** The EG found that markers involving the standardised assessment of relevant symptoms (e.g., symptoms of common allergies) or *in vivo* responses to a defined challenge with antigens or allergens (e.g., response to vaccination or allergen provocation) provide the most reliable indication to interpret modulation of immune function. The step-wise approach generated offers a rationale for selecting markers for future trials examining the impact of nutrition on overall immune and allergic response. The output provides a framework for the interpretation of outcomes in these types of intervention studies.

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## 2009

### Modulatory impact of cinnamaldehyde on immune cells is partly due to induction of apoptosis

Moskovskich, A<sup>1</sup>; Gomez-Casado, C<sup>2</sup>; Willensdorfer, A<sup>1</sup>; Singer, J<sup>3</sup>; Fuchs, H<sup>4</sup>; Roth-Walter, F<sup>1</sup>; Jensen-Jarolim, E<sup>1,3</sup>

<sup>1</sup>University of Veterinary Medicine Vienna, Messerli Research Institute, Comparative Medicine, Vienna, Austria; <sup>2</sup>Technical University Madrid, Center for Plant Biotechnology and Genomics, Madrid, Spain; <sup>3</sup>Department of Pathophysiology and Allergy Research, Medical University of Vienna, Vienna, Austria; <sup>4</sup>Department of Biochemical Engineering, University of Applied Sciences Technikum Wien, Vienna, Austria

**Background:** Cinnamaldehyde (CA) has been reported to have antiinflammatory, anti-bacterial, anti-fungal, chemoprotective and anti-carcinogenic activity. Here, we further investigated the immune-modulating capacity of CA.

**Method:** NF- $\kappa$ B activation by CA (0–10  $\mu$ g/ml) alone or in combination with lipopolysaccharide (LPS) was assessed using THP1XBlue<sup>®</sup> human monocytic cell line transfected with an alkaline phosphatase

reporter. IL10 and nitric oxide (NO) secretion in murine RAW264.7 cells and human peripheral blood mononuclear cells (PBMCs) stimulated with CA alone or in conjunction with LPS were analyzed. Human PBMCs were stimulated with different concentrations of CA alone or in combination with LPS for 24 h and subsequently stained with AnnexinV and Propidium Iodide (PI) to assess cell death and apoptosis.

**Results:** Incubation with CA resulted in a concentration-dependent inhibition to a maximum of 50% of NF $\kappa$ B in LPS-stimulated THP1-cells. Similarly, NO as well as IL10 secretion, induced by LPS in RAW264.7 cells, were blocked by addition of CA. Induction of apoptosis in human PBMCs was triggered by CA alone or in conjunction with LPS. These results correlated with a dose-dependent decrease in IL10 by addition of CA in LPS-stimulated PBMCs.

**Conclusion:** Antiinflammatory properties of CA are likely due to blocking of NF $\kappa$ B-pathway and induction of apoptosis in immune cells.

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## 2010

### Aerobiology of *Olea* airborne pollen in Portugal

Caeiro, E<sup>1,2</sup>; Ferro, R<sup>1,2</sup>; Brandão, R<sup>3</sup>; Trindade, J<sup>4</sup>; Lopes, L<sup>5</sup>; Gaspar, A<sup>1,6</sup>; Nunes, C<sup>1,7</sup>; Todo-Bom, A<sup>8</sup>; Oliveira, J<sup>9</sup>; Morais de Almeida, M<sup>1,6</sup>

<sup>1</sup>SPAIC- Soc. Portuguesa de Alergologia e Imunologia Clínica, Lisboa, Portugal; <sup>2</sup>ICAAM- Instituto de Ciências Agrárias e Ambientais Mediterrânicas, Évora, Portugal; <sup>3</sup>Department of Biologia, ICAAM- Instituto de Ciências Agrárias e Ambientais Mediterrânicas, Évora, Portugal; <sup>4</sup>Faculdade de Medicina da Universidade de Lisboa, Lisboa, Portugal; <sup>5</sup>Hospital de Santa Luzia, Elvas, Portugal; <sup>6</sup>Hospital Descobertas – CUF, Lisboa, Portugal; <sup>7</sup>Centro de Imunoalergologia do Algarve, Portimão, Portugal; <sup>8</sup>Hospitais da Universidade de Coimbra, Coimbra, Portugal; <sup>9</sup>Hospital S. João EPE, Porto, Portugal

**Background:** *Olea* airborne pollen is one of the most important sources of aeroallergens in mediterranean Europe and in Portugal.

**Objectives:** To analyze the aerobiology of airborne pollen of olive (*Olea europaea* L.) in Portugal.

**Methods:** For this study, daily and hourly sampling data of *Olea* pollen (2002–2012) from five monitoring stations of the Portuguese Aerobiology Network: Oporto, Coimbra, Lisbon, Evora and Portimão were used.

**Results:** *Olea* pollen is well represented in pollen spectrum of the atmosphere of Portugal: 4% Oporto, 14% Coimbra, 12% Lisbon, 9% Évora and 36% Portimão. Statistical significant differences ( $P < 0.05$ ) were observed in the pollen index and in the features of main atmospheric pollen