

their TSS score was 6.4 ± 3.3 in 15 and 25.9% of them had a value > 8 corresponding to a major symptomatology. Cluster analysis identified among all patients the existence of a homogeneous group of patients characterized by a more significant ocular involvement (TSSS: $8.5 \pm$ vs 4.6 ± 2.7 $P < 0.0001$; TOSS: 60.3 ± 16.0 vs 25.8 ± 14.1 $P < 0.0001$) whose rhinitis was more frequently persistent with a moderate to severe intensity (61.4% vs 39.0% $P < 0.0001$), and with a greater impairment of the quality of life (3.5 ± 1.0 vs 2.5 ± 1.0 $P < 0.0001$). The logistic regression analysis confirmed these data showing also that pollen but also fungal spore allergens are more frequently identified. In these patients the practitioners more frequently associated intranasal corticosteroids

(73.9% vs 67.6% $P < 0.001$) and cromones (76.0% vs 52.6% $P < 0.0001$) with oral H1 antihistamines,

Conclusion: The association of rhinitis and ocular symptoms could be a frequent and specific entity requiring a specific treatment combining oral H1 antihistamines and cromones.

1386

Severe allergic rhinitis is associated with the use of emergency care

Salo, T¹; Kauppi, P¹; Peura, S²; Salimäki, J²; Maasilta, P³

¹Helsinki University Central Hospital, Respiratory Diseases and Allergology, Helsinki, Finland;

²Association of Finnish Pharmacies, Helsinki, Finland;

³Helsinki University Central Hospital, Meilahti Triangle Hospital, Helsinki, Finland

Background: As a part of The Finnish Allergy Programme 2008–18 the survey of allergy symptoms, use of medication and health care services was carried out.

Method: This was a questionnaire study to those seeking for allergy or asthma medication in pharmacies all across Finland during one week in September 2010. The respondents were 1114 patients with self-reported physician diagnosed allergic diseases with a mean age of 47 years (SD 18.5 years, 5–75 years). In this study, we examined symptom severity (Rhinasthma questionnaire and self-reported severity with the numeric rating scale, NRS, from 0 to 10) and use of health care services in allergic rhinitis patients.

Results: Of 277 patients with a mean age of 45 years (SD 17.7) had self-reported physician diagnosed severe allergic rhinitis. 79.4% of these were women. In the last 12 months, 8.3% of the patients with severe allergic rhinitis had emergency care because of allergies compared to 4.2% of the controls and all patients ($P = 0.023$).

Only 3.0% of the patients with severe allergic rhinitis had received specific immunotherapy in the past 12 months, but 31.9% had used per oral steroids as short courses and 2.5% regularly. In the total study population, activity restriction domain (correlation 0.38, $P < 0.001$) and nasal symptoms (correlation 0.44, $P < 0.001$) of Rhinasthma questions correlated best with NRS score.

Conclusion: Severe allergic rhinitis is associated with use of emergency care and even regular use of per oral steroids. Specific immunotherapy and new treatment options should be used more often to treat severe allergic rhinitis patients.

1387

Prevalence of allergic rhinitis in 3 to 6-year-old children in Chiba city (urban area), Japan

Yamaide, F¹; Inoue, Y¹; Okamoto, Y²; Shimojo, N¹

¹Department of Pediatrics, Graduate School of Medicine, Chiba University, Chiba, Japan; ²Department of Otorhinolaryngology and Head and Neck Surgery, Graduate School of Medicine, Chiba University, Chiba, Japan

Background: The sequential development of allergic diseases (beginning with food allergy and atopic dermatitis followed by asthma and allergic rhinitis (AR)) during early childhood is often referred to as the allergy march. Recently, the number of school-age children with AR has shown to increase in Japan. But early onset of AR is poorly described, and it remains unknown about the prevalence of AR in young children.

Objective: We aim to evaluate the prevalence, clinical characteristics, and treatment of AR in a population of 3 to 6-year-old children in Chiba city (urban area), Japan.

Method: A total of 13,963 children aged 3 to 6 years in all 84 kindergartens of Chiba city, Japan were surveyed. Prevalence of symptoms of AR was assessed using a modified version of the International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire.

Results: A total of 9822 (70.3%) questionnaires were returned for evaluation (sex: Male 50.5%, Female 49.5%; age 3y = 2.3%, 4y = 31.7%, 5y = 35.1%, 6y = 30.9%). The prevalence of lifetime, current and physician-diagnosed AR were 54.1%, 50.7% and 37.3%, respectively. The prevalence of AR was higher in males than that in females (cf. physician-diagnosed AR; 40.6% vs. 33.6%, $P < 0.05$) and increased with age (cf. physician-diagnosed AR; 3y = 18.5%, 4y = 28.3%, 5y = 37.3%, 6y = 46.7%).

[Prevalence of allergic rhinitis]

	3y (%) (M:F)	4y (%) (M:F)	5y (%) (M:F)	6y (%) (M:F)
Lifetime	48.0	50.0	54.0	59.1
AR	(52.7:41.8)	(53.5:46.5)	(56.6:51.2)	(63.3:55.0)
Current	44.5	47.3	50.5	55.1
AR	(47.3:40.6)	(50.7:43.9)	(53.3:47.6)	(59.4:50.9)
Physician-diagnosed	18.5	28.3	37.3	46.7
AR	(19.2:17.4)	(31.0:25.1)	(39.9:34.2)	(51.7:41.2)

Many children showed AR symptoms during September and April, especially in February and March (cedar pollen allergy season). About 70% of children with AR visited clinic or hospital, but more than half of them were dissatisfied with their treatment.

Conclusion: The prevalence of AR symptoms was high and starting early in life.

1388

Antihistamines and driving ability: evidence from 30 years Dutch on-road driving research

Verster, JC^{1,2}; van de Loo, AJAE¹; Garssen, J^{1,3}

¹Division of Pharmacology, Utrecht University, Utrecht, the Netherlands; ²Center for Human Psychopharmacology, Swinburne University, Melbourne, Australia; ³Nutricia Research, Utrecht, Netherlands

Background: Since all antihistamines are capable of crossing the blood-brain barrier, they may also cause sedation which may impair daily activities such as driving a car. The purpose of this review was to examine the effects of antihistamines on driving ability.

Method: A literature search revealed 18 double-blind placebo-controlled clinical trials that applied the on-road highway driving test. In this test, subjects are instructed to drive 100-km on a public highway with a steady lateral position and a constant speed (95 km/h). Primary outcome measure is the Standard Deviation of Lateral Position (SDLP, cm), i.e. the weaving of the car.

Results: The literature search yielded 18 clinical trials. At therapeutic doses, a single dose of diphenhydramine, emedastine and hydroxyzine impaired driving comparable or greater than the effects of BAC 0.08%. Clemastine, triprolidine, mizolastine, acrivastine, dexchlorpheniramine CR and mequitazine impaired driving performance to the same extent as BAC 0.05%. For mizolastine significant impairment was only seen after higher than therapeutic doses. Results for cetirizine were mixed, illustrating the drug has the potential to impair driving performance, especially in sensitive subjects. Terfenadine, loratadine,

levocetirizine, desloratadine, ebastine, bilastine fexofenadine and rupatadine showed no driving impairment in the standard driving test after acute administration of their recommended dose. Several studies examined subchronic effects of antihistamines on driving performance. After 4 days of daily treatment significant driving impairment was found for emedastine (2 and 4 mg bid), diphenhydramine (50 mg), clemastine (2 mg bid), triprolidine (5 mg bid), after 5 days of ebastine (30 mg), and after 8 days of hydroxyzine (50 mg). Mixed results were found for cetirizine (10 mg), terfenadine (120 mg) and loratadine (20 mg). No significant differences from placebo were observed after 4 days of subchronic treatment with triprolidine (10 mg), levocetirizine (5 mg), fexofenadine (up to 120 mg), and after 8 days of daily treatment with dexchlorpheniramine (6 mg), bilastine (20 and 40 mg), and mequitazine (10 mg).

Conclusion: First- and second-generation antihistamines may significantly impair driving performance. The newer antihistamines such as levocetirizine and fexofenadine that cross to blood brain barrier to a much lesser degree do not show clinically relevant sedation or driving impairment.

1389

Epidemiology of vernal keratoconjunctivitis in a Spanish pediatric population

Villalón García, ÁL¹; Alarcón Tomás, M²; Vásquez Bautista, AA¹; Rodríguez Cabrerós, M¹; Martín Carribero, R²; Rodríguez Mosquera, M¹

¹Hospital Universitario Puerta de Hierro de Majadahonda, Allergy, Madrid, Spain; ²Hospital Universitario Puerta de Hierro de Majadahonda, Pediatric Ophthalmology, Madrid, Spain

Background: Vernal keratoconjunctivitis (VKC) is a relative rare, chronic allergy inflammatory disease of the ocular surface. Affecting mainly children, it is an IgE and T cells-mediated disease without a totally identified pathogenic mechanism. Several therapeutic measures are required to control the signs and symptoms of the disease.

Method: A retrospective, observational study was conducted with children diagnosed with VKC in the last two years at Majadahonda (Madrid) University Hospital "Puerta de Hierro". The aim of the study is to present the epidemiology of VKC in our population. For that purpose, data such as age, sex, race, atopic familiar history, asthma, rhinitis or dermatitis personal history and treatment with cyclosporine A (CsA) or immunotherapy were analyzed.

Results: Data of 30 patients were recorded: 4 female (13%) and 26 male (27)

with mean age of 10 (range 4–18). 29 of them (97%) were Caucasian and 19 (63%) had atopic familiar history. Atopic dermatitis was observed in 10 patients (33%), asthma and rhinitis in 15 (50%) of them. Allergic tests were performed in 27 (90%) patients, of whom 13 had seasonal allergy (pollen) and 6 (32%) perennial allergy (house dust mite, fungus and animal epithelium). Of those 19 patients showing positive allergic tests, 10 (53%) were treated with specific immunotherapy; and 29 (97%) with CsA 1%, either seasonally or continuously, depending on the severity of the disease, so as to avoid chronic steroids secondary effects. Good response and control was obtained in 27 (93%) of the latter group of patients.

Conclusion: Among the population under study, it is more frequent in male, Caucasian race and patients with allergic positive tests to allergens, such as pollen. No statistical differences were found between allergic and non-allergic patients when comparing personal and familiar history, while allergic patients with VKC were found to more frequently suffer from atopic dermatitis, although with no statistical significance in the study due to the small size of the sample under analysis.

Understanding and treating VKC has been a challenge for ophthalmologists and allergists since the pathogenesis is unclear. Topical CsA has proved to be effective in improving signs and symptoms without significant side effects by the group of patients under study. Currently, the beneficial effect of immunotherapy for treating VKC is under study.

1391

Staphylococcus aureus enterotoxin B induces airway epithelial barrier dysfunction *in vitro*

Steelant, B¹; Lan, F²; Zhang, N²; Seys, S¹; Kortekaas Krohn, T¹; Ceuppens, JL¹; Bachert, C²; Akdis, C³; Hellings, PW¹

¹KU Leuven, Clinical Immunology, Leuven, Belgium, ²U Gent, Upper Airway Research Laboratory, Ghent, Belgium, ³University of Zurich Hospital, Swiss Institute of Allergy and Asthma Research, Davos, Switzerland

Background: Epithelial barrier dysfunction is involved in the pathophysiology of allergy. Staphylococcus aureus enterotoxin B (SEB) has recently been shown to have immunomodulatory effects in the upper airways of patients with chronic rhinosinusitis. Whether SEB directly affects epithelial barrier integrity is unknown.

Method: A bronchial epithelial cell line (Calu-3) was grown in air-liquid interface (ALI) on transwell inserts. The effect of 4 h incubation with SEB (100, 10 and 1 µg/ml) on epithelial barrier function was

evaluated by measuring transepithelial resistance (TER) and permeability of FITC-dextran 4 kDa (FD4). Claudin-1, claudin-4, occludin and zonula occludens-1 expression was determined by RT-qPCR and Western Blot.

Results: Calu-3 cells exposed to 100, 10 and 1 µg/ml SEB showed a dose dependent decrease in TER (-7%, -18%, -27% respectively, $p < 0.05$) in parallel with an increased FD4 passage (+38%, +22%, +44% respectively, $p < 0.05$), suggesting a disrupted epithelial barrier function. Claudin-4 (431 vs. 557, $p < 0.01$), occludin (262 vs. 300, $p < 0.05$), and ZO-1 (23 vs. 28, $p < 0.05$) mRNA expression was significantly decreased after 100 µg/ml SEB stimulation. Western blots showed lower protein levels for claudin-1 (4.1 vs.7.8 fold changes, $p < 0.01$) and phosphorylated-occludin (3.7 vs. 5.5 fold changes, $p < 0.05$). In line, occludin protein levels were higher after 100 µg/ml SEB stimulation, resulting in a higher internalization of occludin after SEB stimulation.

Conclusion: SEB disrupts the epithelial barrier integrity in Calu-3 cells with higher disassembly of occludin, which is accompanied by changes in TJ expression. These data may help to explain the effects of SEB on mucosal airway homeostasis.

1392

Local exercise-induced inflammatory response in upper airways is attenuated in professional athletes

Kurowski, M¹; Jurczyk, J²; Olszewska-Ziębar, A¹; Jarzębska, M¹; Krzysztofak, H²; Kowalski, ML¹

¹Department of Immunology, Rheumatology and Allergy, Medical University of Lodz, Healthy Ageing Research Centre, Lodz, Poland; ²COMS National Centre for Sports Medicine, Warsaw, Poland

Background: Intensive exercise provokes changes in the innate immune response, which may modulate systemic inflammation. The aim of this work was to assess changes in selected innate immunity proteins in serum, nasal lavage fluid (NLF) and exhaled breath condensate (EBC) after exercise challenge.

Method: Study group consisted of 15 competitive athletes (5 speed skaters and 10 swimmers) aged 15–25. Control groups comprised 10 mild-to-moderate asthmatics aged 19–39 (asthma controls, AC) and 7 healthy, non-smoking subjects aged 21–27 (healthy controls, HC). Control subjects were not performing sports regularly. Athletes were assessed in two time-points: in-training (period 1) and out-of-training (period 2) depending on individual training schedule. Levels of heat shock protein (HSP) A1, IL-1RA, TNF- α , IL-10 in serum, NLF and EBC were assessed by