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0567 | Assessment of changes in expression of immune system biomarkers to assist the differential diagnosis of acute bacterial infections

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Introduction: Biomarkers for acute infections include C-reactive protein, MMP-9, sICAM-1, procalcitonin, and neutrophil band counts for bacterial infection. A rapid means of assessment of acute bacterial infections via biomarker assessment was sought.

Objectives: The expression of toll-like receptors (CD282 and CD284), complement receptors (CD35 and CD88), integrins (CD11b and CD11c), Fc-receptors (CD32 and CD64) and L-selectin (CD62L) on the surface of blood neutrophils and monocytes stimulated with inactivated *E. coli*, L. acidophilus, *E. coli* derived bacterial ghosts, *E. coli* LPS and L. acidophilus cell walls was assayed using flow cytometry. Both the percent of expression and mean fluorescence intensity (MFI) were analyzed for each molecule.

Results: All the bacterial components used exerted similar activation capabilities even in low concentrations. While the expression of CD11b, CD11c, CD32, CD35 and CD88 was enhanced by both neutrophils and monocytes under activation, the expression of CD64 significantly increased only in neutrophils. The expression of TLR2 and TLR4 was slightly increased by neutrophils and monocytes. The expression of CD62L by monocytes and neutrophils (the percent of activated cells as well as the MFI) was decreased during activation. There was a negative correlation between CD62L expression and integrins (CD11b and CD11b). The activation index was calculated for each molecule as a ratio of expression of molecule by activated cells vs cells used as a negative control (resting). The highest values for the activation index was seen with CD11b, CD11c, CD32, CD35, CD62L and CD88 MFI by neutrophils and monocytes, and the percent of CD64 expression by neutrophils.

Conclusions: *E. coli* and bacterial ghosts significantly increased the expression of CD11b, CD11c, CD32, CD35, CD62L and CD88 by neutrophils and monocytes even in very low concentrations, suggesting use as potential biomarkers in the differential diagnosis of the etiology of acute infections.

0568 | Phenotypic changes of blood monocytes in kidney transplant recipients

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Introduction: Human peripheral blood monocytes may be subdivided into different populations based on the expression of membrane antigens. A pro-inflammatory (intermediate/nonclassical) subpopulation of monocytes is defined by the CD14+CD16+ phenotype while CD14+CD163+ monocytes seem to be related to M2 macrophages with immunosuppressive properties.

Objectives: The aim of this study was to evaluate changes in peripheral blood monocyte expression of CD16, CD163, CD206, CD209, HLA-DR, and CD47 in kidney allograft recipients. In total, 88 patients who underwent renal transplantation from a deceased donor were enrolled in the study. The phenotype was evaluated by a multicolor flow cytometry in defined time points and in the case of complications requiring fine needle aspiration biopsy procedure.

Results: The results confirmed our pilot data, proportions of peripheral CD14+CD16+ monocytes were downregulated during the first week after the kidney transplantation while the percentage of CD14+CD163+ monocytes dramatically increased early after the kidney transplantation and remained high for at least four months in most patients. The expression of CD206 (marker of M2 macrophages) was limited only to a small population of monocytes (less than 5% in most patients) but the receiver operating characteristic (ROC) curve analysis showed its potential importance by significant correlation with acute rejection with a sensitivity of 70% and specificity of 80.33% (area under the ROC curve 0.7787, p-value: 0.004973). No correlation between two different M2 markers CD163 and CD206 has been found. The expression of CD209 (DC-SIGN) was low and did not show any changes in time or association with acute rejection. HLA-DR (MHC II) and CD47 (integrin associated protein) were constitutively expressed without any significant changes in patients with acute rejection of the allograft.

Conclusions: We assume from our data that kidney allograft transplantation is associated with early reciprocal modulation of monocyte subpopulations (CD14+CD16+ and CD14+CD163+). A decreased proportion of CD206 positive blood monocytes seems to be associated with an increased risk of acute rejection of kidney allograft.

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circulating erythrocytes and a rapid systemic mobilization of neutrophils within an immediate type hypersensitivity immune response upon allergen challenge.

0793 | immunomodulatory effects of autologous total IgG in patients with atopic dermatitis

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Introduction: Idiotype network theory proposes that antigen-binding portion (idiotype) of the autologous immunoglobulin is immunogenic enough to induce active immune response to itself. We hypothesized that intramuscular administrations of autologous total IgG could produce immunomodulatory effects in patients with allergic diseases.

Objectives: This study aimed to evaluate the immunomodulatory effects of intramuscular administration of autologous total IgG on hypersensitivity reaction in patients with atopic dermatitis (AD). Sixteen adult patients with AD received intramuscular injections of 50 mg autologous total IgG twice a week for 4 weeks (from 0 to 4 weeks). The serum concentrations of interleukin (IL)-4, IL-10, IL-12, and interferon gamma (IFN-γ) were measured using enzyme-linked immunosorbent assay at -4, 0 (baseline), 4, 8, and 12 weeks.

Results: The serum concentrations of IL-10 and IFN-γ significantly increased at 4, 8, and 12 weeks compared to baseline ($P < .05$). There were no significant changes in serum concentrations of IL-4 and IL-12 at 4, 8, and 12 weeks compared to baseline ($P > .05$). There were no significant changes in serum concentrations of IL-4, IL-10, IL-12, and IFN-γ between -4 week and baseline ($P > .05$).

Conclusions: Intramuscular administrations of autologous total IgG significantly increased the serum concentrations of IL-10 and INF-γ in patients with AD. Further studies are required to investigate the clinical significance and detailed mechanism of these immunomodulatory effects.

0794 | Aqueous fullerene C60 dispersion reduces the risk of lethal anaphylactic hypersensitivity in mice

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Introduction: Anaphylactic hypersensitivity (AH) is the most serious clinical concern facing allergists. However, for the majority of anaphylactic hypersensitivities, avoidance is the only therapeutic option available presently. Fullerene C_{60} has the unique electronic properties making it an attractive candidate for therapeutic application.

Objectives: The main purpose of our research was to assess the fullerene C_{60} therapeutic effect in a mouse model of AH.

Results: New efficient method for producing a water-soluble fullerene C_{60} (WSF) has been developed. Survival level of mice was evaluated. To assess the WSF effects on systemic anaphylaxis, AH experimental model was induced by the intraperitoneal sensitization of BALB/c mice with ovalbumin (OVA) using 2-fold injections. Two weeks after the last injection, the allergen was administrated intravenously. The WSF was also administrated intravenously in sensitized mice. Concentrations of OVA-specific antibodies in sera and cytokines produced by splenocytes upon OVA in vitro stimulation were detected by ELISA. Experiments showed that after final OVA administration in group AH the survival rate was zero. While the percentage of surviving animals at similar conditions but treated with the WSF fullerene was 60%. It should be noted that the IL-5 concentration was decreased in groups treated with WSF, while the IL-12 and IFN-γ concentrations were conversely raised. The ratio of OVA-specific IgG1/IgG2a was significantly decreased in groups treated with WSF.

Conclusions: Taken together, these results demonstrate that the water-soluble fullerene C_{60} significantly increases survival level in the mouse model of anaphylactic shock and shifts immune response from Th1 to Th2. Thus, fullerene C_{60} possesses a high therapeutic potential.

0795 | Olfactory epithelium-derived mesenchymal stem cells impact antigen-presenting cells when co-cultured ex vivo

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Introduction: Mesenchymal stem cells (MSC) derived from various tissues possess immunomodulatory activity including MSC derived from olfactory epithelium (OE) which impact T-cells ex vivo. This study assesses the impact of MSC OE on the immunophenotypic profile of human antigen-presenting cells (APCs): macrophages (Mf); B-cells; and dendritic cells (DC).

Objectives: MSC-OE (CD90 + CD105 + CD73 + /CD31-CD45-) were obtained from 11 patients with non-inflammatory nasal diseases. Blood monocytes adherent to plastic were used as a source for Mf and DC. DC were obtained from monocytes using a 6-day (GM-CSF/IL-4) protocol. MSC-OE were co-cultured for 72 h with

DC, monocytes and B-cells, providing direct cell-to-cell contact. DC, b-cells and Mf were also cultured with LPS (positive control, M1-control for Mf) and with MSC-OE conditioned media (CM). Mf were also cultured with M-CSF as M2-stimuli. After 72 h DC were assayed for immunogenic (CD80, CD86, HLA-DR) and tolerogenic markers (CD85k, CD273) as well as activation molecules (CD32 and CD83). Mf were assayed for expression of M1 and M2 markers (CD16, CD64, CD68, CD80, CD85k, CD86, CD206, CD273, CD274, CD284 and HLA-DR).

Results: DC cultured with MSC-OE CM maintained immature phenotype. DC co-cultured with MSC-OE had significantly increased expression of both immunogenic (CD80, CD32) and tolerogenic markers: CD85k (iDC—50.2 (21.3-70.5)%; MSC-DC—75.5 (31.2-86.4)%; $P = .03$) and CD273 (iDC—29.9 (24.3-37.0)%; MSC-DC—40.6 (35.1-54.0)%; $P = .02$). MSC-OE-induced Mf had similar expression of CD273 and CD206 comparable with M2-Mf, while the expression of M1-markers (HLA-DR, CD16, CD64 and CD284) was decreased. While MSC-OE stimulated the expression of CD80, the expression of CD86 was significantly lower compared with M1-Mf. B-cells were also characterized by decreased expression of CD86 and HLA-DR, but the expression of CD80 was comparable to the control.

Conclusions: Direct cell-to-cell contact of MSC-OE and mdDC led to the induction of a tolerogenic profile of the DC. MSC-OE induced an anti-inflammatory, tolerogenic immunophenotype in Mf co-cultured ex vivo, resembling M2-polarized cells. The effects of MSC OE on monocyte-derived DC, Mf and B-cells were similar, indicative of comparable influence of MSC on all myeloid- and lymphoid derived antigen-presenting cells.

0796 | Cow's milk and rice fermented with L. paracasei CBA L74 modulate gut microbiota in children

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Introduction: Cow's milk and rice fermented with *Lactobacillus paracasei* CBA L74 prevent infectious diseases in young schooled children. The mechanisms of this effect is still not completely defined.

Objectives: We speculated that these dietary strategies could shape gut microbiota composition. Stool samples (3 gr) were collected from healthy children (aged 12-48 months) before (t0) and after 3 months (t3) of dietary treatment with cow's milk (FM, group A) or rice (FR, group B) fermented with *L. paracasei* CBA L74, or placebo (PL, group C). Changes in gut microbiota composition was investigated by 16S rRNA gene amplicon sequencing (V3-V4 region) and innate (α- and β-defensins and cathelicidin LL-37) and acquired immunity biomarkers (secretory IgA) by ELISA.

Results: 30 children (19 males, 63.3%) with a mean (SD) age of 34.3 (9.7) months were randomly assigned to each group (n = 10/group). A significant increase of all biomarkers of innate and acquired immunity was observed only in groups A and B but not in group C. Both the treatments (in particular, the rice matrix) led to an increase in *Lactobacillus*, while PL showed higher levels of *Bacteroides* after 3 months. Different microbial signatures were detected according to the specific fermented matrix consumed: *Oscillospira* and *Faecalibacterium* abundance increased with fermented milk (FM) treatment, while *Blautia* and *Coprococcus* were boosted by fermented rice (FR). These genera were also positively associated to the increase in α-defensin, particularly evident in FM treated children. Sub-genus diversity of *Blautia*, *Roseburia* and *Faecalibacterium* was also evaluated. Individual *Blautia*, *Roseburia* and *Faecalibacterium* oligotypes were associated to FM or FR treatments and revealed the presence of sub-genus specific links with the immunity biomarkers. Finally, PICRUSt predicted metagenomes showed an increase in key genes involved in butyrate production pathway (acetate coA/acetoacetate coA-transferase—K01034, K01035; butyrate kinase—K00929) following FM treatment.

Conclusions: Dietary supplementation with cow's milk or rice fermented with *L. paracasei* CBA L74 modulates innate and acquired immunity biomarker and these effects are associated with specific signatures in gut microbiota.

0797 | IgE and IgG production to innocuous and live allergens

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Introduction: Mechanisms of IgE formation are not well understood but local B-cell switch to IgE production in nasal or bronchial mucosa is a very likely scenario.

Objectives: Earlier we have shown that in children, allergic to house dust mites (HDM), IgE response was not associated with the formation of other classes of immunoglobulins. Titers of Der f 2 specific IgM, IgG, and IgA were comparable in sera of HDM patients and healthy age-matched controls. At the same time immune response to *A. alternata* (Alt) fungus was characterized by both IgG and IgE formation to Alt a1. Analysis of IgG production by Alt patients and controls demonstrated a comparable age-dependent increase in IgG titers. We have hypothesized that this can be a result of fungal conidia ability to germinate in the site of their accumulation in the mucosa. Expression of TLR ligands by germinating conidia

1400 | A sensitive two-site immunoassay for quantification of Japanese cedar pollen allergen, Cry j 1

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Introduction: Allergy to Japanese cedar pollen (*Cryptomeria japonica*) is the most common form of pollinosis in Japan, affecting nearly 10% of the population. Of those who are sensitized, more than 90% have specific IgE antibodies to Cry j 1, a 41kD glycoprotein. Our aim was to develop a sensitive immunoassay for the detection of Cry j 1.

Objectives: Natural Cry j 1 was extracted and purified from Japanese cedar pollen and used to immunize mice for monoclonal antibody production. Antibodies were screened by ELISA for reactivity to Japanese cedar pollen allergens, Cry j 1 and Cry j 2, birch pollen allergen, Bet v 1, and ragweed allergen, Amb a 1. Additional screening by Octet analysis was performed to identify potential antibody pairs with non-overlapping epitopes. Selected antibodies were used to develop a two-site monoclonal antibody ELISA with natural Cry j 1 as the assay standard.

Results: Eleven positive clones producing Cry j 1-reactive antibody were identified. Three antibodies were selected for production based on ELISA screening for Cry j 1 specificity and Octet analysis for epitope binning. Purified antibodies reacted strongly with Cry j 1 and showed minor cross-reactivity to Cry j 2 (<5%) in ELISA. Additional screening with tree pollen extracts from birch, olive, hazelnut, privet, and ash were negative. The assay standard curve ranged from 250-0.49 ng/mL with a limit of quantification of 3.9 ng/mL.

Conclusions: A sensitive, highly specific ELISA for the quantification of Cry j 1 has been developed. The assay has applications for measuring Cry j 1 in diagnostic and therapeutic allergenic products and for aerobiologic studies of exposure to Japanese cedar pollen allergen and clinical outcomes.

1401 | The influence of the East Asian mushrooms ganoderma lucidum and lentinula edodes and the belarusian mushroom boletus edulis on immune cell function

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Introduction: Over 140 000 species of fungi have been identified, many with immunomodulatory and anti-tumor capabilities. Reishi (Ganoderma lucidum) and shiitake (Lentinula edodes), which contain polysaccharides that suppress cancer growth and influence immunity, are often used in East Asian traditional medicine. Boletus edulis is the most commonly distributed mushroom in Belarus. It is found in Poland, Ukraine and Belarus, being a common constituent of soups and gravies and also frequently pickled or dried for long term storage. The effects of reishi, shiitake and boletus mushrooms on the Reactive Oxygen Species (ROS) production by peripheral blood neutrophils and monocytes.

Objectives: We assayed effect of reishi, shiitake and Boletus mushroom ethanol and water extracts (0.05%-0.2% w/v final concentration in the culture media) on the ROS production by peripheral blood neutrophils and monocytes using the Dihydrorhodamine DHR123 probe and CD69 expression by T-cells. PSB culture medium was used as negative control and PMA (phorbol, 12-myristate, 13-acetate) as positive control.

Results: The 3 mushroom water extracts increased ROS production by peripheral blood neutrophils and monocytes (negative control—2.74 ± 0.75%, PMA—98.9 ± 1.15%, reishi (0.2%) 20.2 ± 1.4%, shiitake—19.4 ± 2.2%, boletus—38.3 ± 3.5%.) The 3 ethanol extracted mushroom extracts had no effect on ROS production in any concentration studied. The investigated water extracts weakly induced CD69 expression by T-cells.

Conclusions: Mushrooms also have immunomodulatory properties. All three of the mushroom extracts caused an increase in ROS production by peripheral blood neutrophils and monocytes. Each of the extracts of the mushrooms gave ROS production which was at least 20% greater than the negative controls. The Boletus edulis mushroom, a popular food ingredient from Poland, Ukraine and Belarus, has been shown to enhance immune responses including production of reactive oxygen species by immune inflammatory cells similar to the medicinal mushrooms of East Asia. These mushrooms should be further studied for their potential use as immune modulators in new pharmacologic preparations or perhaps for use in alternative medicine for viral and oncologic diseases.

1403 | Major peach allergen pru p 3 has structural features similar to saposins

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Introduction: CD1 receptor proteins can present lipids and glycolipids to iNKT, a subtype of T cells. In the trafficking and loading of lipids onto their binding grooves, CD1 molecules are assisted by saposins, small lipid transfer proteins that facilitate non-enzymatically the hydrolysis of disparate glycosphingolipids in lysosomes. Pru p 3, the major allergen from peach fruit, is a lipid transfer protein carrying a ligand with a phytosphingosine domain.

Asthma	Controls (n = 209)	Cases (n = 34)	OR (95%CI OR)	*P*-value	aOR (95%CI aOR)*	*P*-value
SPT						
B. tropicalis	40 (19.1)	9 (26.5)	1.52 (0.66-3.51)	.326	1.50 (0.62-3.64)	.37
D. pteronyssinus	23 (11.0)	8 (23.5)	2.49 (1.01- 6.14)	.048	2.28 (0.89-5.86)	.09
Ascaris	28 (13.4)	13 (38.2)	4.00 (1.80-8.89)	.001	3.59 (1.55-8.29)	.003
Specific IgE	(n = 203)	(n = 32)				
B. tropicalis[#]	76 37.4	16 (50.0)	1.76 (0.84-3.68)	.14	1.71 (0.80-3.71)	.17
D. pteronyssinus[#]	41 (20.2)	13 (40.6)	2.81 (1.30-6.06)	.01	2.58 (1.14-5.81)	.02
Ascaris[#]	87 (42.9)	21 (65.6)	2.60 (1.20-5.64)	.02	2.69 (1.21-5.98)	.003
ABA-1[§]	82 (39.2) [a]	20 (62.5)	2.58 (1.20-5.56)	.015	2.31 (1.04-5.12)	.04
Rhinitis						
SPT	(n = 153)	(n = 90)				
B. tropicalis	24 (15.7)	25 (27.8)	2.07 (1.10-3.90)	.025	1.91 (0.95-1.54)	.07
D. pteronyssinus	13 (8.5)	18 (20.0)	2.69 (1.25-5.80)	.015	1.70 (0.73-3.97)	.22
Ascaris	19 (12.4)	22 (24.4)	2.28 (1.16-4.50)	.017	2.21 (1.07-4.56)	.03
Specific IgE	(n = 146)	(n = 89)				
B. tropicalis[#]	54 (37.0)	38 (42.7)	1.27 (0.74-2.17)	.385	1.14 (0.64-2.05)	.65
D. pteronyssinus[#]	23 (15.8)	31 (34.4)	2.86 (1.53-5.33)	.001	2.47 (1.25-4.91)	.01
Ascaris[#]	58 (39.7)	50 (56.2)	1.95 (1.14-3.32)	.015	2.04 (1.14-3.65)	.02
ABA-1[§]	61 (46.9) [b]	40 (44.4)[c]	1.15 (0.68-1.96)	.59	1.14 (0.64-2.03)	.66

*Adjusted odd ratios were obtained in multivariate logistic regression models including age, gender, living in the municipal head and familiar history of asthma or rhinitis as co-variates. Cut-offs to define a positive IgE result were [#] >0.35 kU/L. [§] > 0.13 OD. [a] n = 209,

Conclusions: In a rural tropical village ascariasis exerts risk and protective effects on asthma symptoms, an influence associated with the severity of the infection by *Ascaris lumbricoides*. Since most environmental conditions are the same in this community, genetic factors might be determining the degree of infection and consequentially asthma symptoms.

0836 | Decline in serum cytidine deaminase activity in patients with Hepatitis C infection

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Introduction: Several pathogens have mechanisms by which they influence the host immune response, especially antibody development. Cytidine deaminase (CDA) is enzyme which responsible for finishing the somatic recombination and somatic hypermutation processes for immunoglobulin heavy chains genes. Chronic Hepatitis C (HCV) infection may alter immune responses via impact on CDA activity.

Objectives: CDA activity was measured in 126 HCV patients and compared with 47 healthy individuals (study1). CDA activity was also compared (study 2) in another group of 180 patients, studied for viral hepatitis presence and viral load (97 + HCV, 27 + Hepatitis B virus, 56 no viral hepatitis). Serum CDA levels were measured by indophenol colorimetric method of Guisti and Gallanti (with prolonged incubation time (18 h) and 10.5 mmol/L cytidine concentration). Data are presented as M±SD; CI 95%.

Results: Statistically significant differences ($P = .007$) were detected in study 1 comparing serum CDA activity (IU/L) of healthy individuals (1.7 ± 0.99; 1.4-2.0) and HCV patients (1.2 ± 0.4; 1.0-1.3). In the study 2, reduction in enzyme activity in patients with HCV infection (1.1 ± 0.65; 1.0-1.3) was seen compared with patients without PCR-detected viral load (1.7 ± 2.11; 1.1-2.3) ($P = .015$). CDA activity for HCB patients was (1.3 ± 0.65; 1.1-1.5).

Conclusions: Although the levels of CDA enzyme activity were low, there was a trend towards decrease in CDA activity for HCV patients in both studies when compared to levels of healthy individuals. Chronic hepatitis C viral presence reduced serum CDA activity potentially impacting CDA dependent immune responses.