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Scientific Tracks & Abstracts

35 YEARS OF EXCELLENCE IN MEDICAL PUBLISHING

Sessions

Immune Disorders | Viral Immunity

Session Introduction

Title: mRNA vaccines: Mode of delivery and therapeutic potential

Nadeem Kizilbash, Northern Border University, Saudi Arabia

Title: Follicular T helper and Breg cell balance in Severe Allergic Asthma before and after Omalizumab therapy

Laura Bergantini, University of Siena, Italy

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mRNA vaccines: Mode of delivery and therapeutic potential

Nadeem Kizilbash
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mRNA vaccines use a copy of a molecule called messenger RNA (mRNA) to produce an immune response. For SARS-CoV-2 virus, the vaccine delivers molecules of mRNA that code for the Viral Spike Protein to Antigen Presenting Cells (APC). These protein molecules create an adaptive immune response that teaches the body to identify and destroy the attacking pathogen. The mRNA vaccine is delivered as a co-formulation in lipid nanoparticles that protect the mRNA strands and help their absorption into the cells. For the mRNA vaccine to be successful, sufficient mRNA must enter the host cell cytoplasm to stimulate production of specific antigens. But mRNA molecules are too large to cross the cell membrane by simple diffusion and they are also negatively charged like the cell membrane, which causes mutual electrostatic repulsion. However, Dendritic cells can readily absorb the mRNA molecules via Phagocytosis.

Recent Publications

1. Ambreen, J., Khachfe, H.M. & Kizilbash, N. "A Review of Synthetic Approaches and Biological Activity of Substituted Hydrazones" Anal. Chem. Ind. J. 21(5):170-175, 2021.

Biography

Nadeem Kizilbash is a Head of Biochemistry in Northern border university. He has completed his PhD in Boston University.

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Follicular T helper and Breg cell balance in Severe Allergic Asthma before and after Omalizumab therapy

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Background: Severe Allergic Asthma (SAA) is based on type 2 (T2-high) immune responses to allergens promoting type 2 T helper (Th2) cell cytokine responses and production of IgE antibodies. Omalizumab was the first biological drug licensed for clinical use in the management of IgE-mediated SAA. Despite, emerging evidence supporting the prominent role of follicular T cells (Tfh), Breg and Treg subsets, in the development and progression of SAA, no data is available on the impact omalizumab therapy.

Methods: Ten SAA patients monitored at the Respiratory Diseases Unit of Siena University Hospital and 10 healthy sex- and age-matched controls were enrolled in the study. Clinical and functional parameters were collected at baseline (T0) and after 6 months of therapy (T6). Cellular population analysis were determined through multi-color flow cytometry.

Results: SAA patients showed higher percentages of Th17.1, Tfh and Tfh2 while CD24hiCD27hi Breg cell, Treg and Tfr percentages were significantly lower than controls. Higher percentages of Tfh2 in patients with nasal polyps than in those without and in controls were observed. At T6, significant decreases of Tfh and Tfh2 than T0 were observed. A slightly significant increase in Teff was reported at T6 with respect to T0. ΔIgE levels in serum were correlated with ΔCD19+CD24+CD27+ Breg cell percentages (r=-0.86, p=0.0022).

Conclusions: Our data explored the changes of Tfh cells, Tregs and Bregs in severe asthma. The restoration of immunological imbalance in SAA patients after omalizumab is surely intriguing and represents a glimpse of light in the comprehension of immunological effects of treatment.

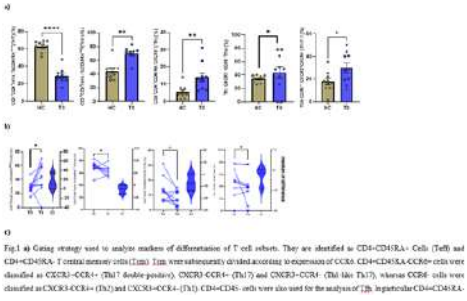

Fig.1 a) Gating strategy used to analyze markers of differentiation of T cell subsets. They are identified as CD4+CD45RA+ Cells (Teff) and CD4+CD45RA- T central memory cells (Tcm). Tcm were subsequently divided according to expression of CCR6. CD4+CD45RA-CCR6+ cells were classified as CXCR3−CCR4+ (Th17 double-positive), CXCR3-CCR4+ (Th17) and CXCR3−CCR4- (Th1-like Th17), whereas CCR6- cells were classified as CXCR3-CCR4+ (Th2) and CXCR3+CCR4-(Th1). CD4+CD45- cells were also used for the analysis of Tfh. In particular CD4+CD45RA-

Recent Publications

1. Bergantini, L., d'Alessandro, M., Cameli, P., Pianigiani, T., Fanetti, M., Sestini, P., & Bargagli, E. (2021). Follicular T Helper and Breg Cell Balance in Severe Allergic Asthma Before and After Omalizumab Therapy. Molecular diagnosis & therapy, 25(5), 593–605.

2. Bergantini, L., d'Alessandro, M., Cameli, P., Bianchi, F., Sestini, P., Bargagli, E., & Refini, R. M. (2020). Personalized Approach of Severe Eosinophilic Asthma Patients Treated with Mepolizumab and Benralizumab. International archives of allergy and immunology, 181(10), 746–753.

3. Yao, Y., Chen, C. L., Yu, D., & Liu, Z. (2021). Roles of follicular helper and regulatory T cells in allergic diseases and allergen immunotherapy. Allergy, 76(2), 456–470.

Biography

Laura Bergantini, born in Rome (27/07/1991), has her expertise in immunology of lung disorders with particular regards to severe asthma and immunology of lung rejection after transplantation. In these fields, she work in the evaluation of discriminatory pathways able to phenotyping different kinds of asthma and response to treatment. She started to work to these project during PhD and now, during post-doc fellowship. She worked between hospital and research center at the University of Siena. She also worked in Germany in MHH center of Hannover about lung transplant 3D cellular models. Nowadays She is author of more than 80 peer review articles and 15 of H index.

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Sessions

Healthcare | Renal Cell carcinoma

Session Introduction

Title: **Raman spectroscopy based molecular signatures analysis of radiation response in human peripheral blood & lymphocyte**

Akanchha Mani Tripathi, Defence Research & Development Organization, India

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Raman spectroscopy based molecular signatures analysis of radiation response in human peripheral blood & lymphocyte

Akanchha Mani Tripathi
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Treatments for cancer include surgery, chemotherapy, and radiation therapy, as well as newer techniques such as interventional radiology and immunotherapy.

Background: The application use of Raman spectroscopy to measure the biochemical profile of cells and tissue in health and disease may be a possible solution for many diagnostic problems in the clinical setting. Different type of treatment for cancer, radiation therapy is a standard procedure, however, local reoccurrence is a major issue with this type of treatment. A better understanding of the cell response to radiation therapy may provide insight into improved approaches for local tumour control. Genomic instability is a well-established determinant that influences by radiation response, its impact on other cell signalling pathways. The current study demonstrates, for the first time, the capability of Raman spectroscopy to detect radiation-induced damage responses in whole blood and isolated lymphocytes.

Methods: Human peripheral blood from healthy donor was ex-vivo irradiated with different doses (1, 3 and 5Gy) of γ-radiation by using 60Co-irradiator. After 2h of irradiation, established Raman spectroscopic (RS) technique was used in combination with immunofluorescence staining of human whole blood and isolated lymphocytes to measures DNA damage response. All parallel metrics to the Raman spectra were analysed and compared with DNA damage assessed using γ–H2AX assay.

Results: Chemometric analysis demonstrated the unique radiation related Raman signature that were determined to nucleic acid, protein, lipid and carbohydrate spectral features. Among all of these changes, the dramatic shift was observed in phosphodiester bond and β carotene content after 1, 3 and 5Gy dose of ionizing radiation. Metabolically, this signature was correlated to the extent of DNA damage. Immunofluorescence staining for γ–H2AX correlated with RS-identified genomic damage in whole blood and lymphocyte.

Conclusions: Collectively, these data provide unique information into the biochemical response and a label-free approach for the prediction of DNA damage after radiation exposure. It demonstrated the utility of Raman spectra for detecting distinct radiobiological response for biodosimetry and cancer diagnosis.

Recent Publications:

1. Radiomitigation by Melatonin in C57BL/6 Mice: Possible Implications as Adjuvant in Radiotherapy and Chemotherapy. Akanchha Mani Tripathi, Shahanshah Khan, Nabo Kumar Chaudhury. In Vivo. 2022 May-Jun;36(3):1203-1221

Biography

Akanchha is currently pursuing in Division of Radiation Biodosimetry, Institute of Nuclear Medicine and Allied Science, Defence Research & Development Organization in Delhi, India.

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