2nd International Conference on
CANCER BIOLOGY, THERAPEUTICS AND DRUG DISCOVERY AND DELIVERY
&
10th Annual Congress on
BIOMARKERS, CLINICAL RESEARCH & THERAPEUTICS
October 03-04, 2018 | Los Angeles, USA

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Cancer immunotherapy array: A novel screening tool for immune system profiling in cancer immunotherapy bridging autoimmunity and cancer

Background: Recent FDA-approved checkpoint inhibitors targeting the cytotoxic T-lymphocyte–associated antigen 4 (CTLA-4) and programmed death 1 (PD-1)/PD-L1 pathway represent milestones in the field of cancer immunotherapy. In general, cancer immunotherapy works only in a subset of patients, but some patients experience prolonged responses. Cancer immunotherapy can cause severe immune-related adverse events (irAE) in patients and no predictive biomarkers exist. We now have developed a Cancer Immunotherapy Array, which includes a combination of antigens important in autoimmune diseases, anti-tumor immunity and oncogenes and tested the array in patient sera from a diverse set of cancer immunotherapy trials.

Methods: The Cancer Immunotherapy Array consists of a bead-based multiplex array using minimal patient serum samples incubated with antigen-coated, color-coded Luminex beads. Run in microtiter plate format, the Array permits quantification of the autoantibody reactivity in thousands of serum samples towards approximately 900 human protein antigens in each sample. Magnetic beads are employed to enable automated pipetting and washing steps (1).

Results: Over 4,000 serum samples from diverse cancer indications plus hundreds of samples from autoimmune diseases such as RA, SLE, Sjogren's disease and healthy controls were screened with the Cancer Immunotherapy Array. As key findings we report autoantibody panels which differentiate patients with and without irAEs. Also, but less prominent, individual autoantibodies are associated with overall survival. Autoantibodies that target antigens involved in cancer signaling pathways are associated with irAEs. Also, patients with increased levels of a distinct autoantibody against an inflammatory cytokine do not develop irAEs across multiple tumors.

Conclusions: The Cancer Immunotherapy Array is suitable for the analysis of thousands of cancer patient serum samples. Its first application presents novel autoantibody signatures for therapy-related toxicities and response. These signatures have the potential to broaden our understanding of the mechanisms of therapy response and irAE occurrence.

Biography

P Schulz-Knappe is MD and Cell Biologist with long-standing expertise in R&D on biomarkers from the blood. His research topics include Proteomics, Peptidomics, Biomarkers, Autoantibodies, and related technologies such as Protein Microarrays, chromatography, biostatistics and mass spectrometry, resulting in IVD-Development in autoimmune diseases and cancer. Peter has served as CSO in several biotech companies such as Bio Vision (Germany), Proteome Sciences (UK) and Protagen (Germany). He published over 80 peer-reviewed papers and is an inventor with more than 20 patent families.

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