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Epitope mapping of the human immunome directly from sera

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Mapping of antibody epitopes with standard peptide phage display is a common but not always really satisfying approach. Refinement of library parameters for and application of deep sequencing in combination with a novel software analysis tool results in epitope information based on hundreds or more sequences presenting epitope/mimotope variations. The approach does not require more than two selection rounds and can be run in a relatively short time. Even when applied to sera, we observe significant enrichment of motifs of disease related antibody epitopes. These can all be retrieved from a single set of data obtained from a single phage display experiment with 1-2 µl serum. Due to the statistic approach based on short motifs of 3-4 amino acids structural motifs are also revealed. This detailed epitope/mimotope information can be used to generate peptides for various applications. This presentation will deal with the immunodiagnostic tools that can be generated from our data. We are able to generate arrays that enable for the first time an individualized analysis of a patient's immune response even towards individual cross reactive proteins. In the case of allergies it allows us to determine potential cross reactivity to related species, since an individual epitope's cross reactivity can be predicted from sequence alignments. The technology is today well enough established to approach larger projects like our present efforts to map most major food allergens or the identification of markers for virus serotypes.

Biography

Michael Szardenings has a great personal interest in the advancement of combinatorial methods at the border line between Molecular Biology, Medicine and Chemistry and its exploration for pharmaceutical and medical relevant research. He has been working with enzyme inhibitors as well as membrane and nuclear receptors. His present research activities focus on the improvement of peptide phage display methods to establish novel cell type specific ligands and towards a better understanding of the immune response amongst others in allergies and infectious diseases. He studied Chemistry from Hamburg University with a Diploma Thesis on bioluminescent nucleic acid derivatives in 1985. Three years later, he received a Doctoral degree at the former German Biotechnology Center GBF (Braunschweig) for protein design of protease inhibitor hPSTI. After Post-doctoral years in protein crystallography and research on melanocortin receptors, he served as CSO and CBO for phage display and CRO companies between 1998 and 2009, when he was appointed as Group Leader of a continuously growing group at Fraunhofer IZI in Leipzig. He is now also heading a spin-off company in Leipzig for epitope mapping services.

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