Clinical Applications of PepTenChip®, Peptide Microarrays, 2024

Peptide microarrays, PepTenChip® system, for determination of gastric cancer-risks

The novel biodetection system by peptide microarrays with a novel principle, PepTenChip® system, has been completed. This report describes the use of the system for the prediction for gastric cancer using a novel detector, PepTenCam [1]. Although body fluids contain numerous compounds, the use of the present system with statistical data processing allows detection without physico-chemical identification of specific compounds, even when disease responsible compounds are unknown [2][3]. Gastric diseases can be classified as gastritis (usually chronic superficial gastritis alone does not carry cancer-risks) and precancerous stages. Precancerous lesion of gastric cancer is associated with intestinal metaplasia, gastric intraepithelial metaplasia, chronic atrophic gastritis, etc. These occur often together and are considered as pre-cancerous stages and are associated with the risk of gastric cancer. Currently objective identification for carcinogenesis-risks is only by endoscopically tissue sampling followed by pathological diagnosis. Biopsies are inappropriate in patients on anticoagulants for heart or cerebrovascular diseases due to bleeding. The purpose of the present study is to afford an objective method for identifying the risk of carcinogenesis as an alternative to endoscopic tissue sampling with pathological diagnosis by non-invasive analyses. Recognition by PepTenChip® is not limited to analyte and capturing molecules in a 1:1 correspondence. We have collected *ca* 50 gastric juice samples of patients and three kinds of structured peptide arrays, b-sheets, b-loops and a-helices, were used for characterization of these. Among libraries α-helices gave an optimal discrimination capability between gastric cancer-risks and risk-free subjects, which were confirmed by pathological evidences for which producers are illustrated below. PepTenChip® gives easier and objective classification of gastric cancer-risks without tissue sampling. Microarrays with selection of capturing peptides can contribute to facile and early diagnoses for diseases.

Classification of neuronal diseases, multiple sclerosis and atypical multiple sclerosis using spinal fluids

An application of the novel PepTenChip® system, a peptide microarray, reviewed in [1] is presented for the classification of Multiple Sclerosis (MS) and atypical MS (AMS). Although body fluids contain numerous compounds, the use of the PepTenChip® system with statistical data processing allows detection without physico-chemical identification of the specific compounds, even when disease responsible compounds are unknown [2][3]. The cause of MS is unknown and an objective diagnostic method is not yet established. MS is one of the central demyelinating diseases characterized by inflammation occurring in the brain, spinal cord, and optic nerves, of which cause is unknown and no curative treatment exists. It is designated as a rare and intractable disease No. 13 in Japan. Current diagnosis primarily relies on MRI and cerebrospinal fluid examination, applying the McDonald criteria for comparison with symptoms of other cases. Within MS, typical and atypical forms exist and require different treatments. Hence, accurate diagnosis before treatment is crucial, although there is no totally distinguishable method. The number of global patients is estimated at ca. 2.3 million including neuromyelitis Optica (NMO) and is inceasing year by year. The criterion of MS is applied after excluding other possibilities through cerebrospinal fluid and antibody tests. Treatment responsiveness for AMS and MS are different and specific biomarkers are unknown. Differentiating AMS from MS is important as the clinical treatment is different. Currently there is no reliable diagnostic method to distinguish between the different forms and clinicians desire facile objective methods. Cerebrospinal fluid samples (57) were collected and two kinds of structured peptide arrays, b-loops and a-helices as capturing molecules were used for characterization. Among the libraries, β-loop peptides were found to be appropriate for this purpose, and peptide sequences suitable for discrimination between MS and AMS were identified. The results from the present biochip are expected to give valuable diagnostic information for guiding treatment decisions. It has been shown that PepTenChip® is useful for diagnostics in difficult and/or similar diseases. Manufacturing of microarrays with selection of capturing peptides according to a specific purpose can contribute to the characterization of diseases. Tailor-made chips can be easily prepared.

References

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