

Multiplexed immunohistochemical detection of tumor markers in breast cancer tissue using laser ablation inductively coupled plasma mass spectrometry

Charlotte Giesen,^{*a,b} Thomas Mairinger,^c Lina Khoury,^c Larissa Waentig,^b Norbert Jakubowski,^b and Ulrich Panne^{a,b}

^aHumboldt-Universität zu Berlin, Department of Chemistry, Brook-Taylor-Strasse 2, 12489 Berlin, Germany

^bBAM Federal Institute for Materials Research and Testing, Richard-Willstätter-Strasse 11, 12489 Berlin, Germany.

^cHELIOS Klinikum Emil von Behring, Walterhoferstrasse 11, 14165 Berlin, Germany.

E-mail: charlotte.giesen@bam.de

Abstract

We optimized multiplexed immunohistochemistry (IHC) on breast cancer tissue. Up to 20 tumor markers are routinely evaluated for one patient and thus, a common analysis results in a series of time consuming staining procedures. As an alternative, we used lanthanides for labeling of primary antibodies, which are applied in IHC. Laser ablation (LA)-ICP-MS was elaborated as a detection tool for multiplexed IHC of tissue sections. In this study, we optimized sample preparation steps and LA-ICP-MS parameters to achieve a sufficient signal-to-background ratio. The results prove the high selectivity of applied antibodies, which was sustained after labeling. Up to three tumor markers (Her 2, CK 7, and MUC 1) were detected simultaneously in a single multiplex analysis of a 5 µm thin breast cancer tissue at a laser spot size of 200 µm. Furthermore, the LA-ICP-MS results indicate a significantly higher expression level of MUC 1 compared to Her 2 and CK 7, which was not obvious from the conventionally stained tissue sections.

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