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The Potential of Gel Electrophoresis Coupled to ICP-MS and MALDI-MS for the Determination and Characterisation of Cisplatin DNA Adducts

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The use of elemental mass spectrometry was successfully applied to different questions in biological and medical research in the last few years. Especially, the online coupling of powerful separation methods like liquid chromatography (LC) or capillary electrophoresis (CE) to inductively coupled plasma-mass spectrometry (ICP-MS) has gained great importance to the determination of biopolymers and their interaction with metals. Different methods were developed for the separation and detection of metalloproteins or DNA metal adducts in various samples. However, the most popular and powerful separation method for biopolymers, gel electrophoresis (GE), was not coupled online to ICP-MS for such studies at this time. Several approaches have been developed on the basis of laser ablation (1), but this technique is quite laborious and time-consuming, so easier approaches are highly desirable.

In this paper we describe the technical realisation of an online coupling of GE to ICP-MS (2) for the direct determination of cisplatin DNA adducts. For these studies, different 8-mer oligonucleotides are incubated with cisplatin under physiological conditions and the reaction products are quantitatively monitored via ^{31}P and ^{195}Pt detection. The high potential of ICP-MS in biochemical application is shown here for the determination of the kinetic reaction constants for the monitored processes. Complementary studies with MALDI-MS were conducted on fractions sampled from the GE system and confirmed the expected structures.

References:

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