Supplementary information S1:

Representative Pt-specific chromatograms obtained after the addition of *cis*-platin (CP) to human plasma incubated for 30 min (37° C). Subsequently D-methionine was added and the obtained mixture was analyzed by SEC-ICP-AES after 10 min (red solid line) and 50 min (red dashed line). The molar ratio of D-methionine:CP was 20:1. A control experiment involved the addition of CP to human plasma followed by the analysis with SEC-ICP-AES after 40 min (blue solid line) and 80 min (blue dashed line). Stationary phase: Superdex 200 10/300 GL (30 x 1.0 cm I.D., 13 µm particle size) SEC column at 22° C; Mobile phase: PBS buffer (0.15 M, pH 7.4); Flow rate: 1.0 mL/min, Injection volume: 500 µL; Detector: ICP-AES at 214.423 nm (Pt). The retention times of the molecular markers are depicted on top of the figure.

Supplementary information S2:

Representative Pt-specific chromatograms that were obtained after the addition of D-methionine to human plasma incubated for 30 min (37° C). Subsequently *cis*-platin (CP) was added and the obtained mixture was analyzed 10 min (red solid line) and 50 min (blue solid line) later by SEC-ICP-AES. The molar ratio of D-methionine:CP was 20:1. The same experiment was repeated using L-methionine instead of D-methionine and the obtained mixture was analyzed by SEC-ICP-AES after 10 min (red dashed line) and 50 min (blue dashed line). Stationary phase: Superdex 200 10/300 GL (30 x 1.0 cm I.D., 13 µm particle size) SEC column at 22° C; Mobile phase: PBS buffer (0.15 M, pH 7.4); Flow rate: 1.0

mL/min, Injection volume: 500 µL; Detector: ICP-AES at 214.423 nm (Pt). The retention times of the molecular markers are depicted on top of the figure.

Supplementary information S3:

A LC-ESI-MS spectrum (positive mode) obtained 10 min after the simultaneous addition of *cis*-platin (CP) and D-methionine to PBS-buffer. The molar ratio of D-methionine:CP was 20:1. Stationary phase: Purospher Star Hibar HR 100-2.1 UHPLC column containing C_{18} endcapped silica gel (100 mm x 2.1 mm I.D., 2-3 µm particle size) at 22° C; Mobile phase: gradient elution, with the initial concentration of acetonitrile in water set to 20% and gradually increased to 80% over five minutes, and then to 100% acetonitrile by the end of the sixth minute; Flow rate: 0.4 mL/min, Injection volume: 10 µL; Column was coupled to an Agilent Technologies 6520 Accurate-Mass Q-TOF.

Supplementary information S4:

A LC-ESI-MS spectrum (positive mode) obtained 1 h after the simultaneous addition of *cis*-platin (CP) and D-methionine to PBS-buffer. The molar ratio of D-methionine:CP was 20:1. Stationary phase: Purospher Star Hibar HR 100-2.1 UHPLC column containing C_{18} endcapped silica gel (100 mm x 2.1 mm I.D., 2-3 µm particle size) at 22° C; Mobile phase: gradient elution, with the initial concentration of acetonitrile in water set to 20% and gradually increased to 80% over five minutes, and then to 100% acetonitrile by the end of the sixth minute; Flow rate: 0.4 mL/min, Injection volume: 10 µL; Column was coupled to an Agilent Technologies 6520 Accurate-Mass Q-TOF.

Supplementary information S5:

A LC-ESI-MS spectrum (positive mode) obtained 24 h after the simultaneous addition of *cis*-platin (CP) and D-methionine to PBS-buffer. The molar ratio of D-methionine:CP was 20:1. Stationary phase: Purospher Star Hibar HR 100-2.1 UHPLC column containing C_{18} endcapped silica gel (100 mm x 2.1 mm I.D., 2-3 µm particle size) at 22° C; Mobile phase: gradient elution, with the initial concentration of acetonitrile in water set to 20% and gradually increased to 80% over five minutes, and then to 100% acetonitrile by the end of the sixth minute; Flow rate: 0.4 mL/min, Injection volume: 10 µL; Column was coupled to an Agilent Technologies 6520 Accurate-Mass Q-TOF.

Supplementary information S6:

Accurate masses and percentage abundance of all isotopologues in the presented mass spectra.