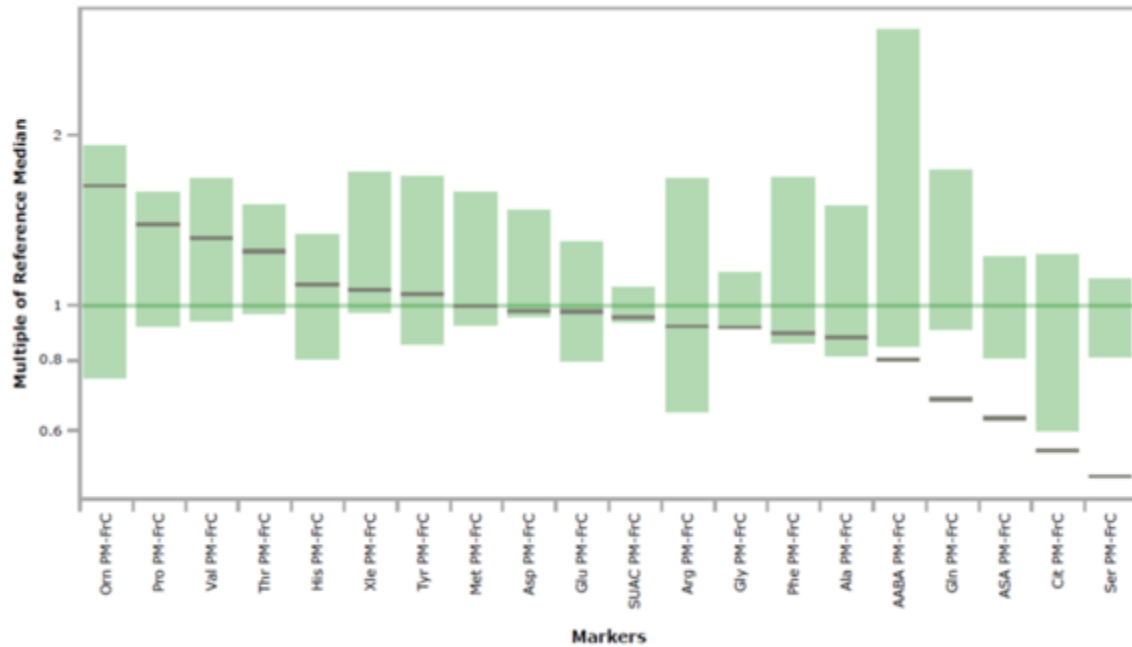


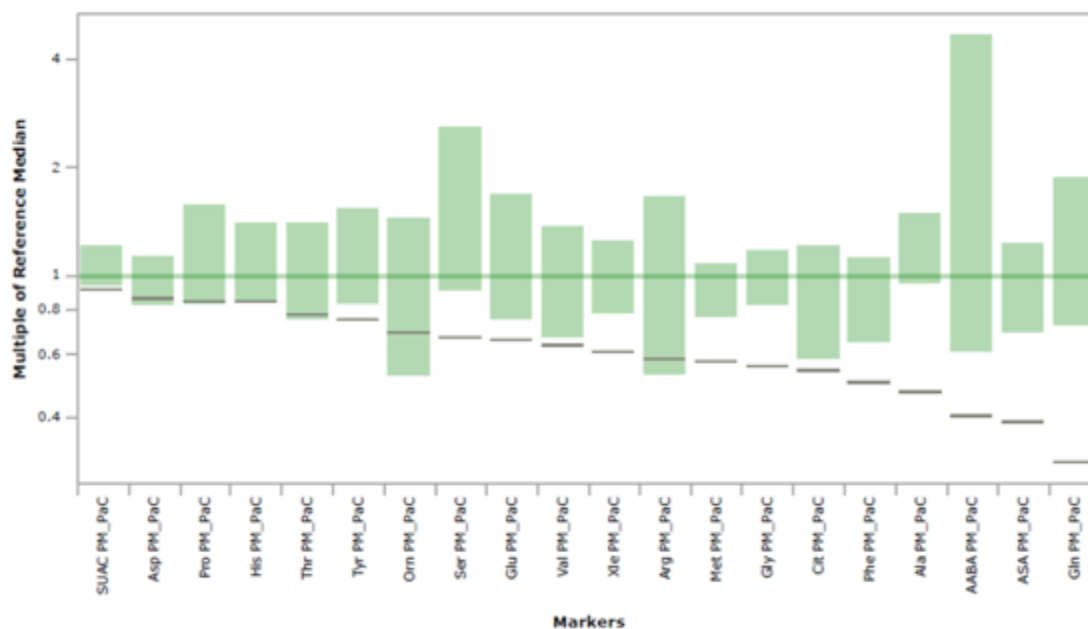
Suppl. Fig. 1



Amino acid content in extracts of frontal cortex spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. X-axis values indicate individual amino acid species. Abbreviations: PM-FrC, post-mortem frontal cortex; Xle, sum of leucine and isoleucine (isobaric); SUAC, succinylacetone; AABA, α -aminobutyric acid; ASA, argininosuccinic acid; all other amino acids described using standard three letter abbreviations (PNG 25.7 mb)

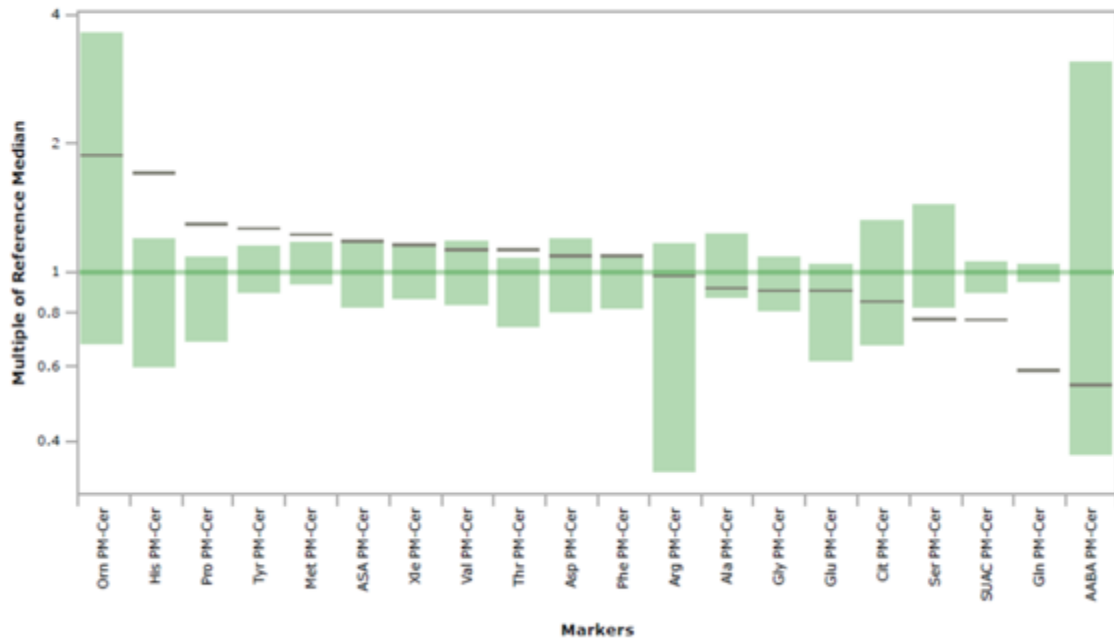
[Full size image](#)

Suppl. Fig. 2



Amino acid content in extracts of parietal cortex spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. X-axis values indicate individual amino acid species. Abbreviations: PM-PaC, post-mortem parietal cortex; Xle, sum of leucine and isoleucine (isobaric); SUAC, succinylacetone; AABA, α -aminobutyric acid; ASA, argininosuccinic acid; all other amino acids described using standard three letter abbreviations(PNG 6.44 mb)

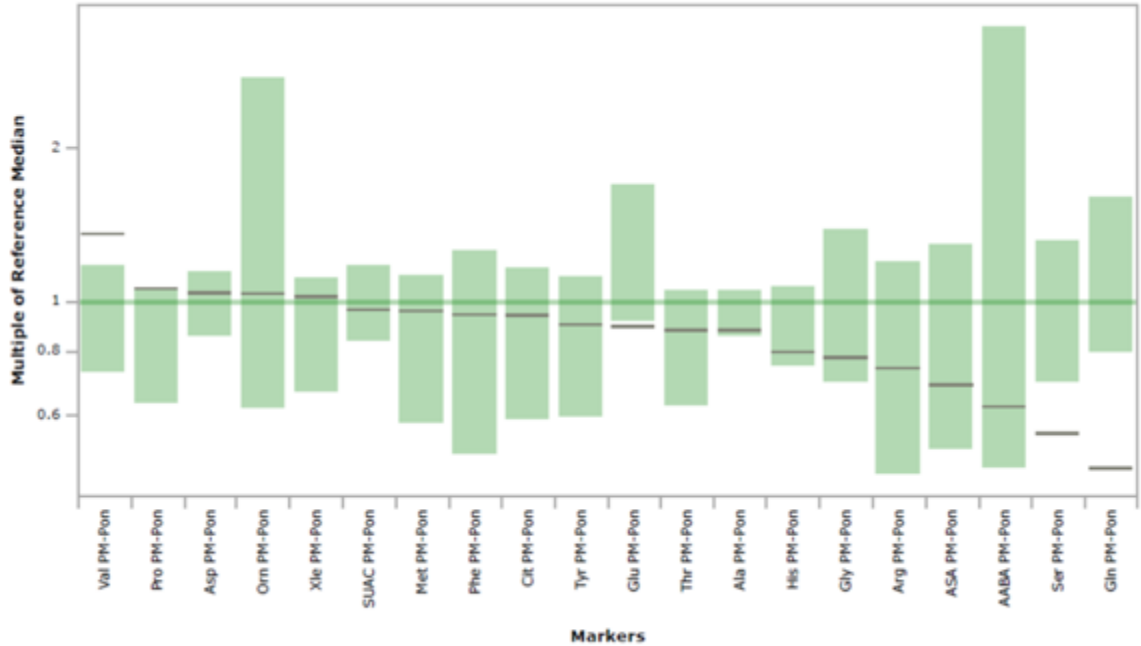
[Full size image](#)
Suppl. Fig. 3



Amino acid content in extracts of cerebellum spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. X-axis values indicate individual amino acid species. Abbreviations: PM-Cer, post-mortem cerebellum; Xle, sum of leucine and isoleucine (isobaric); SUAC, succinylacetone; AABA, α -aminobutyric acid; ASA, argininosuccinic acid; all other amino acids described using standard three letter abbreviations(PNG 6.44 mb)

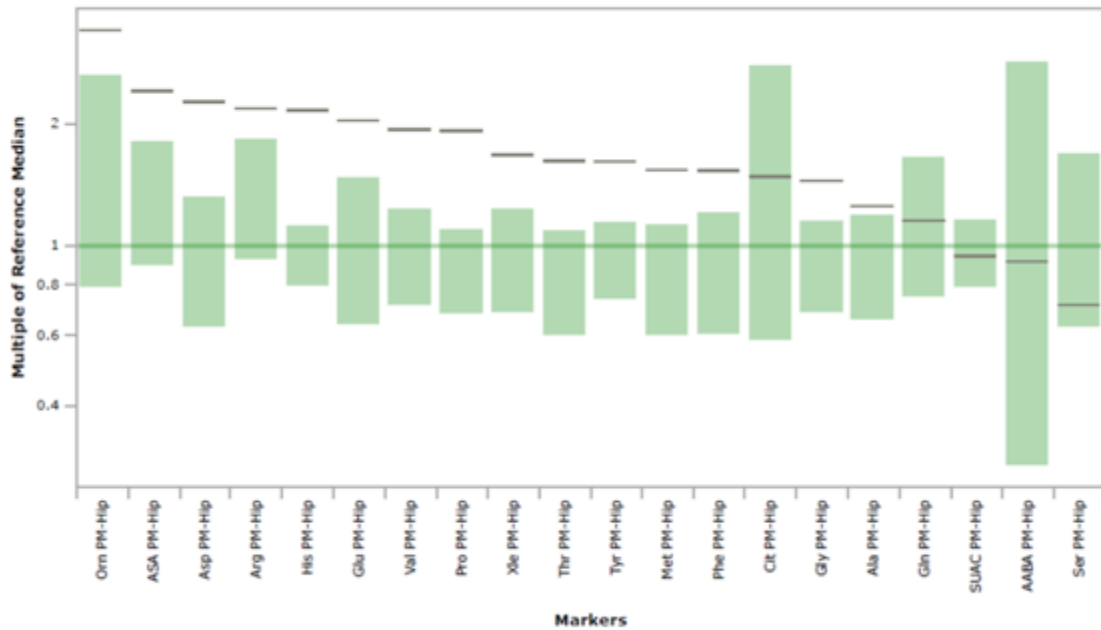
[Full size image](#)

Suppl. Fig. 4



Amino acid content in extracts of pons spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. X-axis values indicate individual amino acid species. Abbreviations: PM-Pon, post-mortem pons; Xle, sum of leucine and isoleucine (isobaric); SUAC, succinylacetone; AABA, α -aminobutyric acid; ASA, argininosuccinic acid; all other amino acids described using standard three letter abbreviations (PNG 6.44 mb)

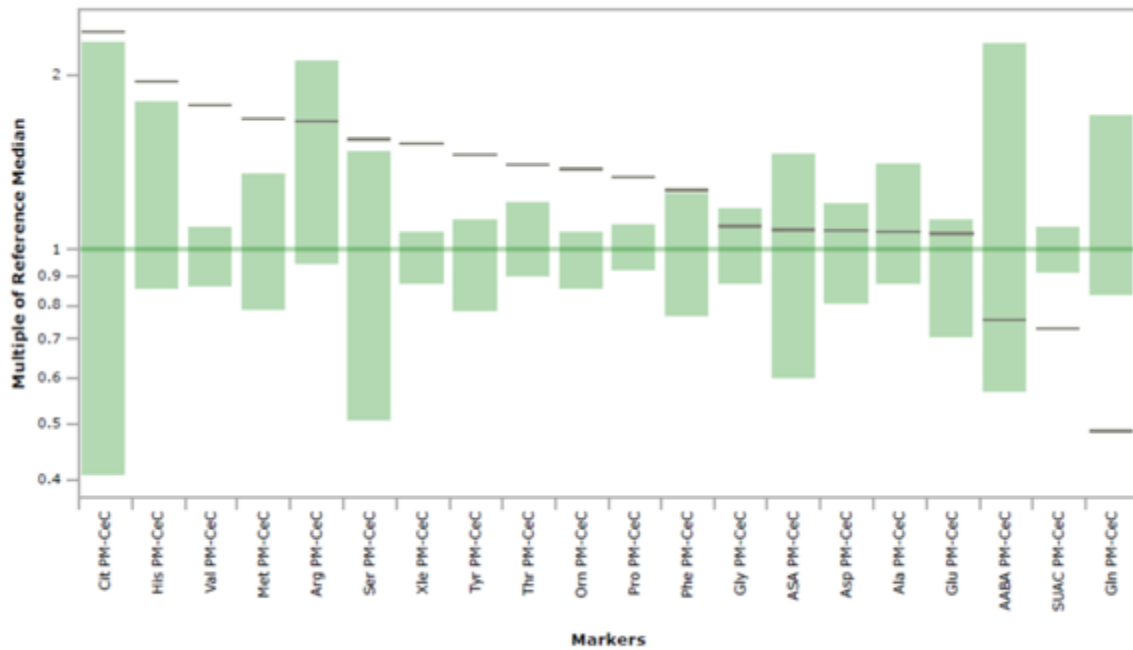
[Full size image](#)
Suppl. Fig. 5



Amino acid content in extracts of hippocampus spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. X-axis values indicate individual amino acid species. Abbreviations: PM-Hip, post-mortem hippocampus; Xle, sum of leucine and isoleucine (isobaric); SUAC, succinylacetone; AABA, α -aminobutyric acid; ASA, argininosuccinic acid; all other amino acids described using standard three letter abbreviations(PNG 6.44 mb)

[Full size image](#)

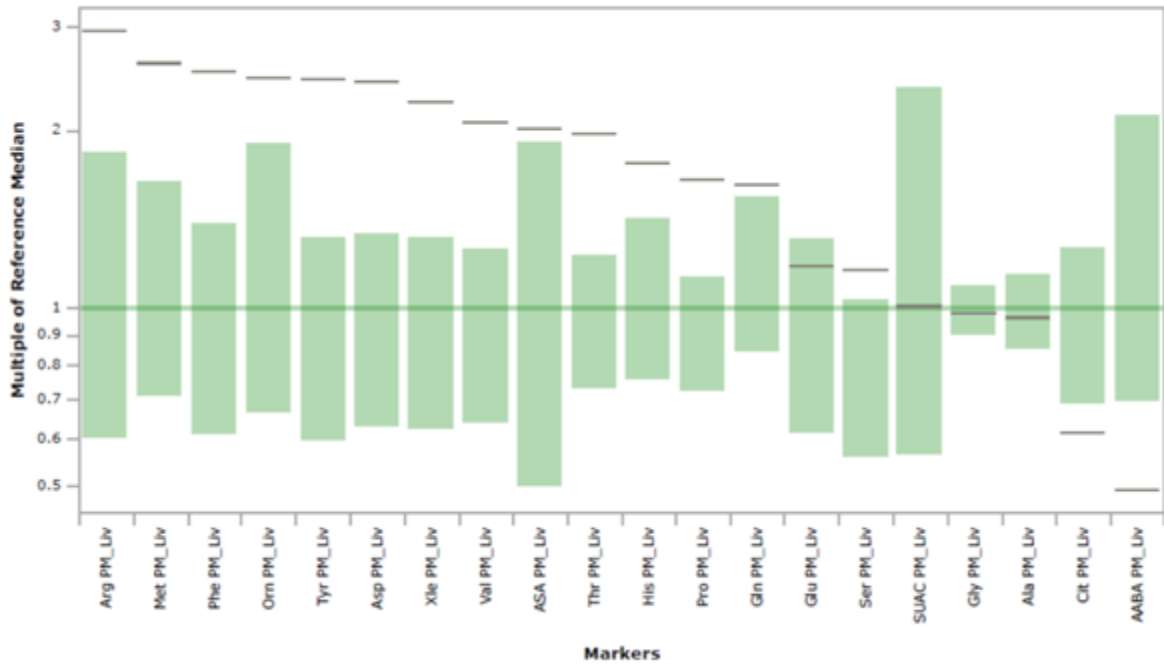
Suppl. Fig. 6



Amino acid content in extracts of hippocampus spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. X-axis values indicate individual amino acid species. Abbreviations: PM-Hip, post-mortem hippocampus; Xle, sum of leucine and isoleucine (isobaric); SUAC, succinylacetone; AABA, α -aminobutyric acid; ASA, argininosuccinic acid; all other amino acids described using standard three letter abbreviations(PNG 6.44 mb)

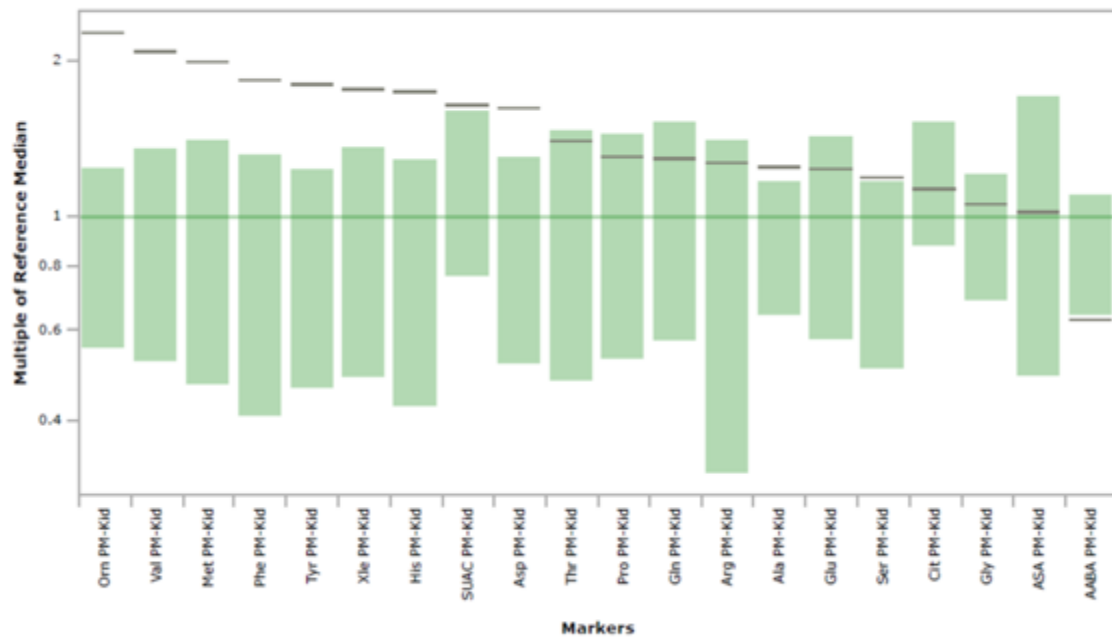
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Suppl. Fig. 7



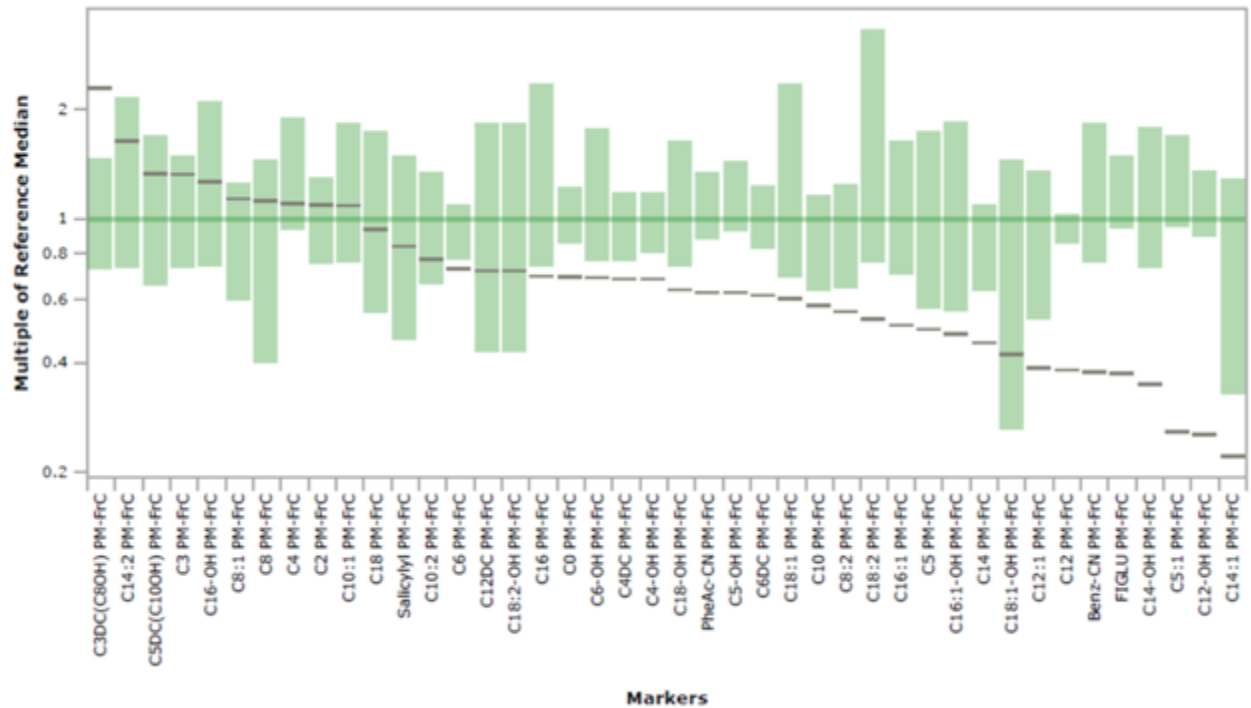
Amino acid content in extracts of cerebral cortex spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. X-axis values indicate individual amino acid species. Abbreviations: PM-Liv, post-mortem liver; Xle, sum of leucine and isoleucine (isobaric); SUAC, succinylacetone; AABA, α -aminobutyric acid; ASA, argininosuccinic acid; all other amino acids described using standard three letter abbreviations(PNG 6.44 mb)

[Full size image](#)
Suppl. Fig. 8



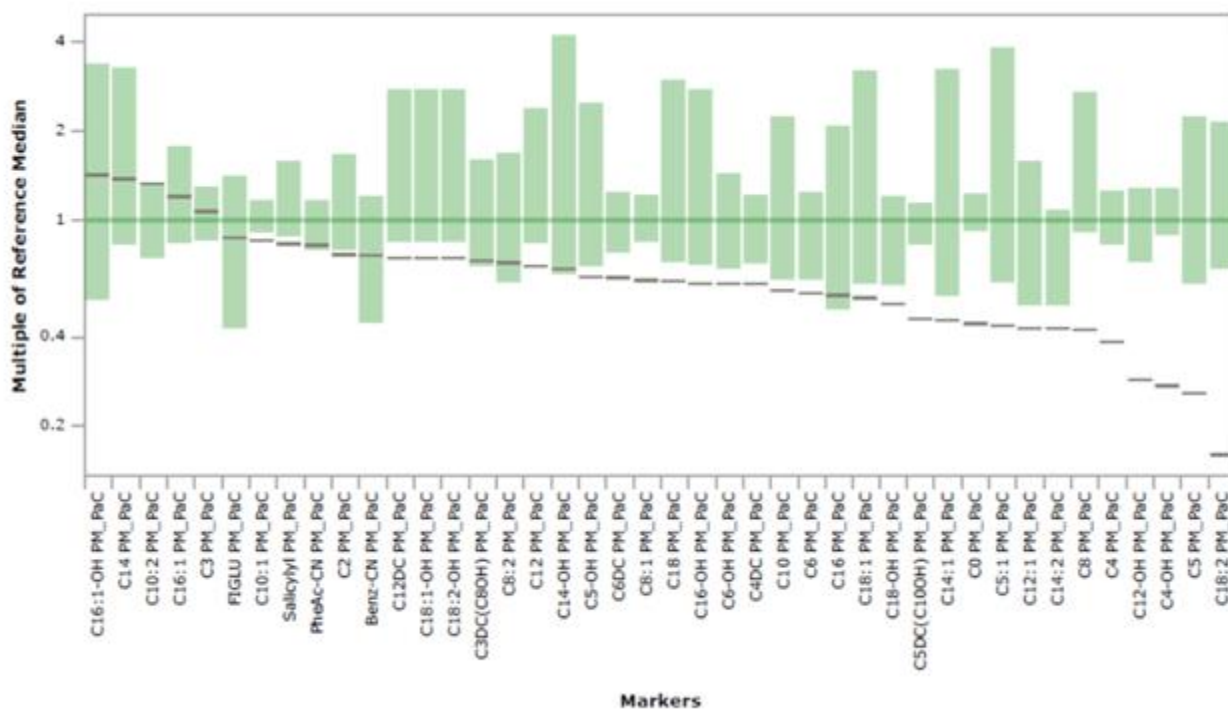
Amino acid content in extracts of kidney spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. X-axis values indicate individual amino acid species. Abbreviations: PM-Kid, post-mortem kidney; Xle, sum of leucine and isoleucine (isobaric); SUAC, succinylacetone; AABA, α -aminobutyric acid; ASA, argininosuccinic acid; all other amino acids described using standard three letter abbreviations (PNG 6.44 mb)

[Full size image](#)
Suppl. Fig. 9



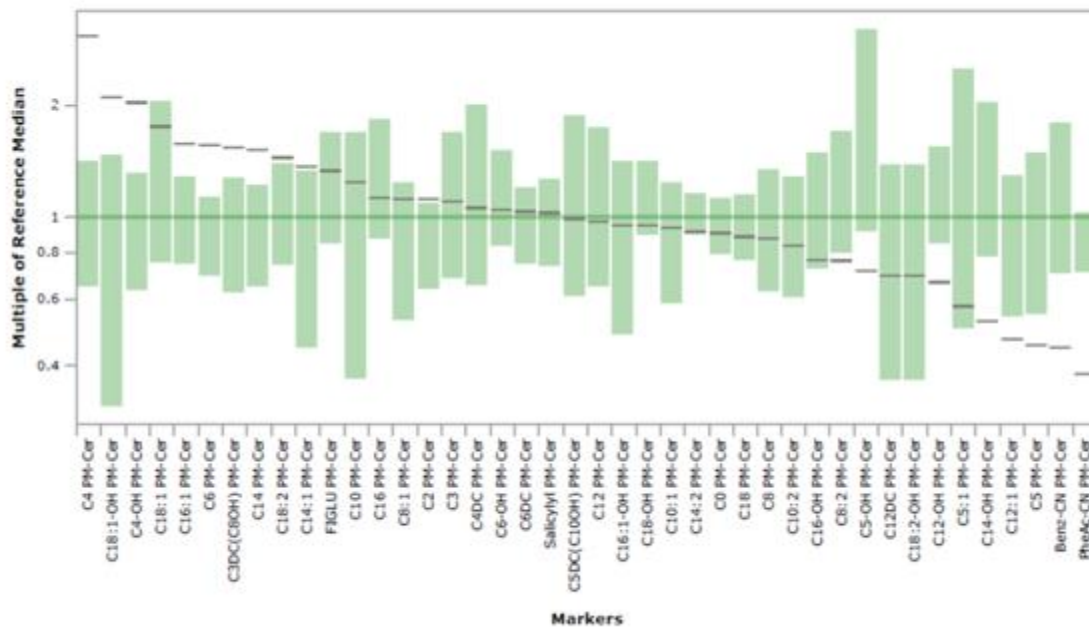
Acylcarnitine content in extracts of frontal cortex spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. For the x-axis, carnitine ester chain length is presented as carbon number (e.g., C3-carnitine, C4-carnitine). Single or double alkene species are presented as, for example, C14:1 and C14:2. Dicarboxylic acids (DC) are also presented as chain length, e.g., C12DC. Hydroxylated species are depicted as OH, e.g., C14-OH. Additional abbreviations employed: PM-FrC, post-mortem frontal cortex; CN, carnitine; salicyl, salicyl carnitine; PheAc-CN, phenylacetate carnitine; Benz-CN, benzoyl carnitine; FIGLU, formiminoglutamic acid. In those instances in which a marker is composed of two molecular ions of identical molecular weight, the data is depicted parenthetically (e.g. C5DC(C10OH), representing a mixture of C5 dicarboxylic acid and C10 hydroxyl carnitines) (PNG 6.44 mb)

[Full size image](#)
Suppl. Fig. 10



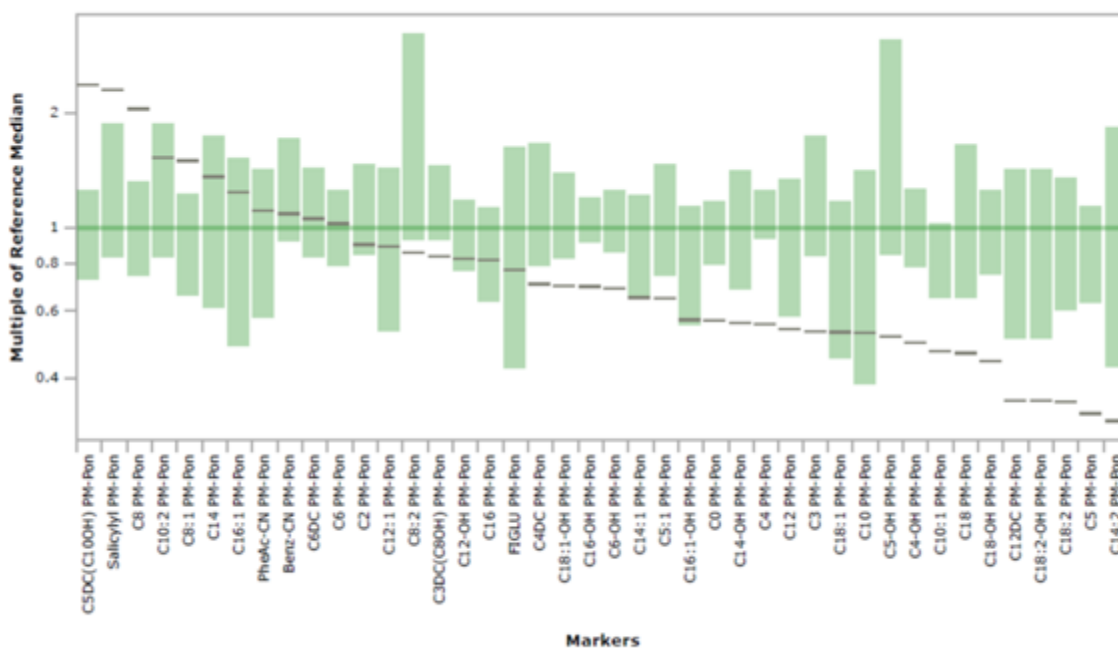
Acylcarnitine content in extracts of parietal cortex spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. For the x-axis, carnitine ester chain length is presented as carbon number (e.g., C3-carnitine, C4-carnitine). Single or double alkene species are presented as, for example, C14:1 and C14:2. Dicarboxylic acids (DC) are also presented as chain length, e.g., C12DC. Hydroxylated species are depicted as OH, e.g., C14-OH. Additional abbreviations employed: PM-PaC, post-mortem parietal cortex; CN, carnitine; salicyl, salicyl carnitine; PheAc-CN, phenylacetate carnitine; Benz-CN, benzoyl carnitine; FIGLU, formiminoglutamic acid. In those instances in which a marker is composed of two molecular ions of identical molecular weight, the data is depicted parenthetically (e.g. C5DC(C10OH), representing a mixture of C5 dicarboxylic acid and C10 hydroxyl carnitines) (PNG 6.44 mb)

[Full size image](#)
Suppl. Fig. 11



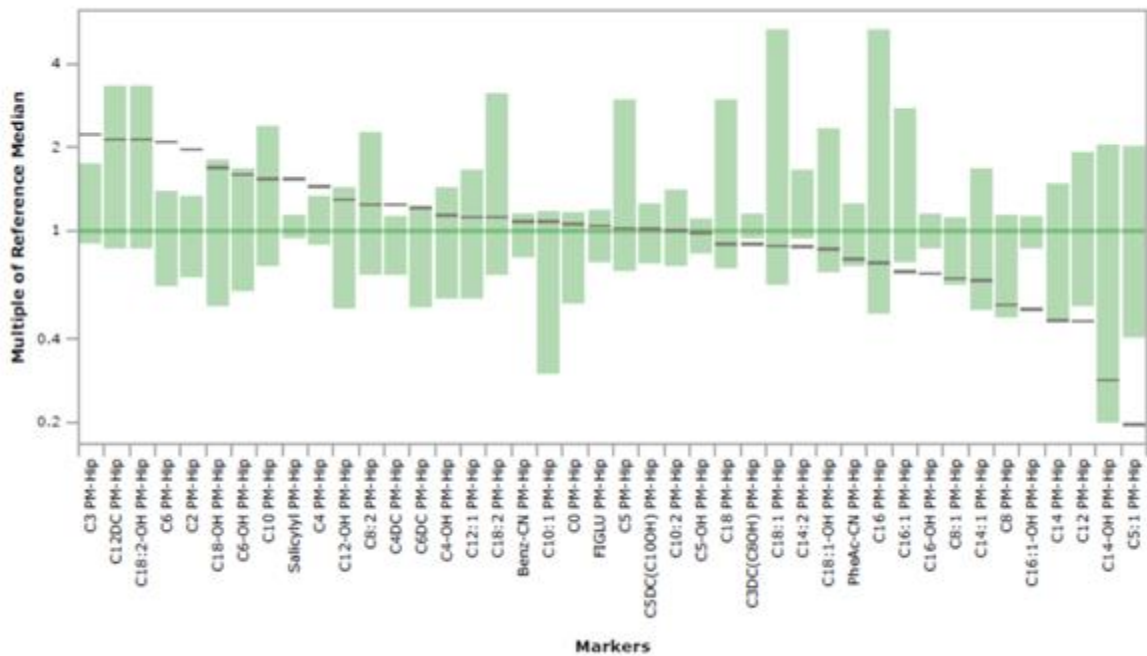
Acylcarnitine content in extracts of cerebellum spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. For the x-axis, carnitine ester chain length is presented as carbon number (e.g., C3-carnitine, C4-carnitine). Single or double alkene species are presented as, for example, C14:1 and C14:2. Dicarboxylic acids (DC) are also presented as chain length, e.g., C12DC. Hydroxylated species are depicted as OH, e.g., C14-OH. Additional abbreviations employed: PM-Cer, post-mortem cerebellum; CN, carnitine; salicyl, salicyl carnitine; PheAc-CN, phenylacetate carnitine; Benz-CN, benzoyl carnitine; FIGLU, formiminoglutamic acid. In those instances in which a marker is composed of two molecular ions of identical molecular weight, the data is depicted parenthetically (e.g. C5DC(C10OH), representing a mixture of C5 dicarboxylic acid and C10 hydroxyl carnitines)(PNG 6.44 mb)

[Full size image](#)
Suppl. Fig. 12



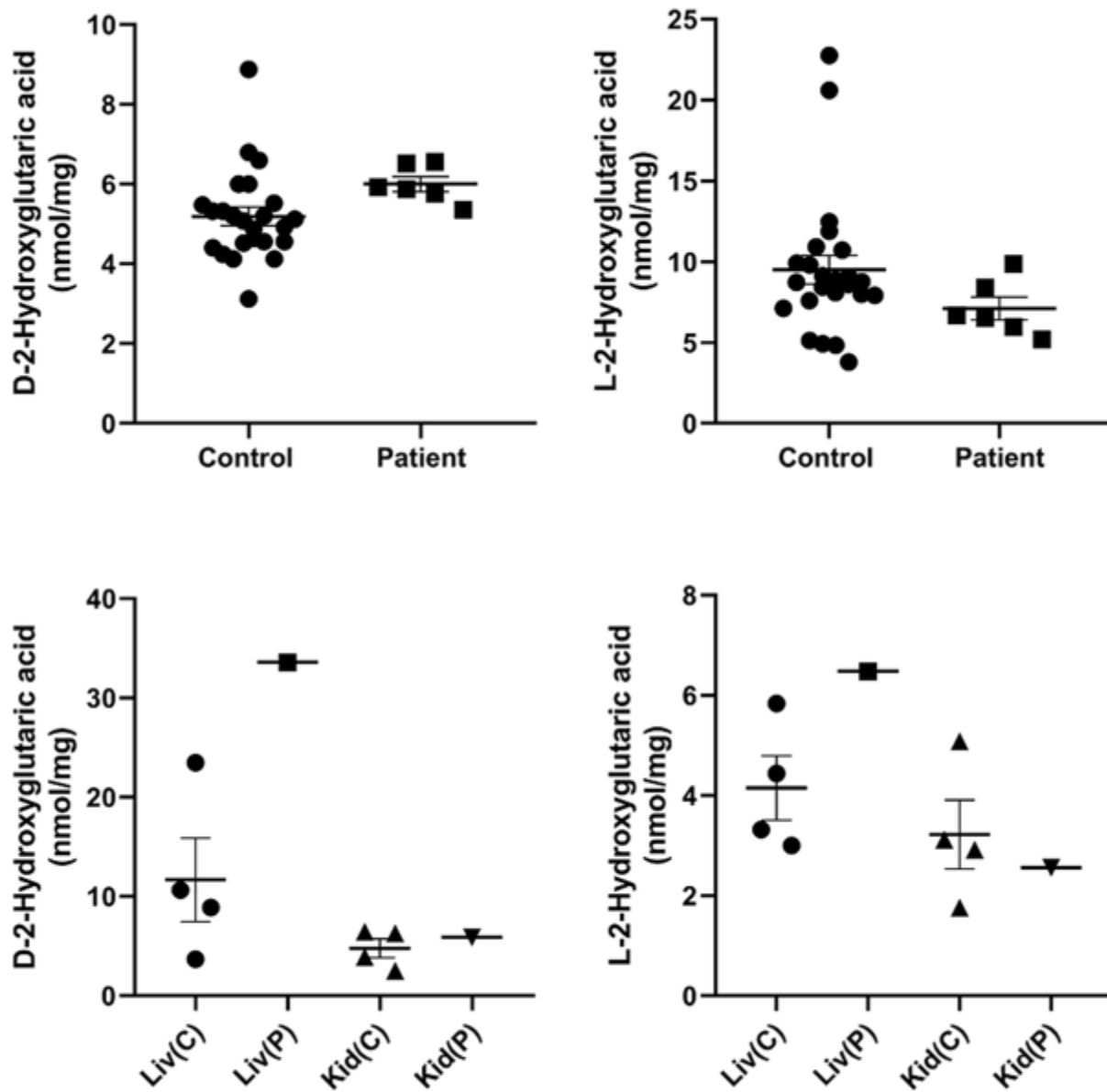
Acylcarnitine content in extracts of pons spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. For the x-axis, carnitine ester chain length is presented as carbon number (e.g., C3-carnitine, C4-carnitine). Single or double alkene species are presented as, for example, C14:1 and C14:2. Dicarboxylic acids (DC) are also presented as chain length, e.g., C12DC. Hydroxylated species are depicted as OH, e.g., C14-OH. Additional abbreviations employed: PM-Pon, post-mortem pons; CN, carnitine; salicyl, salicyl carnitine; PheAc-CN, phenylacetate carnitine; Benz-CN, benzoyl carnitine; FIGLU, formiminoglutamic acid. In those instances in which a marker is composed of two molecular ions of identical molecular weight, the data is depicted parenthetically (e.g. C5DC(C10OH), representing a mixture of C5 dicarboxylic acid and C10 hydroxyl carnitines)(PNG 6.44 mb)

[Full size image](#)
Suppl. Fig. 13



Acylcarnitine content in extracts of hippocampus spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. For the x-axis, carnitine ester chain length is presented as carbon number (e.g., C3-carnitine, C4-carnitine). Single or double alkene species are presented as, for example, C14:1 and C14:2. Dicarboxylic acids (DC) are also presented as chain length, e.g., C12DC. Hydroxylated species are depicted as OH, e.g., C14-OH. Additional abbreviations employed: CN, carnitine; salicyl, salicyl carnitine; PheAc-CN, phenylacetate carnitine; Benz-CN, benzoyl carnitine; FIGLU, formiminoglutamic acid; PM-Hip, post-mortem hippocampus. In those instances in which a marker is composed of two molecular ions of identical molecular weight, the data is depicted parenthetically (e.g. C5DC(C10OH), representing a mixture of C5 dicarboxylic acid and C10 hydroxyl carnitines)(PNG 6.44 mb)

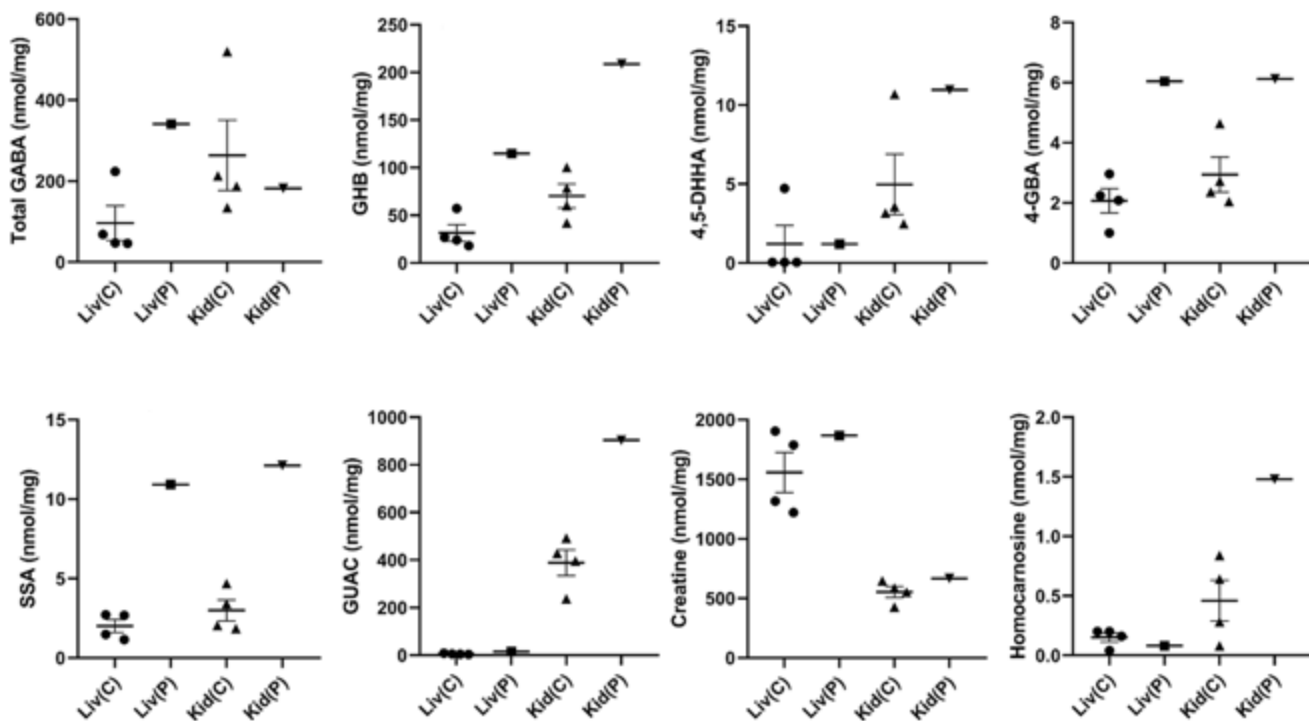
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Suppl. Fig. 14



Acylcarnitine content in extracts of cerebral cortex spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. For the x-axis, carnitine ester chain length is presented as carbon number (e.g., C3-carnitine, C4-carnitine). Single or double alkene species are presented as, for example, C14:1 and C14:2. Dicarboxylic acids (DC) are also presented as chain length, e.g., C12DC. Hydroxylated species are depicted as OH, e.g., C14-OH. Additional abbreviations employed: PM-CeC, post-mortem cerebral cortex; CN, carnitine; salicyl, salicyl carnitine; PheAc-CN, phenylacetate carnitine; Benz-CN, benzoyl carnitine; FIGLU,

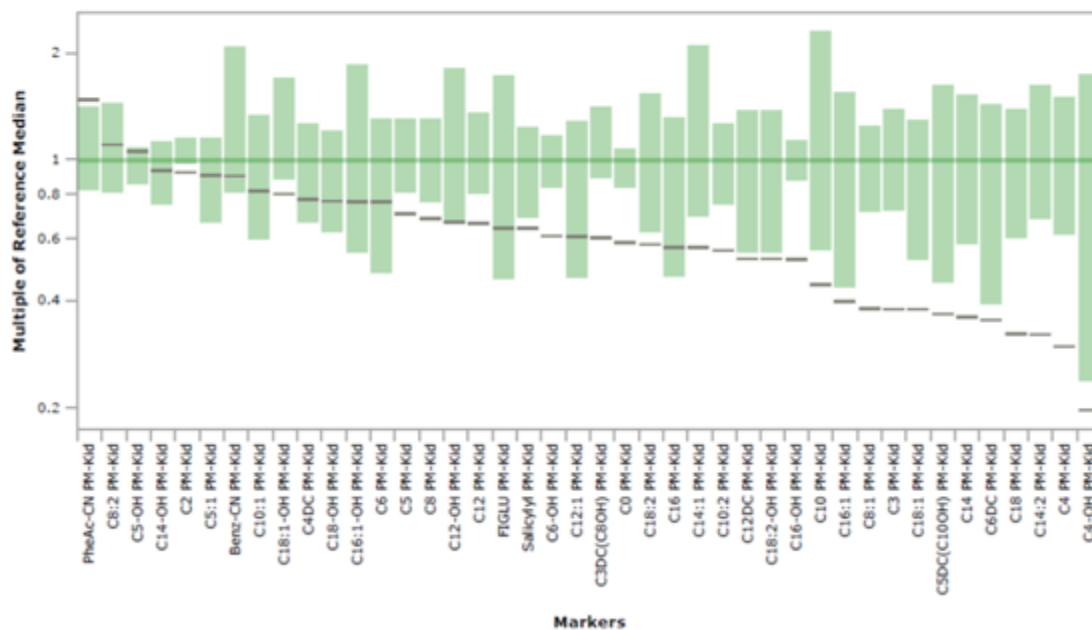
formiminoglutamic acid. In those instances in which a marker is composed of two molecular ions of identical molecular weight, the data is depicted parenthetically (e.g. C5DC(C10OH), representing a mixture of C5 dicarboxylic acid and C10 hydroxyl carnitines)(PNG 227 kb)

[Full size image](#)
Suppl. Fig. 15



Acylcarnitine content in extracts of liver spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. For the x-axis, carnitine ester chain length is presented as carbon number (e.g., C3-carnitine, C4-carnitine). Single or double alkene species are presented as, for example, C14:1 and C14:2. Dicarboxylic acids (DC) are also presented as chain length, e.g., C12DC. Hydroxylated species are depicted as OH, e.g., C14-OH. Additional abbreviations employed: PM-Liv, post-mortem liver; CN, carnitine; salicyl, salicyl carnitine; PheAc-CN, phenylacetate carnitine; Benz-CN, benzoyl carnitine; FIGLU, formiminoglutamic acid. In those instances in which a marker is composed of two molecular ions of identical molecular weight, the data is depicted parenthetically (e.g. C5DC(C10OH), representing a mixture of C5 dicarboxylic acid and C10 hydroxyl carnitines)(PNG 314 kb)

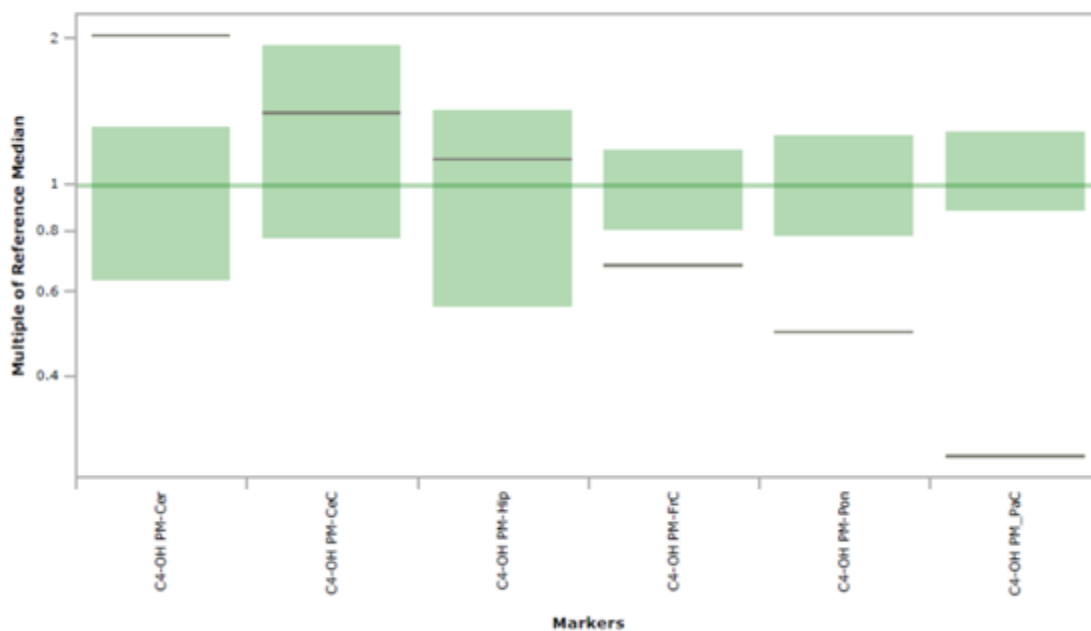
[Full size image](#)
Suppl. Fig. 16



Acylcarnitine content in extracts of kidney spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal blackline. The y-axis depicts “multiples of the reference (control) median”. For the x-axis, carnitine ester chain length is presented as carbon number (e.g., C3-carnitine, C4-carnitine). Single or double alkene species are presented as, for example, C14:1 and C14:2. Dicarboxylic acids (DC) are also presented as chain length, e.g., C12DC. Hydroxylated species are depicted as OH, e.g., C14-OH. Additional abbreviations employed: PM-Kid, post-mortem kidney; CN, carnitine; salicyl, salicyl carnitine; PheAc-CN, phenylacetate carnitine; Benz-CN, benzoyl carnitine; FIGLU, formiminoglutamic acid. In those instances in which a marker is composed of two molecular ions of identical molecular weight, the data is depicted parenthetically (e.g. C5DC(C10OH), representing a mixture of C5 dicarboxylic acid and C10 hydroxyl carnitines). (PNG 6.44 mb)

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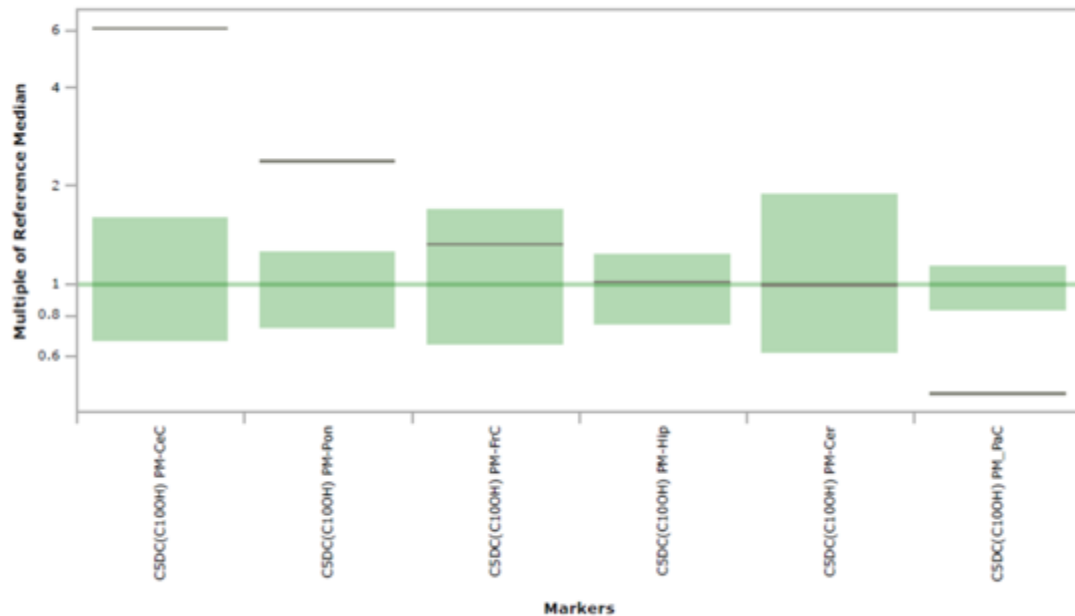
Suppl. Fig. 17



Content of C4OH carnitine in regional brain extracts spotted onto filterpaper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. For the x-axis, carnitine ester chain length is presented as carbon number (e.g., C3-carnitine, C4-carnitine). Single or double alkene species are presented as, for example, C14:1 and C14:2. Dicarboxylic acids (DC) are also presented as chain length, e.g., C12DC. Hydroxylated species are depicted as OH, e.g., C14-OH. Additional abbreviations employed: PM-Liv, post-mortem liver; CN, carnitine; salicyl, salicyl carnitine; PheAc-CN, phenylacetate carnitine; Benz-CN, benzoyl carnitine; FIGLU, formiminoglutamic acid. In those instances in which a marker is composed of two molecular ions of identical molecular weight, the data is depicted parenthetically (e.g. C5DC(C10OH), representing a mixture of C5 dicarboxylic acid and C10 hydroxyl carnitines)(PNG 6.44 mb)

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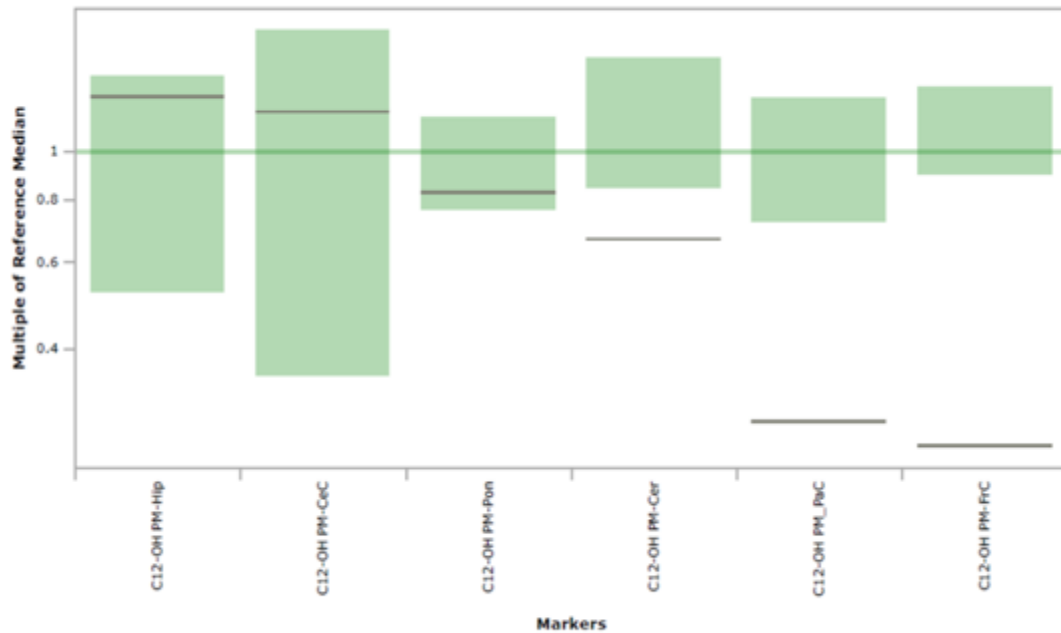
Suppl. Fig. 18



Content of C5DC carnitine in regional brain extracts spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. Abbreviations: C5DC, C5 dicarboxylic acid carnitine (e.g., glutarylcarnitine); PM, post-mortem; Cer, cerebellum; CeC, cerebral cortex; FrC, frontal cortex; Hip, hippocampus; Pon, pons; PaC, parietal cortex. For C5DC carnitine, the data represents two molecular ions of identical molecular weight (e.g. C5DC(C10OH), representing a mixture of C5 dicarboxylic acid and C10 hydroxyl carnitines); nonetheless, the predominant species here is C5DC carnitine (PNG 6.44 mb)

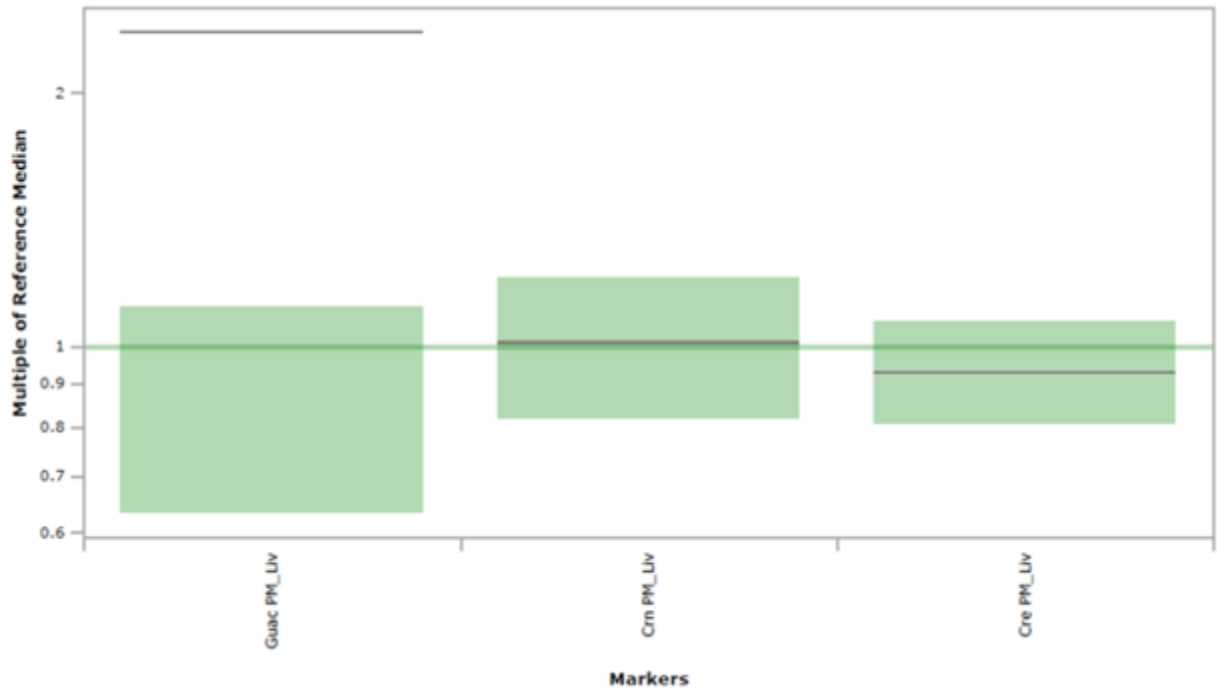
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Suppl. Fig. 19



Content of C12OH carnitine in regional brain extracts spotted onto filterpaper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. Abbreviations: C12OH, C12 hydroxy carnitine; PM, post-mortem; Cer, cerebellum; CeC, cerebral cortex; FrC, frontal cortex; Hip, hippocampus; Pon, pons; PaC, parietal cortex (PNG 6.44 mb)

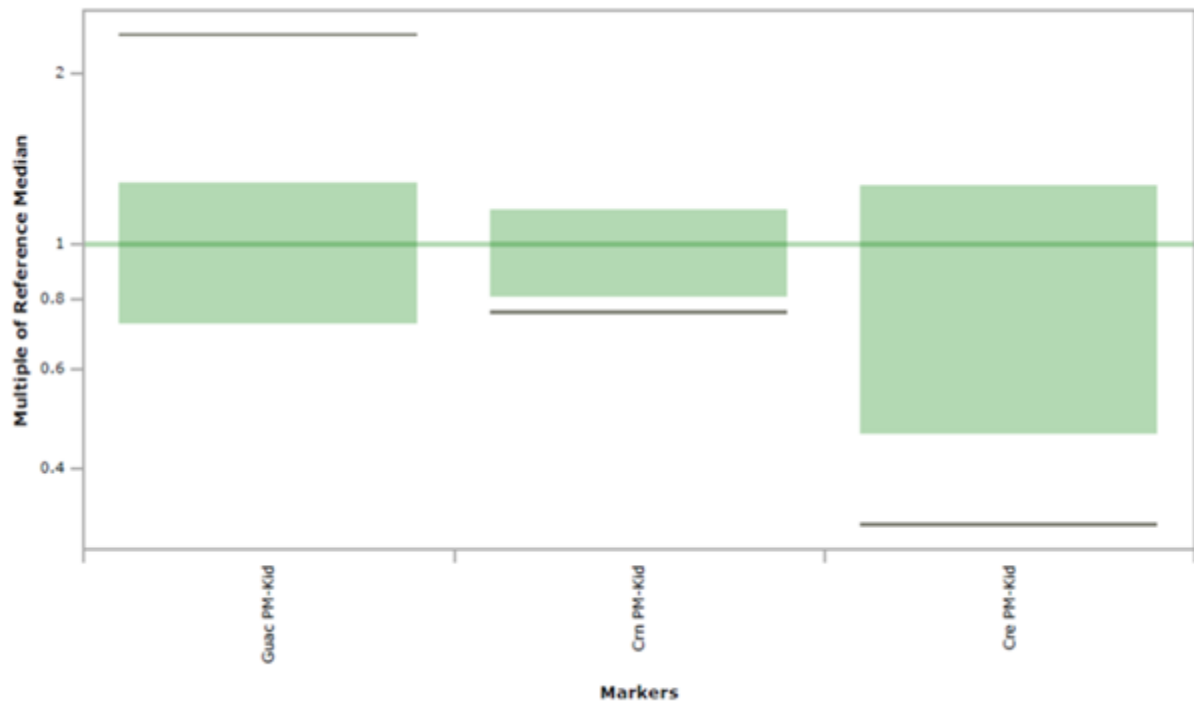
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Suppl. Fig. 20



Content of guanidino- species in extracts of liver spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. Abbreviations: Liv, liver; guac, guanidinoacetic acid; cre, creatine; crn, creatinine; PM, post-mortem (PNG 6.44 mb)

[Full size image](#)

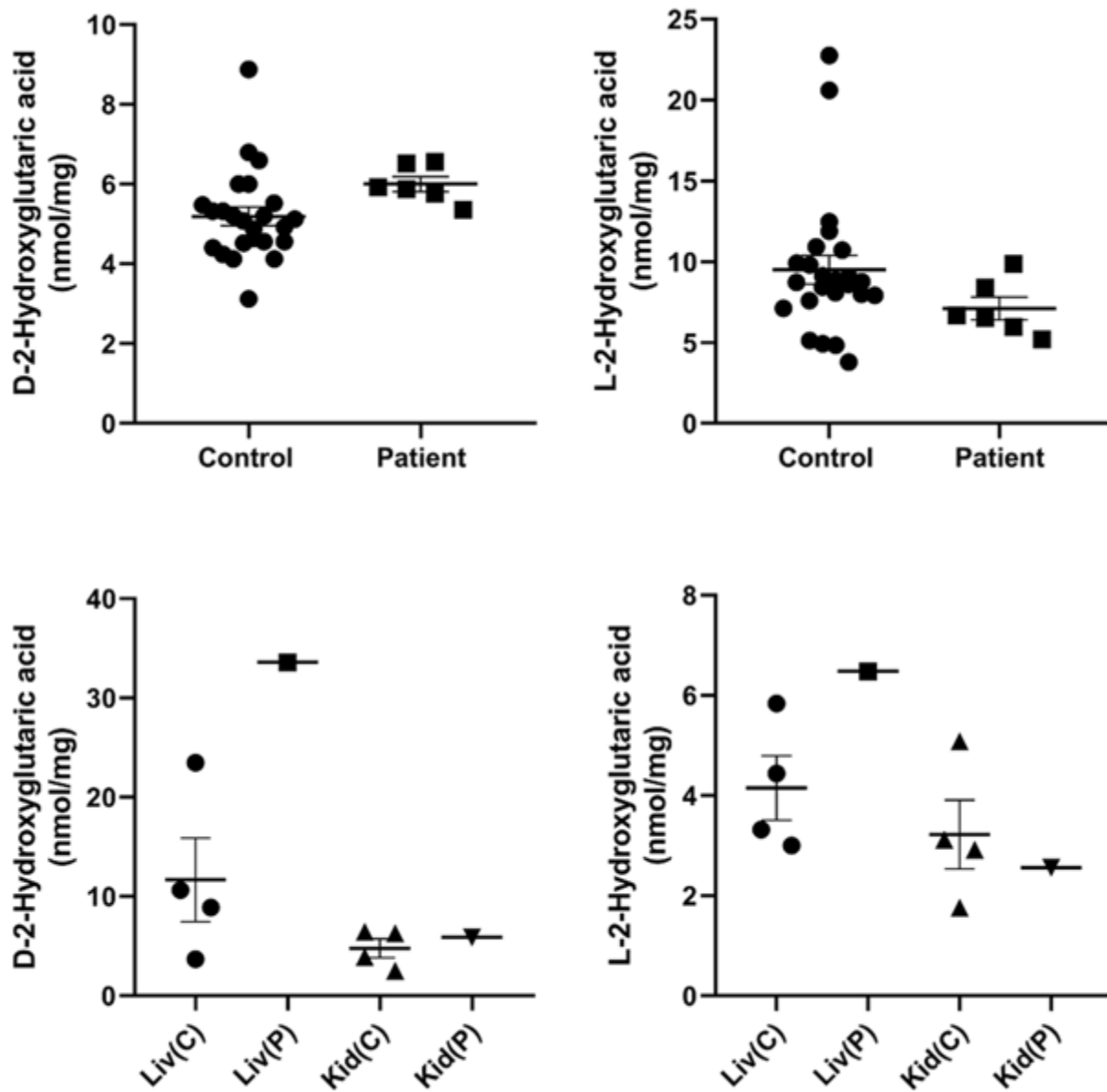
Suppl. Fig. 21



Content of guanidino- species in extracts of kidney spotted onto filter paper and measured by tandem mass spectrometry. The figure depicts the range of control values (n=4; green), with the median of control set to 1.0. Patient values are depicted as a horizontal black line. The y-axis depicts “multiples of the reference (control) median”. Abbreviations: Kid, kidney; guac, guanidinoacetic acid; cre, creatine; crn, creatinine; PM, post-mortem (PNG 6.44 mb)

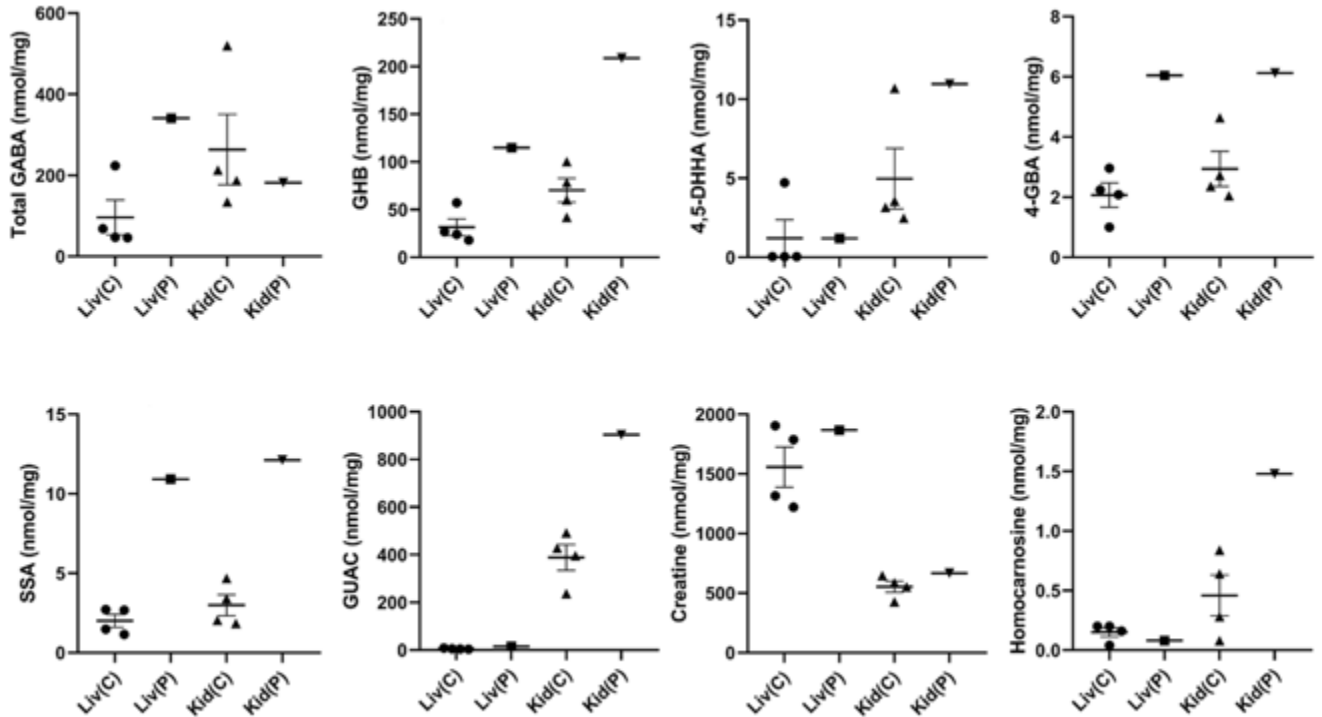
[Full size image](#)

Suppl. Fig. 22



Quantitation of D- and L-2-hydroxyglutaric acids in pooled brain regions (top panels), as well as liver and kidney (bottom panels) using isotope dilution mass spectrometry. Values in top panels represent the sum of all analyses across all brain regions for both $n=4$ controls and the patient (regions: cerebellum, frontal and parietal cortices, pons, hippocampus, cerebral cortex, cerebellum). Statistical analyses, two-tailed t test ($p=ns$ for both). Data depicted as mean + SEM. Bottom panels depict the range (mean + SEM) for controls ($n=4$) controls in both liver (liv) and kidney (kid), as well as the value obtained for the patient. Additional abbreviation: P, patient; C, control. Since only a single measure for the patient was available, statistical evaluation was not undertaken (PNG 6.61 mb)

[Full size image](#)
Suppl. Fig. 23



Quantitation of D- and L-2-hydroxyglutaric acids in pooled brain regions (top panels), as well as liver and kidney (bottom panels) using isotope dilution mass spectrometry. Values in top panels represent the sum of all analyses across all brain regions for both $n=4$ controls and the patient (regions: cerebellum, frontal and parietal cortices, pons, hippocampus, cerebral cortex, cerebellum). Statistical analyses, two-tailed t test ($p=ns$ for both). Data depicted as mean + SEM. Bottom panels depict the range (mean + SEM) for controls ($n=4$) controls in both liver (liv) and kidney (kid), as well as the value obtained for the patient. Additional abbreviation: P, patient; C, control. Since only a single measure for the patient was available, statistical evaluation was not undertaken (PNG 7.20 mb)