ALTERATIONS OF ALBUMIN FUNCTION AFTER KIDNEY TRANSPLANTATION

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Background

Patients with chronic kidney disease (CKD) have increased morbidity and mortality, which is mainly due to a chronic inflammation [1]. A kidney transplantation (KT) can clearly improve this. It is unclear what part albumin plays in this process and what functional alterations a KT has on albumin.

Methods

Albumin redox state (ARS) was determined by fractionating it into reduced human mercaptalbumin (HMA), reversibly oxidized human non-mercaptalbumin 1 (HNA-1), and irreversibly oxidized human non-mercaptalbumin 2 (HNA-2) by high-performance liquid chromatography. In healthy individuals, albumin circulates roughly in the following proportions: HMA 70–80%, HNA-1 20–30% and HNA-2 2–5% [2].

The binding and detoxification efficiency of albumin (BE and DTE) were assessed by electron paramagnetic resonance spectroscopy using a spin-labelled fatty acid. BE reflects strength and amount of bound fatty acids under certain ethanol concentration. DTE reflects the molecular flexibility of the patient's albumin molecule, thus the ability to change the conformation depending on ethanol concentration. Percentage of BE and DTE are depicted in relation to healthy individuals (100%) [3].

ARS, BE and DTE were measured once immediately before (baseline) and at eight time points until six months after KT.

Results

42 patients (29 male, median age 43.5 years, median time on dialysis 72 months) were analyzed. Before KT, HMA (median 63.5%, IQR 59.6-67.3%) was lower than in healthy individuals. Accordingly, oxidized albumin fractions were above the level of healthy individuals (median HNA-1 28.9%, IQR 25.9-33.3%; median HNA-2 7.1%, IQR 6.0-8.1%). After KT, HNA-2 increased further, within the first week after KT (median 9.1%, IQR 7.3-11.4%); HMA and HNA-1 accordingly decreased. In most patients, ARS improved during six months after KT.

Binding and detoxification efficiency of albumin showed a similar course. Before KT, they were below the values of healthy individuals (median BE 76%, IQR, 66-84%; median DTE 67%, IQR 48-85%). We found the lowest BE and DTE one week after KT (median BE 40%, IQR 31-49%; median DTE 30%, IQR 19-39%). Six months after KT, most patients had BE and DTE values similar to the values of healthy individuals.

Conclusion

This is the first multimodal analysis of functional alterations of albumin after kidney transplantation. Albumin redox state, as well as binding and detoxification efficiency of albumin clearly improved after KT, but approach the values of healthy individuals only six months after KT.

References

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