

Zürbig P, Decramer S, Dakna M, Jantos J, Good DM, Coon JJ, Mischak H, Bascands JL, Schanstra JP

A low molecular weight urinary proteome profile of human aging

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Aging induces morphological changes of the kidney and reduces renal function. We analyzed the low molecular weight urinary proteome of 324 healthy individuals from 2-73 years of age to gain insight on human renal aging. We observed age-related modification of secretion of 325 out of over 5000 urinary peptides. The majority of these changes was associated with renal development before and during puberty, while 49 peptides were related to aging in adults. We therefore focused the remainder of the study on these 49 peptides. The majority of these 49 peptides were also markers of chronic kidney disease, suggesting high similarity between aging and chronic kidney disease. Blinded evaluation of samples from healthy volunteers and diabetic nephropathy patients confirmed both the correlation of biomarkers with aging and with renal disease. Identification of a number of these aging-related peptides led us to hypothesize that reduced proteolytic activity is involved in human renal aging. Finally, among the 324 supposedly healthy individuals, some had urinary aging-related peptide excretion patterns typical of an individual significantly older than their actual age. In conclusion, these aging-related biomarkers may allow non-invasive detection of renal lesions in healthy persons and show high resemblance between human aging and chronic kidney disease. This similarity has to be taken into account when searching for biomarkers of renal disease.