Age-related collagen turnover of the interstitial matrix and basement membrane: Implications of age- and sex-dependent remodeling of the extracellular matrix

The extracellular matrix (ECM) plays a vital role in maintaining normal tissue function. Collagens are major components of the ECM and there is a tight equilibrium between degradation and formation of these proteins ensuring tissue health and homeostasis. As a consequence of tissue turnover, small collagen fragments are released into the circulation, which act as important biomarkers in the study of certain tissue-related remodeling factors in health and disease. The aim of this study was to establish an age-related collagen turnover profile of the main collagens of the interstitial matrix (type I and III collagen) and basement membrane (type IV collagen) in healthy men and women. By using well-characterized competitive ELISA-assays, we assessed specific fragments of degraded (C1M, C3M, C4M) and formed (PINP, Pro-C3, P4NP7S) type I, III and IV collagen in serum from 617 healthy men and women ranging in ages from 22 to 86. Subjects were divided into 5-year age groups according to their sex and age. Groups were compared using Kruskal-Wallis adjusted for Dunn’s multiple comparisons test and Mann-Whitney t-test. Age-specific changes in collagen turnover was most profound for type I collagen. PINP levels decreased in men with advancing age, whereas in women, the level decreased in early adulthood followed by an increase around the age of menopause (age 40-60). Sex-specific changes in type I, III and IV collagen turnover was present at the age around menopause (age 40-60) with women having an increased turnover. In summary, collagen turnover is affected by age and sex with the interstitial matrix and the basement membrane being differently regulated. The observed changes needs to be accounted for when measuring ECM related biomarkers in clinical studies.

General information
Publication status: Published
Organisations: Department of Biotechnology and Biomedicine, Disease Systems Immunology, Department of Bio and Health Informatics, Nordic Bioscience A/S, Charité – Universitätsmedizin Berlin
Corresponding author: Kehlet, S. N.
Contributors: Kehlet, S. N., Willumsen, N., Armbrecht, G., Dietzel, R., Brix, S., Henriksen, K., Karsdal, M. A.
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: PLoS One
Volume: 13
Issue number: 3
Article number: e0194458
ISSN (Print): 1932-6203
Ratings:
BFI (2018): BFI-level 1
Scopus rating (2018): CiteScore 3.02 SJR 1.1 SNIP 1.123
Web of Science (2018): Indexed yes
Original language: English
Electronic versions:
Age_related_collagen_turnover_of_the.pdf
DOIs:
10.1371/journal.pone.0194458

Bibliographical note
This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.
Source: FindIt
Source ID: 2398361702
Research output: Contribution to journal › Journal article – Annual report year: 2018 › Research › peer-review