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Spotlight on Leading Edge Research

Frontline Science: Tryptophan restriction arrests B cell development and enhances microbial diversity in WT and prematurely aging *Ercc1*$^{-/\Delta 7}$ mice

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Abstract

With aging, tryptophan metabolism is affected. Tryptophan has a crucial role in the induction of immune tolerance and the maintenance of gut microbiota. We, therefore, studied the effect of dietary tryptophan restriction in young wild - type (WT) mice (118 - wk life span) and in DNA - repair deficient, premature - aged (*Ercc1*$^{-/\Delta 7}$) mice (20 - wk life span). First, we found that the effect of aging on the distribution of B and T cells in bone marrow (BM) and in the periphery of 16 - wk - old *Ercc1*$^{-/\Delta 7}$ mice was comparable to that in 18 - mo - old WT mice. Dietary tryptophan restriction caused an arrest of B cell development in the BM, accompanied by diminished B cell frequencies in the periphery. In general, old *Ercc1*$^{-/\Delta 7}$ mice showed similar responses to tryptophan restriction compared with young WT mice, indicative of age - independent effects. Dietary tryptophan restriction increased microbial diversity and made the gut microbiota composition of old *Ercc1*$^{-/\Delta 7}$ mice more similar to that of young WT mice. The decreased abundances of Alistipes and Akkermansia spp. after dietary tryptophan restriction correlated significantly with decreased B cell precursor numbers. In conclusion, we report that dietary tryptophan restriction arrests B cell development and concomitantly changes gut microbiota composition. Our study suggests a beneficial interplay between dietary tryptophan, B cell development, and gut microbial composition on several aspects of age - induced changes.

Citing Literature

Number of times cited: 4

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Supporting Information