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Basic Study

Transcriptomic alterations underline aging of osteogenic bone marrow stromal cells

Cheng YH *et al.* Transcriptomic alterations underline BMSC aging

Yu-Hao Cheng, Shu-Fen Liu, Jing-Cheng Dong, Qin Bian

Abstract

BACKGROUND

Multipotent ¹⁰bone marrow stromal cells (BMSCs) are adult stem cells that form functional osteoblasts and ⁴play a critical role in bone remodeling. During aging, ⁴an increase in bone loss and ⁵reduction in structural integrity lead to osteoporosis and result in ⁵an increased risk of fracture. We examined age-dependent histological changes

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Understanding metabolic changes in aging bone marrow ...

<https://ehoonline.biomedcentral.com/articles/10.1186/s40164-018-0105-x>

May 23, 2018 · **Aging** is associated with complex molecular **alterations** at the cellular level. **Bone marrow** exhibits distinct phenotypic, genetic and epigenetic **alterations** with **aging**. Metabolic changes in the **bone marrow** related to **aging** have not been studied. In this study, we characterized the metabolome and transcriptome of **aging** murine **bone marrow** and compared it with **bone marrow** from young healthy ...

Cited by: 2 Author: Kwasi M. Connor, Kwasi M. Connor, Young ...
Publish Year: 2018

Global Transcriptomic Profiling of the Bone Marrow Stromal ...

[https://www.cell.com/cell-reports/fulltext/S2211-1247\(19\)31475-5](https://www.cell.com/cell-reports/fulltext/S2211-1247(19)31475-5)

Bone marrow (BM) stromal cells provide the regulatory framework for hematopoiesis and contribute to developmental stage-specific niches, such as those preserving **hematopoietic stem cells**. Despite **advances** in our **understanding of stromal function**, little is known about the **transcriptional changes** that this compartment undergoes throughout lifespan and during adaptation to stress.

Cited by: 7 Author: Patrick M. Helbling, Elena Piñeiro-Yáñez, R...
Publish Year: 2019

Age-Related Changes in the Osteogenic Differentiation ...

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2679384>

The decrease in the number and activity of **bone-forming osteoblasts** and increase in the number and activity of **bone-resorbing osteoclasts** are implicated in the progression of **age-related bone loss**. It is also possible that, whereas the number of **bone marrow stromal cells (BMSCs)** is decreased,(6,7) the commitment of BMSCs to the **osteogenic** ...

Cited by: 109 Author: Weixi Zhang, Weixi Zhang, Guomin Ou, Mar...
Publish Year: 2008

[PDF] Global Transcriptomic Profiling of the Bone Marrow Stromal ...

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Cell Reports Resource Global **Transcriptomic Profiling of the Bone Marrow Stromal Microenvironment** during Postnatal Development, **Aging**, and Inflammation Patrick M. Helbling,¹ Elena Piñeiro-Yáñez,² Rahel Gerosa,¹ Steffen Boettcher,¹ Fa'ima Al-Shahrour,² Markus ...

Transcriptomic profiling of the myeloma bone-lining niche ...

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6778199>

Using **transcriptomic profiling** of isolated **bone lining cell** subtypes from a murine myeloma model, we find that **bone morphogenetic protein (BMP)** signalling is upregulated in **stromal progenitor cells**. BMP signalling has not previously been reported to be dysregulated in myeloma **bone disease**.

Cited by: 6 Author: Sarah Gooding, Sam W. Z. Olechnowicz, E...
Publish Year: 2019

Mesenchymal Stem Cell Derived Extracellular Vesicles in Aging

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7047768>

Age-related changes in bone marrow mesenchymal stromal cells: a potential impact on osteoporosis and osteoarthritis development. Cell Transplant. 26 1520–1529. 10.1177/0963689717721201 [PMC free article] [Google Scholar] Harrell C. R., Fellabaum C., Jovicic N., Djonov V., Arsenijevic N., Volarevic V. ...

Single-Cell Transcriptomics of Human Mesenchymal Stem ...

<https://stemcellsjournalsonline.wiley.com/doi/10.1002/stem.2934>

Although **bone marrow-derived mesenchymal stem cells (BM-MSCs)** are widely recognized as promising therapeutic agents, the **age-related impacts** on cellular function remain largely uncharacterized. In this study, we found that BM-MSCs from young donors healed wounds in a xenograft model faster compared with their aged counterparts ($p < .001$).

The Instructive Role of the Bone Marrow Niche in Aging and ...

<https://link.springer.com/article/10.1007/s40778-018-0143-7>

Oct 12, 2018 · **Physiological alterations** of the **bone marrow niche** occurring in **aging** have been described to be sufficient to promote functional **aging** of young HSCs. Furthermore, a growing body of evidence suggests that aberrant activation of endothelial-derived signaling pathways can aid or **trigger neoplastic transformation**.

Aging is associated with decreased maximal life span and ...

<https://www.ncbi.nlm.nih.gov/pubmed/14678851>

Aging is associated with decreased maximal life span and accelerated senescence of **bone marrow stromal cells**. Stenderup K(1), Justesen J, Clausen C, Kassem M. Author information: (1)University Department of Endocrinology and Metabolism, University Hospital of ...

The relationship between bone marrow adipose tissue and ...

<https://www.sciencedirect.com/science/article/pii/S135961011930173X>

Apr 01, 2020 · 1. Introduction. **Bone** homeostasis depends on the orchestrated **bone remodeling process** where osteoclastic **bone resorption** and osteoblastic **bone formation** are tightly coupled and maintained in dynamic equilibrium []. At menopause, estrogen withdrawal accelerates **bone remodeling** with a net increase in **bone resorption**, which leads to **bone loss** and even osteoporosis [2,3].

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Author: Patrick M. Helbling, Elena Piñeiro-Yáñez, R...

Publish Year: 2019

[Age-Related Changes in the Osteogenic Differentiation ...](https://asbmr.onlinelibrary.wiley.com/doi/abs/10.1359/jbmr.080304)

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Age-Related Changes in the Osteogenic Differentiation Potential of Mouse Bone Marrow Stromal Cells ... it has been hypothesized that **alterations** in progenitor **cell** number or function are important. Little is known regarding the properties of **bone marrow stromal cells (BMSCs)** or **bone progenitor cells** during the **aging** process, so the question ...

Cited by: 108

Author: Weixi Zhang, Weixi Zhang, Guomin Ou, Mar...

Publish Year: 2008

[Age-Related Changes in the Osteogenic Differentiation ...](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2679384)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2679384>

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Cited by: 108

Author: Weixi Zhang, Weixi Zhang, Guomin Ou, Mar...

Publish Year: 2008

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Cell Reports Resource Global Transcriptomic Profiling of the **Bone Marrow Stromal** Microenvironment during Postnatal Development, **Aging**, and Inflammation Patrick M. Helbling,¹ Elena Piñeiro-Yáñez,²