Biomaterials Translational

VOL 03

生物材料转化电子杂志（英文）

Volume 3 Issue 1 March 2022

Application of Stem Cells in Translational Medicine
Stem Cells - Part II

Bone Marrow Stromal Cells/Skeletal Stem Cells
Biological basis of cell heterogeneity and differentiation potentials

Haematopoietic Stem and Progenitor Cells
Distinct microenvironmental niches determine cell fate

Oral Stem Cells
Decoding & mapping the different stem cell lineages

ISSN 2096-112X
CN 11-9367/R

Biomaterials Translational

Responsible Institution
National Health Commission of the People's Republic of China

Sponsor
Chinese Medical Association
42 Dongsi Xidajie, Beijing 100710, China

Publishing
Chinese Medical Multimedia Press Co. , Ltd.
62 Dongheyan Street, Beijing 100052, China
Tel: 0086-10-51322622

Executed by
Union Hospital Affiliated to Tongji Medical College of Huazhong University of Science and Technology
1277 Jiefang Avenue, Wuhan, Hubei Province, China

Editing
Editorial Office of *Biomaterials Translational*

Websites
http://www.biomat-trans.com/

Online Submission
https://www.editorialmanager.com/biomater_transl/

Contact
1277 Jiefang Avenue, Wuhan, Hubei Province, China
Email: editors@biomat-trans.com
Tel: 0086-13437105155

Periodical Registration
ISSN 2096-112X
CN 11-9367/R

Biomaterials Translational is an electronic journal, which will be printed on demand of readers.

Albeit not the 'Balm of Gilead' bringing magical, universal cures to all diseases, stem cell technology plays a central role in the development of functional biomaterials for translational applications.

Cover image: by Florence R. Wang

Biomaterials Translational is an international journal publishing research at the interface of translational medicine, biomaterials science and engineering. The journal publishes original, high-quality, peer-reviewed papers including original research articles, reviews, viewpoints and comments. Translational medicine is an interdisciplinary field that applies emerging new technologies and sciences to the prevention, diagnosis and treatment of human disease, with a particular focus on animal disease models in the application of biomaterials for treatments. Thus, the journal highlights breakthrough discoveries in basic science and clinical application of biomaterials, as well as other significant findings related to the translation of biomaterials.

The scope of the journal covers a wide range of physical, biological and chemical sciences that underpin the design of biomaterials and the clinical disciplines in which they are used.

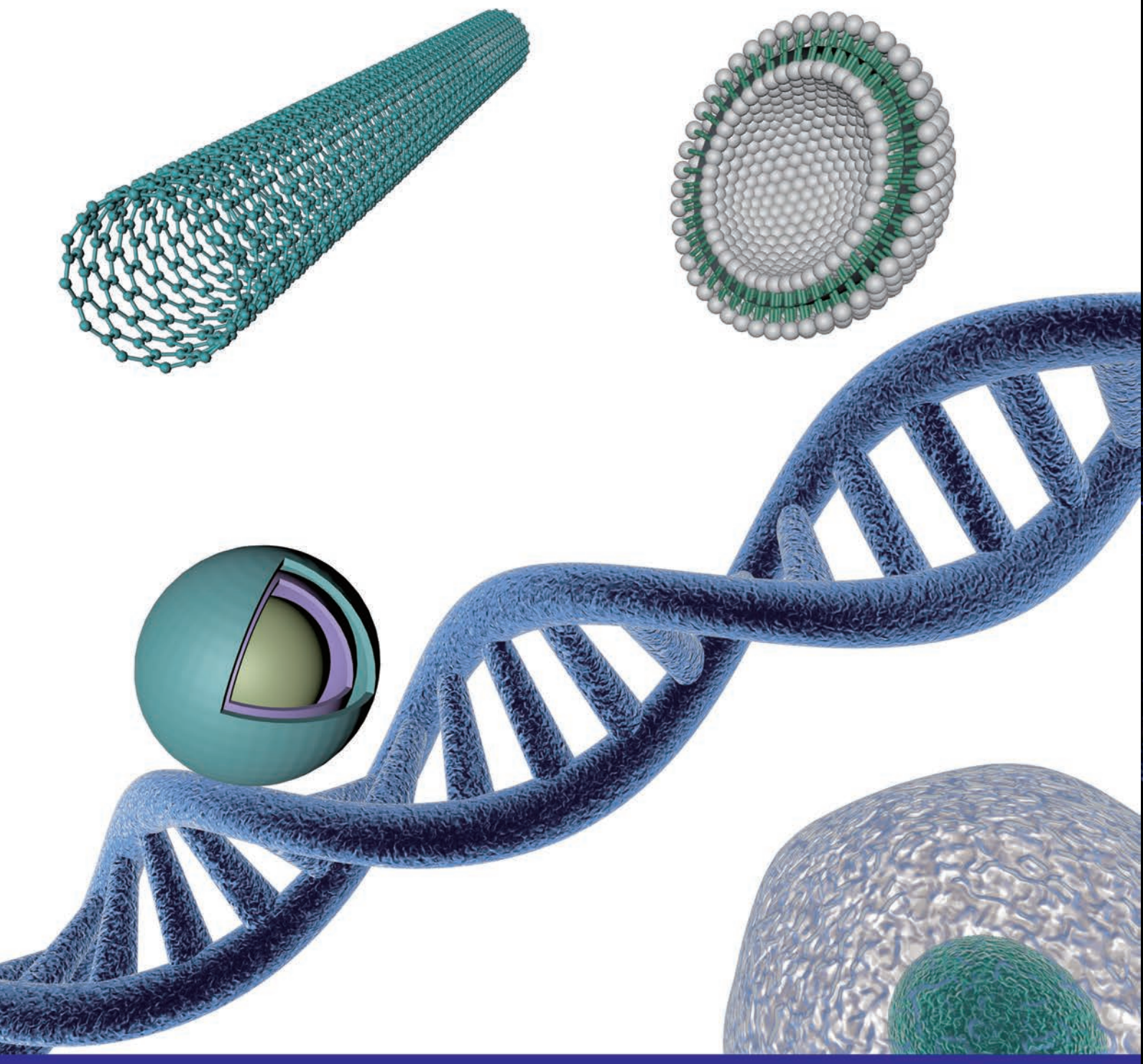
Original articles will be considered for publication within, but not limited to, the following domains:

- Investigation of human biology and pathogenesis of diseases with potential applications of biomaterials in treatment
- Synthesis, characterization and biomedical potential of metallic, ceramic, polymeric, composite and hybrid biomaterials
- Physical, chemical, biological, pharmaceutical and toxicological features of biomaterials
- Drug and gene delivery system design, with a focus on its application to disease conditions
- Short-term and long-term biocompatibility of biomaterials
- *In vivo* disease models and the biology of the host response in application of novel biomaterials
- Biomaterials design for modern diagnosis and therapeutic clinical practice (bioimaging, biosensing, biotherapy)
- Stem cell–biomaterial-based tissue engineering

THE FIRST EDITORIAL BOARD

Biomaterials Translational

The new vehicle of translational medicine:
www.biomat-trans.com



submit your best research at
www.editorialmanager.com/biomater_transl/

ISSN 2096-112X

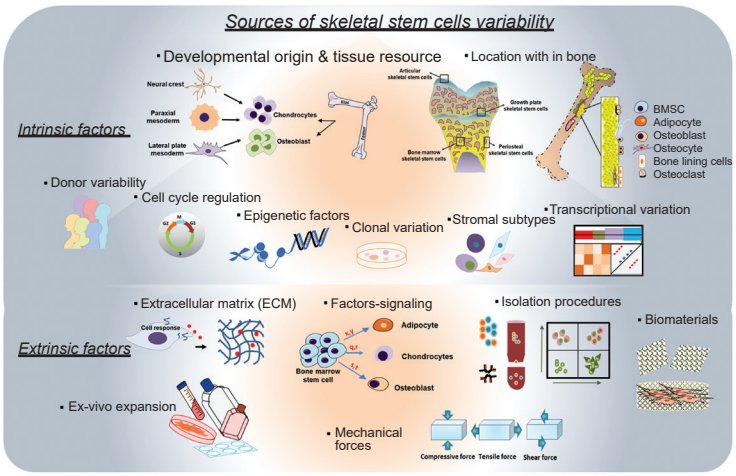
Biomaterials Translational

CONTENTS Quarterly Established in December 2020. Volume 3, Issue 1 March 28, 2022

SPECIAL ISSUE

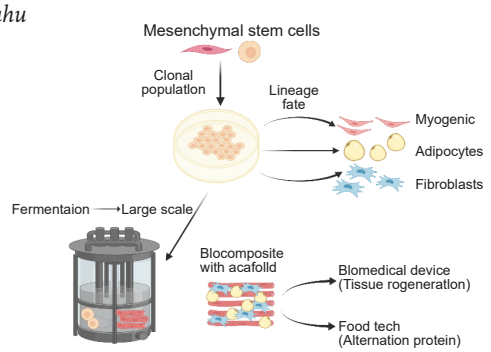
1 **Stem cell fate and microenvironment**
James T. Triffitt, Qian Wang

3 **Recent updates on the biological basis of heterogeneity in bone marrow stromal cells/skeletal stem cells**
Deepika Arora, Pamela Gehron Robey



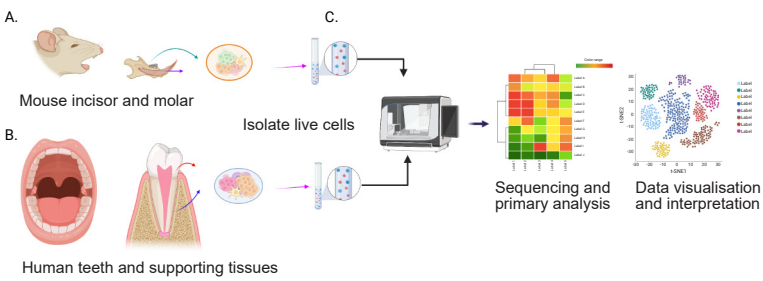
Heterogeneity in BMSCs/skeletal stem cells still remains a long-standing challenge in developing successful and reproducible tissue grafts for applications. Understanding the molecular basis of heterogeneity in skeletal stem cells is critical and so far, several intrinsic and extrinsic factors that may account for the heterogeneity have been put forth.

17 **Mesenchymal stem cell differentiation and usage for biotechnology applications: tissue engineering and food manufacturing**
Dafna Benayahu



Schematic illustration of mesenchymal cells, which can differentiate into various lineages, along with a scaffold which can serve as building blocks. The use of cells and scaffold in biotechnology approaches combined with fermentation in bioreactors can result in the large-scale mass production needed for tissue regenerative or food tech applications.

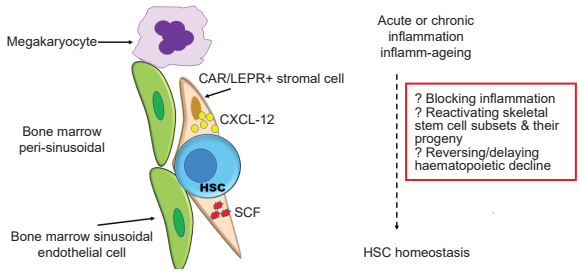
24 **Oral stem cells, decoding and mapping the resident cells populations**
Xuechen Zhang, Ana Justo Caetano, Paul T. Sharpe, Ana Angelova Volponi



Teeth and their supporting oral tissues harbour diverse populations of stem cells that are easily accessible. The recent advancements in studying these cells in mouse models (A), as well as different human oral tissues (B), by using cell-sequencing approaches (C) reveal complex cellular architecture of different oral tissues, offering a deeper understanding of the underlying mechanisms that drive homeostasis, repair, and regeneration.

31 **The long and winding road: homeostatic and disordered haematopoietic microenvironmental niches: a narrative review**

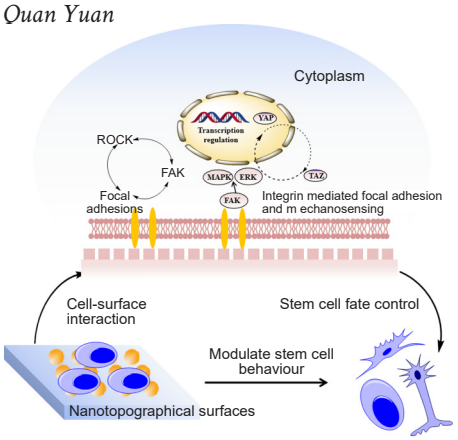
Suzanne M. Watt



Some key cellular components of adult bone marrow microenvironmental haematopoietic stem cell (HSC) peri-sinusoidal niches are depicted on the left. C-X-C motif chemokine ligand 12 (CXCL-12) abundant reticular stromal cells are important elements of the HSC perisinusoidal niche, producing key cytokines and chemokines for HSC retention, and homeostatic regulation of HSC fate. Dysregulation of perivascular/endosteal niches and haematopoiesis occurs with acute or chronic inflammation or inflamm-ageing as shown on the right. The haematopoietic decline observed with ageing is potentially reversible by blocking or controlling inflamm-ageing or by reactivating skeletal stem cells.

55 **An update of nanotopographical surfaces in modulating stem cell fate: a narrative review**

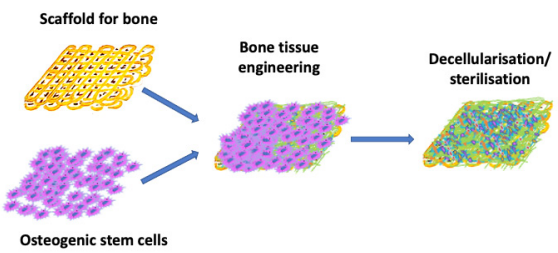
Shuqin Cao, Quan Yuan



Three different types of nanotopographic structures and their fabrication are discussed, namely, static patterned surface, dynamic patterned surface, and roughness surface. The application of these nanotopographical features in modulating stem cell fate are illustrated, furthermore, their future perspective in fundamental research and clinical application are also discussed.

65 **Manufacturingartificial bone allografts: a perspective**

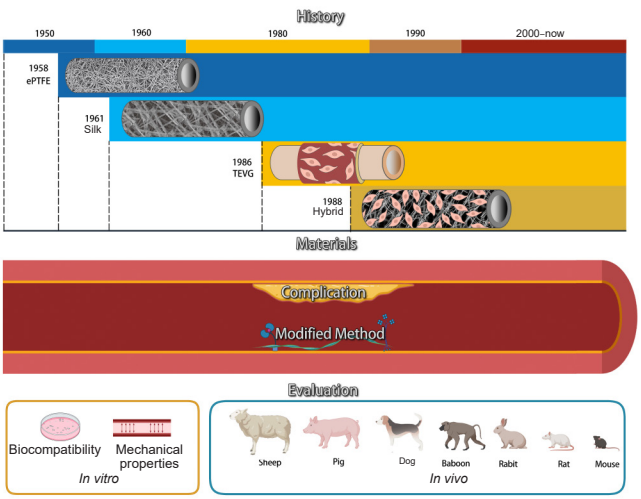
Emma Steijvers, Armaan Ghei, Zhidao Xia



Potential manufacture of artificial bone grafts in two steps: (1) Engineering biodegradable synthetic bone-like scaffolds using allogenic human osteogenic stem cells *in vitro*. (2) Removing living cells to form the end product substantially equivalent to bone allograft.

81 **History, progress and future challenges of artificial blood vessels: a narrative review**

Ke Hu, Yuxuan Li, Zunxiang Ke, Hongjun Yang, Chanjun Lu, Yiqing Li, Yi Guo, Weici Wang



During the development of artificial blood vessels, various materials and manufacturing methods have been continuously explored, and modifications can be made to improve the causes of failure. Through *in vitro* and *in vivo* evaluation, we will eventually select the ideal artificial blood vessel.