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Effects of nanofibers on mesenchymal stem cells: environmental factors affecting cell adhesion and osteogenic differentiation and their mechanisms

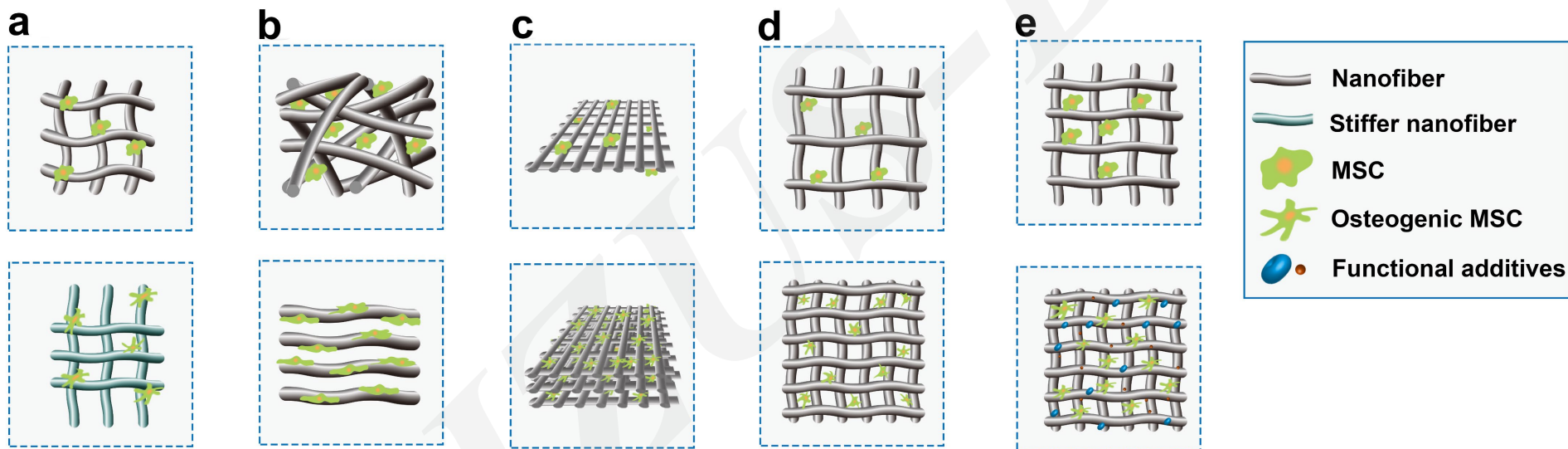
Key words: Nanofiber, Stem cell, Mimicking natural tissue, Morphology, Signaling pathway

Innovation points

- **Summary** of relevant studies and characterize the effect of nanofibers on mesenchymal stem cells, as well as factors that affect cell adhesion and osteogenic differentiation.
- **Illustration** that the process of bone regeneration in vitro is similar to bone formation and healing in vivo, and the closer nanofibers or nanofibrous scaffolds are to natural bone tissue, the better the bone regeneration process will be.
- **Emphasis** of the vital role of physical properties of nanofibers including favorable hydrophilicity, porosity and swelling properties as well as scaffolds stiffness, hierarchical structure and combination with functional additives, which promote cell adhesion and osteogenesis by regulating relevant pathways.

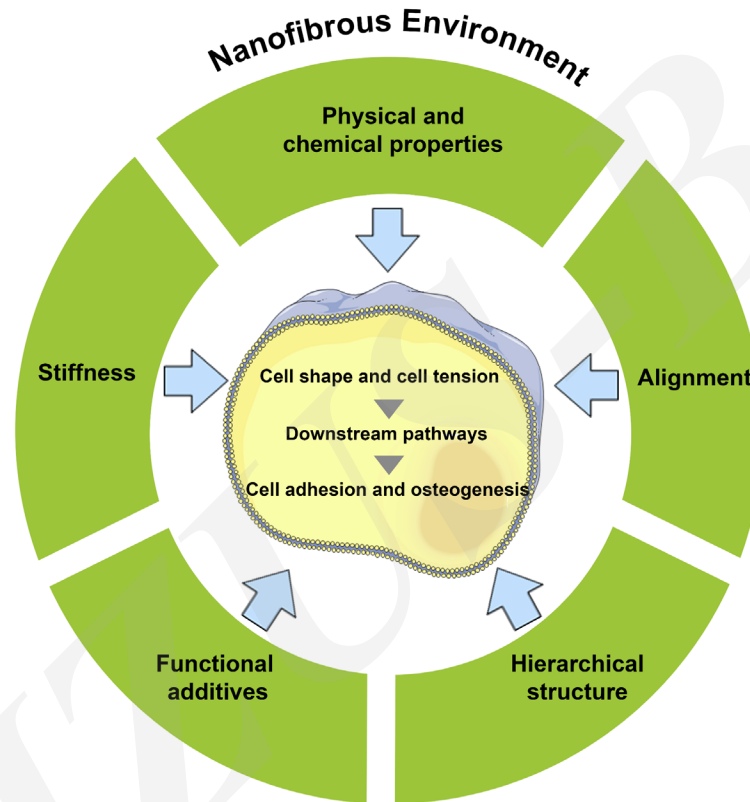
Research Summary

In this review, we include relevant studies and characterize the effect of nanofibers on mesenchymal stem cells, as well as factors that affect cell adhesion and osteogenic differentiation.



Cells with osteogenic tendency are more spindle-shaped.
The stiffness (a), alignment (b), hierarchical structure (c), pore volume (d) and functional additives (e) helps cell adhesion and osteogenetic differentiation.

Research Summary



Stem cells sense the stiffness and other characteristics of nanofibers, change their shape and cell tension accordingly, and regulate downstream pathways resulting in osteogenesis and bone regeneration.