

## **A NEW FRONTIER: THE NANOSPINEMEDICINE**

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**INTRODUCTION:** The idea of nanotechnology was developed by Richard Feynman, a physicist who won a Nobel Prize for "fundamental work in quantum electrodynamics". He proposed work in a field "in which little has been done, but in which an enormous amount can be done in principle". Feynman described how the entire Encyclopedia Britannica could be written on the head of a pin, and how all the world's books could fit in a pamphlet. The design and application of **bionanotechnologies** aimed at spine and spinal cord provide powerful new approaches for studying cell and molecular biology and physiology.

**PURPOSE:** The main purpose of this paper is give an introduction to the structure and organization of the spine and spinal cord starting at the organ level and working down in spatial scale to the cellular and molecular levels, with specific examples of biological 'nanoengineering' in bone and neural cells and clarify some aspects of the emerging nanotechnologies for neuroscience and spine science applications.

**METHOD :** Bibliographic review.

**RESULTS:** Miniaturization provides cost effective and more rapidly functioning mechanical, chemical and biological components. Emerging clinically oriented **bionanotechnologies** are targeting spine and spinal cord pathologies such as trauma or degenerative events. The successful and meaningful development of **bionanotechnologies** designed to interact with the spine as research or clinical tools require an understanding of the relevant neurophysiology and pathology, an appreciation of the inherent 'nanoscale' structure of the spine and spinal cord, and an understanding of the relevant chemistry and materials science and engineering.

**CONCLUSION:** Nanotechnology is a multidisciplinary scientific field with roots in medicine, communications, genomics, and robotics. The potential applications of nanotechnology encompass virtually every aspect of our lives but one of the greatest values of nanotechnology will be the development of new and effective medical and surgical treatments for spinal disorders (i.e. nanospine medicine).

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