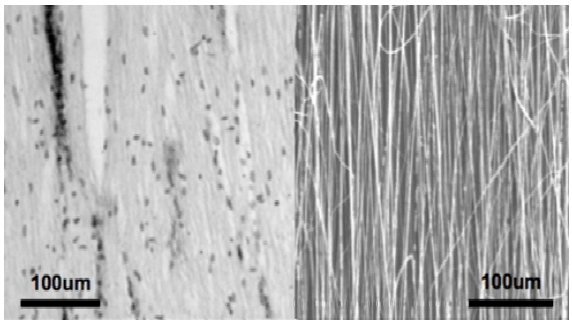
Nanofiber SOLUTIONS

3-D Cell Culture for a 3-D World

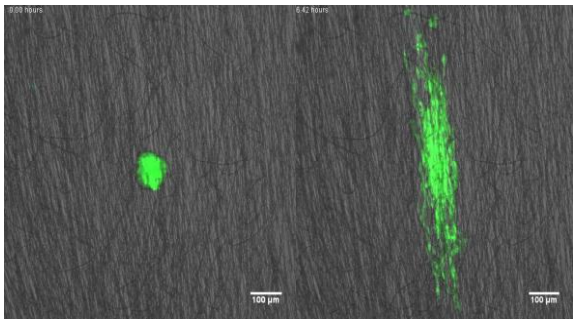
NanoAligned™ or NanoECM™ Randomly Oriented Polymer Nanofibers

Nanofiber Solutions™ develops and markets electrospun nanofiber substrates for cell culture and drug development applications in standard multiwell plates or it can be scaled for larger configurations. Historically, general cell culture has been performed on flat, tissue culture polystyrene (TCPS) because it is cheap, optically clear, and many cells grow well on it. In reality, however, living organisms are made up of an extracellular matrix (ECM) that presents both aligned physical structure and mechanical support to the cells. Adherent cells are complex, self-sustaining units that require ECM anchorage to proliferate and undergo normal differential function. TCPS lacks this aligned three-dimensional (3-D) component and cells behave very differently on this flat, smooth substrate than they do in true biological settings. Not surprisingly, drugs developed using TCPS as an *in vitro* substrate experience a >99% failure rate in clinical studies.



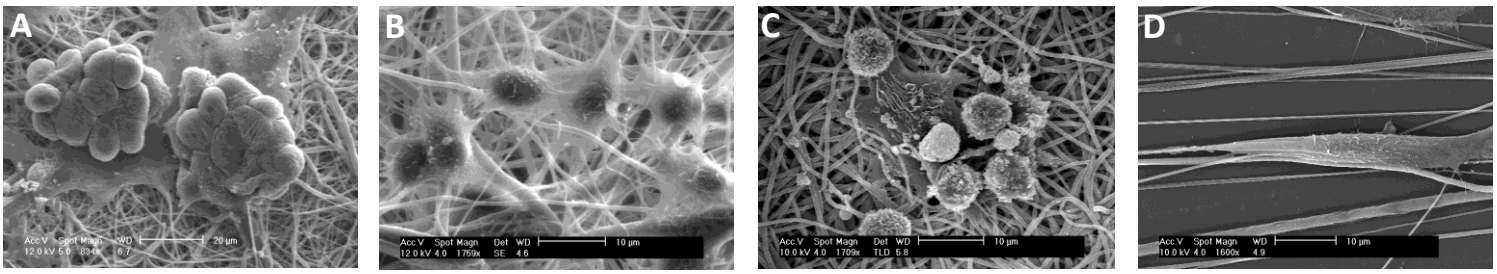
Aligned white matter in the human brain (left) and **NanoAligned™** product (right).

NanoAligned™ 3-D substrates mimic specific human *in vivo* environments (brain and cardiac tissue) allowing cells to align and orient as they do *in vivo* which facilitates faster screening and more effective cancer and stem cell research. As a result, researchers are able to more accurately study the effects of various chemical compounds on cell behavior and differentiate stem cells faster and more efficiently. This is especially true as researchers attempt to model and measure cell migration (i.e. metastasis) from the primary tumor or differentiate stem cells into cardiomyocytes. This technology allows high-throughput testing previously possible only in specialized labs and live cell imaging through the 3-D nanofibers.



Human brain tumor cells (green) deposited on **NanoAligned™** nanofibers (left). After 18 hours cells have migrated only in the direction of fiber alignment, modeling the white matter metastasis observed *in vivo* (right).

By allowing researchers to measure cell mobility for cancer research and providing physiologically relevant cell culture substrates for faster stem cell expansion, Nanofiber Solutions' technology allows earlier breakthroughs and fewer failures to significantly decrease time to market.



A) Stem/progenitor cells isolated from human primary breast tissue and cultured on **NanoECM™** randomly oriented nanofibers to spontaneously form mammospheres *in vitro*. **B)** Human bone marrow derived stem cells cultured on **NanoECM™** nanofibers specially treated to investigate idiopathic pulmonary fibrosis (IPF) **C)** Human umbilical cord stem cells cultured on **NanoECM™** nanofibers to maintain stem cell pluripotency while allowing for higher expansion rates. **D)** Rat mesenchymal stem cells that have been differentiated into cardiomyocytes that align and orient on **NanoAligned™** nanofibers to promote stronger contractions and normal *in vivo* behavior.

Please contact Nanofiber Solutions™
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"Aligning *Life Science*"