

Small Spheres, Big Possibilities: Cellular Spheroids and Their Role in Nanobiomedicine

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Cellular spheroids have emerged as a highly promising platform with diverse applications in the field of nanobiomedicine. This talk delves into the intricate aspects of spheroid formation, elucidates their unique properties, and explores their versatile role in nanoparticle biocompatibility studies, tissue modeling, and tissue engineering.

The formation process of spheroids involves the self-assembly of cells into three-dimensional structures that closely mimic native tissue microenvironments. A comprehensive understanding of the underlying mechanisms governing this process is essential for harnessing the full potential of spheroids in various nanobiomedical applications.

In the context of nanoparticle biocompatibility studies, spheroids serve as an indispensable tool due to their ability to recapitulate in vivo-like conditions. This allows for precise investigations into nanoparticle-cell interactions and tissue penetration, providing critical insights for the development of targeted drug delivery strategies and nanotherapeutic interventions.

The integration of cellular spheroids into organ-on-a-chip models has revolutionized tissue modeling capabilities. These microfluidic platforms accurately replicate organ functionality, facilitating the study of complex disease mechanisms and enabling personalized drug testing approaches.

Tissue engineering benefits significantly from the versatile nature of cellular spheroids. By employing various modifications, such as enhanced vascularization and bioprinting techniques, researchers can create intricately organized tissue constructs with potential applications in regenerative medicine.

In conclusion, cellular spheroids represent a paradigm shift in the realm of nanobiomedicine, holding immense promise for advancements in drug development, disease modeling, and tissue regeneration. This scientific exposition urges researchers to explore and exploit the remarkable possibilities offered by small spheres in driving forward medical research and transformative healthcare solutions.

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