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Novel Biomaterials used for Dendritic Cell Vaccine for Cancer Immunotherapy

Project Team

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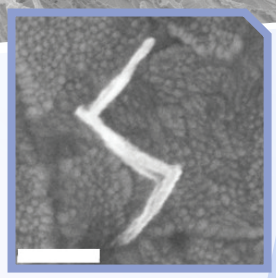
Traditional cancer treatments often rely on cytotoxic agents. This invention offers a safer and more efficient biocompatible method of using extracellular silica nanozigzags (NZ) to mature dendritic cells (DC) *in vitro* through the mechanical activation of focal adhesion kinase (FAK) within DCs, enhancing the ability of NZs to activate immune cells and suppress tumour growth *in vivo*. This makes NZs a promising biomaterial for effective cancer immunotherapy, boosting the body's natural defences against cancer without the use of harmful chemicals.

▼ Dendritic Cell

Nanozigzag ▶



Features and Advantages

1. Improves therapeutic efficacy compared to conventional methods in terms of *in vitro* CTL activation and *in vivo* tumour suppression
2. A safer and more efficient alternative to existing chemical maturation agents which may have a higher risk of side effects
3. Biocompatible and with no cytotoxic effects observed during DC maturation
4. Enhances antigen uptake capacity
5. Novel method integrating nanotechnology with cellular immunology
6. Synergetic convergence of nanotechnology, immunology, and cellular engineering to address healthcare challenges

Future Development

- Serve as an improved component for DC-based cancer vaccines
- Improve tumour targeting and immune memory formation
- Adapt for development of vaccines targeting other diseases, such as infections or autoimmune disorders
- Precision drug delivery to lymph nodes or tumour sites through the DC-SIGN targeting ability of silica NZ-matured DCs

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