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Surface Coatings for Spatial Control of Macrophage Fusion

Multinucleated giant cells (MGCs), formed from macrophage fusion, occur as a consequence of a number of pathological conditions in the body. MGC formation can be particularly destructive to synthetic implants, as it etches their surface, and could lead to implant failure. Despite significant research into macrophage fusion, there are many underlying molecular events that are still unknown, and there are currently no systems that allow in vitro visualization of this process in living specimens. This is because there are no surfaces that promote macrophage fusion while maintaining the necessary optical properties for advanced imaging. Studies to determine the mechanisms modulating the formation and function of MGCs are needed, not only to identify ways to curb its destructive nature but also to better understand giant cell biology.

Researchers at Arizona State University and their collaborators developed a novel surface coating that promotes high rates of macrophage fusion and formation of multinucleated giant cells in living specimens. In addition to promoting macrophage fusion, this surface also enables researchers to control where macrophage fusion will occur. This surface coating is optically clear and is compatible with every known microscope technique. Furthermore, the preparation for the surface coating is relatively simple and straight forward.

This novel surface coating facilitates in vitro studies of macrophage fusion and MGC formation in living specimens which could have a huge impact in therapeutic treatments of MGC related disorders and the field of giant cell biology in general.

Potential Applications

- Monitoring macrophage fusion and additional functionalities in living specimens
- Monitoring multinucleated giant cell formation in living specimens
- Could help in discovering treatments for physiological conditions associated with MGC formation

Benefits and Advantages

- Compatible with existing microscope techniques
- Promotes high rates of macrophage fusion
  - About 60% of macrophages fuse after 24 hours
- Provides for spatial control of macrophage fusion
- The surface is optically clear
- Simple and straightforward surface coating preparation

For more information about the inventor(s) and their research, please see Dr. Ugarova's directory webpage Dr. Ros' laboratory webpage