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Zirconium oxide ceramic foam: a promising supporting biomaterial for massive production of glial cell line-derived neurotrophic factor

Key words:

Zirconium oxide, Ceramic foam, GDNF, Parkinson's disease

Problem to be solved



Small scale production



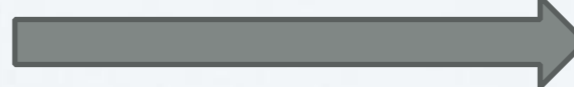
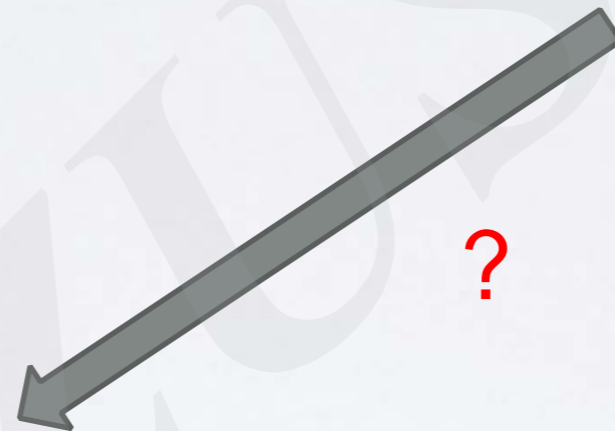
Massive production



Via Traditional cell culture



GDNF



Parkinson's disease

Properties of ZrO₂ ceramic foam

Porosity

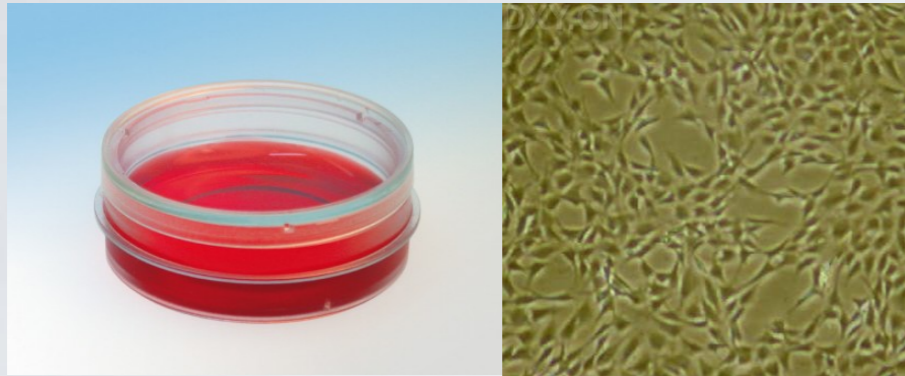
- Maintains high cell density in a small volume
- A3-D structure guarantees an optimistic microenvironment



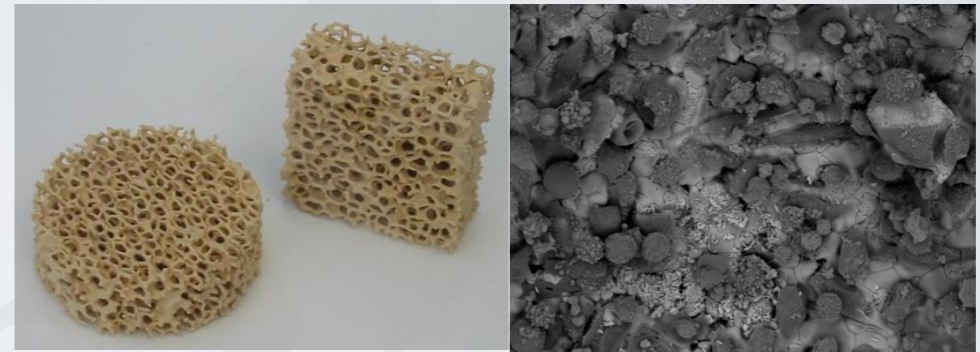
Biocompatibility

- Non-cytotoxic
- Provides surfaces for cell anchoring and attachment

Primary astrocytes



Traditional 2-D culturing sys.



3-D ceramic foam culturing sys.



3-D ceramic foam culturing sys.

has biocompatibility

accelerates astrocyte proliferation

promotes GDNF production

Conclusions

1. The ZrO₂ ceramic foam was biocompatible when supporting primary astrocyte 3- dimensional culturing.
2. The yield of GDNF of ZrO₂ ceramic foam based 3- dimensional astrocytes culturing system overwhelmed that from the regular 2-dimensional culturing system.
3. The considerable productivity of GDNF in the 3- dimensional system was due to elevation of astrocyte proliferation and the stimulation of GDNF secretion pathways from astrocytes.