D6. Executive summary

- "Nichoid in Space" project aimed at recapitulating features of human solid tumours of the central nervous system *in vitro* by development of 3D scaffolds and exposure to simulated microgravity (also termed s-µg).
- To the purpose, innovative two-photon polymerization (a lithography technique that allows for fabrication of minuscule lattices with submicron resolution and with geometries suitable to tuning of cell response) was conducted on substrates suitable to spaceflight in order to obtain 3D scaffolds, that were termed Nichoid-ET.
- A cellular model of *glioblastoma multiforme* (U87-MG cells) was used to perform investigations concerning cell capability of Nichoid-ET scaffold population/evasion, transcription of the main tumorigenesis markers (*Cd44*, *Mdm2*, *Stat3* and *Tgf-b1*), and proliferative capability (Ki-67 expression).
- Investigations were conducted upon U87-MG cell culture on scaffolds under normal gravity and simulated microgravity, by exposure to random speed mode rotation on a random positioning machine at 25-60 deg/s.
- Possibility to exploit the obtained innovative tumour models in real microgravity was explored by implementation in bioreactors qualified for spaceflight and by application of a typical spaceflight timeline/temperature profile, including three days of simulated microgravity, during an Experiment Sequence Test (EST).
- Experimental activities before EST were successfully completed by collection of meaningful data on U87-MG cell response to culture in different spatial configurations (2D *vs.* 3D) and under different gravity levels (1g *vs.* s-µg) in terms of invasiveness, tumorigenesis marker expression and proliferation.
- EST was successfully completed by retrieval of adherent cell cultures suitable for transcriptional analyses from bioreactors, and by obtainment of meaningful transcriptional data concerning tumorigenic profile of 3D cell/Nichoid-ET hybrid constructs.
- Nichoid-ET scaffolds on plastic substrates are good candidates to investigations on *glioblastoma multiforme* in real microgravity conditions.