A

TECNICHE DI ISOLAMENTODI CELLULE DA TESSUTO CUTANEO

PROVA DI INGLESE

DA: *Manduca et al. Frontiers in Immunology, 2023*

DOI 10.3389/fimmu.2023.1175503

Organoids originally arise as 3D in vitro stem cell derived cultures that recapitulate the cellular variety, architectural organization and function of their in vivo normal tissue counterparts and have the ability to self-organize and self-renew (126–128). Since their discovery, organoids represented an ideal model for studying organ development (129) and host-pathogen interactions (130) by bridging the gap between in vivo animal models and in vitro 2D cell culture systems. The first attempts of generating organ-specific models in vitro date back to the early 2000's, when Sasai and colleagues demonstrated that embryonic stem cells could differentiate and self-assemble into 3D apicobasally polarized cerebral cortical tissues (131). Shortly after, Sato et al. established gut organoids from single mouse adult intestinal stem cells in specific culture conditions mimicking the in vivo stem cell niche and favoring the dynamic proliferation and differentiation of the intestinal crypt epithelium (132).

B

MODELLI TUMORALI IN VITRO TRIDIMENSIONALI

PROVA DI INGLESE

DA: *Manduca et al. Frontiers in Immunology, 2023*

DOI 10.3389/fimmu.2023.1175503

Spheroids are one of the best established 3D culture methods for the study of tumor biology (51, 52). As extensively reviewed in (53), spheroids are microsized aggregates of closely-packed cells which accurately recapitulate some important features of solid tumors including internal structure, cellular heterogeneity, cell signaling pathways, ECM deposition, cell-to-cell and cell-to-ECM interactions, growth kinetics, gene expression and drug resistance. These unique characteristics highlight the potential of spheroids to be used as suitable in vitro tools for high-throughput screening of anticancer therapeutics (54–56).

Depending on cellular source and preparation protocols, spheroids can be distinguished into four major types, namely: (i) multicellular tumor spheroids (MCTSs) assembled using primary cell or cell line suspensions, (ii) tumorospheres obtained from solid tumor dissociation, (iii) tissue-derived tumorospheres generated from tissue remodeling after partial enzymatic or mechanical dissociation and (iv) organotypic multicellular spheroids consisting of cut and minced tumor fragment cultures obtained without dissociation (57).

C

ISOLAMENTO E COLTURA DI CELLULE STAMINALI EPIDERMICHE

PROVA DI INGLESE

DA: *Manduca et al. Frontiers in Immunology, 2023*

DOI 10.3389/fimmu.2023.1175503

Organ-on-a-Chip (OoC)-technology is a rapidly evolving, highly innovative, and promising tool that allows in vitro microscale biomimetics of human organs. By flanking and integrating cell biology with microengineering and microfluidics, OoCs model physiological and pathol o g i c a l tissue microenvironments thus breaking conventional in vitro and in vivo impasses (215). Specifically, OoCs are multichannel microfluidic cell-culture devices hosting multiple cell types organized in a 3D tissue, and even organ, structure in order to model with high fidelity, and to control with high precision, key structural and functional units including, but not limited to, vasculature-like perfusion, heterotypic cellular interactions, flows of chemical gradients and mechanical forces (216–219). These features make OoCs accurate human-relevant models critical to address questions that conventional cell culture and animal models do not (220, 221). Indeed, conventional in vitro models are not complex enough to recapitulate tissue/organ pathophysiology, and animal models do not faithfully mimic human disease and natural and therapy-induced response (218).