

Application of compartmentalized in vitro models to explore maternal interactions with gametes and early embryos

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Air-liquid interface (ALI) culture procedures are predominantly popular for establishing airway and skin epithelium models, which are frequently employed for basic research, toxicology as well as clinical applications. The ALI approach was initially adapted for female reproductive tract epithelia to study oncogenesis or virus-host cell interactions. However, beyond this, they serve as powerful tools for basic reproductive research. The high physiological relevance of ALI culture systems allows us to better understand the function and regulation of those epithelia that form the contact zone between the gametes or embryos and the maternal system. Furthermore, apical secretions of ALI cultures represent a *bona fide* reflection of the oviductal and uterine luminal fluid *in vivo*. Consequently, ALI models can be used to explore the highly dynamic microenvironment experienced by gametes and early embryos within the female reproductive tract, thereby providing insights for the optimization of media and conditions currently applied in assisted reproduction.