

Single Mouse Oocyte Encapsulated in Medium-in-Oil Microdroplets by Using a Polydimethylsiloxane Microfluidic Device

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(Received June 10 2013; accepted October 2, 2013)

Key words: microfluidic device, microdroplet generation, polystyrene beads, and mouse oocyte

A polydimethylsiloxane (PDMS) flow-focusing microfluidic device was used to generate micrometer medium-in-oil microdroplets, and a single mouse oocyte was encapsulated in each dispersed microdroplet for *in vitro* fertilization (IVF) research. The droplet-based microfluidics provides a dynamic and noncontinuous culture condition for mimicking the *in vivo* cell development environment. Cell culture in monodispersed microdroplets requires less medium volumes, reduces cell culture cost, prevents contamination risk, and minimizes evaporation. This PDMS microfluidic channel contains two inlets for continuous oil injection and medium injection with oocytes. The oocyte in the culture medium was embedded into microdroplets by shear force and dispersed in the oil phase. The volume of microdroplets can be controlled by adjusting the flow rates of both oil and medium inlets. After microdroplets containing a single oocyte were generated stably into the outlet of the microfluidic channel, the microdroplets could be collected in a tube for further biomedical applications.

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