Video Article

An Ex-Ovo Chicken Embryo Culture System Suitable for Imaging and Microsurgery Applications

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Abstract

Understanding the relationships between genetic and microenvironmental factors that drive normal and malformed embryonic development is fundamental for discovering new therapeutic strategies. Advancements in imaging technology have enabled quantitative investigation of the organization and maturing of the body plan, but later stage embryonic morphogenesis is less clear. Chicken embryos are an attractive vertebrate animal model system for this application because of its ease of culture and surgical manipulation. Early embryos can be cultured for a short time on filter paper rings, which enables complete optical access for cell patterning and fate studies1,2. Studying advanced developmental processes such as cardiac morphogenesis are traditionally performed through a window of the eggshell3-5, but limit optical access due to window size. We previously developed a simple method to culture whole embryos ex-ovo for up to 10 days, which enabled high resolution imaging via ultrasonography6,7. These cultures were difficult to transport, limiting the types of imaging tools available for live experiments. We here present an improved shell-less culture system with a cost-effective, portable environmental chamber. Eggs were cracked onto a hammock created by a polyurethane membrane (cling wrap) affixed circumferentially to a plastic cup partially filled with sterile water. The dimensions of the circumference and depth of the hammock were both critical to maintain surface tension, while the mechanics of the hammock and water beneath helped dampen vibrations induced by transportation. A small footprint circulating water bath was also developed to enable continuous temperature control during experimentation. We demonstrate the ability to culture embryos in this way for at least 14 days and employ this system in several microsurgical and imaging applications

Disclosures

No conflicts of interest declared.

