

Scientific Paper:

Micromachines (2019) 10, 16

## **Hypoxic Physiological Environments in a Gas-Regulated Microfluidic Device**

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### **Abstract:**

Hypoxic environment is known as one of the critical factors in various physiological / pathological processes. It is imperative to recapitulate oxygen level in microscale for human physiology / pathology induced by hypoxia. Herein, we propose and oxygen-regulating system that can be applied to in vitro tissue models. We fabricated a microdevice with a gas-permeable membrane, allowing oxygen diffusion without direct contact to cells. We verified the formation of oxygen level less than 2 % O<sub>2</sub> concentration inside the device through computational simulation and experiments. H9c2 heart myoblasts were exposed to hypoxic condition in the device, and their cell viability were investigated. We anticipate that our system will be integrated with a platform to study hypoxia-induced human physiology and pathology as an efficient oxygen-regulating system.

Keywords: hypoxic condition, microfluidic system, computational simulation, oxygen detection, oxygen scavenger