Formation of Tumor Spheroids by Spontaneous Cellular Aggregation in Incubation: Effect of Agarose as a Compaction Agent

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Abstract. Tumor spheroids is a 3D culture of cancer cells. This type of cell culture is a great tool for the evaluation of novel nanomedicine systems and in other areas of biomedical engineering. The main advantage over monolayer cell cultures is the biomimetic microenvironment which is appropriate for recapitulating tumor complexity. However, current tumor spheroids obtention methods require sophisticated and expensive equipment and are time-consuming. It is possible to obtain these tumor spheroids by centrifugation of the suspended cancer cells in round-bottom tubes and using compaction agents, for example agarose, which is a polysaccharide well known for its function of forming gels. Herein, we developed a method for obtaining cancer spheroids varying the centrifugation time and the concentration of agarose. The variation in spheroid size was analyzed. No significant changes were observed in the morphology or in the initial size and growth of the spheroids; except in those obtained with the shortest centrifugation time. The cell viability of spheroids that showed growth as a function of incubation time was evaluated. Viability greater than 80% was presented, however, the cell viability does not grow when the size of the spheroidal tumor increases. This simple and effective method for obtaining in vitro tumors represents a tool to further studies in Nanomedicine systems or the development of new anticancer drugs.

Keywords: Cancer · Tumor spheroid · Cell viability

1 Introduction

Cell culture methods have spread prolifically within a century [1]. Cell culture has represented a powerful tool to progress on investigation cellular responses to drugs [2] and novel anticancer nanomedicine systems [3, 4]. In 2D culture systems, cells are grown as monolayers on a flat solid surface, missing cell interactions that are present in native organs or tumors. In contrast, 3D culture systems encourage cell aggregation and

C. A. González Díaz et al. (Eds.): CLAIB 2019, IFMBE Proceedings 75, pp. 637–642, 2020.
https://doi.org/10.1007/978-3-030-30648-9_84