UNIVERSITI TEKNOLOGI MARA

EVALUATION OF GROWTH OF FULL TERM AMNIOTIC FLUID C-KIT POSITIVE STEM CELL

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ABSTRACT

Amniotic fluid contains a heterogeneous population of cells having broadly multipotent to pluripotent characteristics. The cells are accessible, possess low immunogenicity, non-tumorigenic and devoid of ethical issues. Amniotic fluid stem cells can be derived from mid-term and full-term gestation. Many studies were done on mid-term amniotic fluid and there are limited studies done on full-term amniotic fluid stem cells. Full-term amniotic fluid stem cells represents a more promising source as they do not involve an invasive procedure, in addition to the presence of high proliferative stem cells. Despite having pluripotent properties, the growth rate and population doubling time of the cells were not reported. The aim of this study is to determine the growth curve of the cells and population doubling time. The cells were cultured and showed similar fibroblastic and round-shaped morphology as displayed in previous findings. Cell suspension dilutions were prepared and seeded onto gelatin-coated flasks to count the number of cells to be plotted on a growth curve. The AFS cells showed an exponential growth curve with 24 h population doubling time, indicating its high proliferative capabilities. In conclusion, AFS cells of full-term pregnancy doubles at a shorter time as compared to mid-term AFS cells despite having similar morphology. The rapid growth of the cells may due to changes in cellular profile in which the underlying cause is unknown. Future studies can be done to prove its stability. The cells offer a greater advantage for further research in drug testing or drug discovery.

Key words: full-term AFS cells, cell kinetics, growth curve, population doubling time

CHAPTER ONE

INTRODUCTION

1.1 Background

Stem cell research has been gaining a wide interest in the field of scientific research and clinical trials over the recent years. Stem cell possesses unique characteristics such as ability to divide into self-copies of itself or self-renewal and can differentiate into specialized cells from their precursors (Bajada, Mazakova, Richardson, & Ashammakhi, 2008). Thus, they play an important role in future medical application as they are readily and easily grown and able to differentiate into any cell type in culture. Stem cells are broadly classified into embryonic stem cell and adult stem cell depending on the tissue of origin (Shilpa, Kaul, Sultana, & Bhat, 2013). In addition, induced pluripotent stem cells are the new type of stem cells generated through genetic programming. Embryonic stem cells are the gold standard of stem cells due to their high potency, pluripotency. However, there are limitations associated with their use in regards to possible malignancy *in vivo* and ethical issues that lead to efforts in finding other new and alternative source (Hipp & Atala, 2008). Hence, the discovery of amniotic fluid stem cell from human amniotic fluid expressing Oct-4, a pluripotent stem cell marker (Pan, Chang, Schöler, & Pei, 2002) as the alternative source for stem cell-based therapy (De Coppi *et al.*, 2007; Kim *et al.*, 2007).