Pengaruh Kultur Statis (2D) dan Kultur Dinamis (3D) terhadap Proliferasi Sel, Kadar Total Protein Conditioned Medium, dan Sitokin TGF- pada Sel Punca Mesenkimal Asal Tali Pusat = Effects of Static Culture (2D) and Dynamic Culture (3D) on Cell Proliferation, Total Conditioned Medium Protein Content, and Cytokine TGF- in Mesenchymal Stem Cells from the Umbilical Cord

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Abstrak

Potensi pemanfaatan sel punca mesenkimal dan conditioned medium dalam pengobatan terapi yang tinggi harus diimbangi dengan peningkatan produksi yang memadai. Umumnya menggunakan metode kultur statis (2D), namun produksinya sangat terbatas. Metode kultur dinamis (3D) menggunakan stirred bioreactor merupakan salah satu pilihan yang tepat untuk meningkatkan produksi sel punca dalam skala besar. Selama proses kultur sel, conditioned medium kultur mengandung faktor tumbuh dan sitokin yang disekresikan oleh sel punca mesenkimal. Salah satu sitokin yang disekresikan ialah TGF-. Sitokin TGF- berperan penting dalam proliferasi, diferensiasi, dan proses seluler lainnya. Sampai saat ini belum ada penelitian yang menjelaskan tentang pengaruh kultur statis (2D) dan kultur dinamis (3D) terhadap proliferasi sel, total protein conditioned medium dan kadar sekresi sitokin TGF- pada sel punca mesenkimal asal tali pusat yang dikultur dalam medium alpha-MEM dan disuplementasi 10% thrombocyte concentrated. Tujuan penelitian ini ialah mengetahui pengaruh kultur statis (2D) dan kultur dinamis (3D) terhadap proliferasi sel, kadar total protein conditioned medium, dan sitokin TGF- pada sel punca mesenkimal asal tali pusat. Penelitian yang dilakukan mencakup proses kultur sel, uji Bradford, Sodium Dodecyl Sulphate Polyacrylamide Gel Electrophoresis (SDS-PAGE), dan uji Enzyme-Linked Immunosorbent Assay (ELISA). Penelitian ini menunjukkan bahwa penggunaan kultur dinamis (3D) dapat memproduksi sel dalam skala besar namun memiliki laju proliferasi yang lebih lama dibandingkan dengan kultur statis (2D). Produksi kadar total protein conditioned medium mengalami fluktuasi, namun secara keseluruhan kultur dinamis (3D) mampu memproduksi dalam skala besar, dan terdapat sekresi sitokin TGF- oleh sel punca mesenkimal dari kedua metode kultur, namun masih membutuhkan uji lanjutan untuk memastikan bahwa sel pada kultur dinamis (3D) mensekresi sitokin TGF- lebih banyak

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The high potential of mesenchymal and conditioned medium stem cell utilization in therapeutic treatment should be balanced with an adequate increase in production. Generally using static culture method (2D), but production is very limited. Dynamic culture (3D) method using stirred bioreactor is one of the right choices to increase the production of stem cells on a large scale. During the cell culture process, the conditioned culture medium contains growth factors and cytokines secreted by mesenchymal stem cells. One of the cytokines secreted is TGF-. The TGF- cytokine plays an important role in proliferation, differentiation, and other cellular processes. Until now there has been no research that explains the effect of static (2D) and dynamic (3D) culture on cell proliferation, total protein conditioned medium and levels of secretion of cytokines TGF- in mesenchymal stem cells from umbilical cord cultured in alpha-MEM medium and 10% concentrated thrombocyte supplementation. The purpose of this study was to determine the effect of static

culture (2D) and dynamic culture (3D) on cell proliferation, levels of total protein in conditioned medium, and cytokine TGF- in mesenchymal stem cells from the umbilical cord. The research conducted included cell culture process, Bradford test, Sodium Dodecyl Sulphate Polyacrylamide Gel Electrophoresis (SDS-PAGE), and Enzyme-Linked Immunosorbent Assay (ELISA) test. This study shows that the use of dynamic culture (3D) can produce cells on a large scale but has a longer proliferation rate than static culture (2D). The total protein content of the conditioned medium fluctuates, but overall dynamic (3D) culture is capable of large-scale production, and there is secretion of the cytokine TGF- by mesenchymal stem cells from both culture methods, however, further tests are still needed to confirm that the cells in culture dynamic (3D) secretes more of the cytokine TGF-.