

The effect of O₂ Concentration and Passage on Viability, Apoptosis, Stemness, and Senescence Of Bone Marrow Mesenchymal Stem Cell of New Zealand Rabbit

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Abstract

Background: Oxygen concentration is an important component in the niche as it contributes to the development and function of bone marrow mesenchymal stem cells (bmMSC). Normoxia culture results in DNA damage and apoptosis of stem cell. Hypoxic culture studies have different results because the mechanism is unclear. **Aim:** To explained decreasing of apoptosis, senescence and increasing of viability and stemness due to the O₂ concentration and passage of bmMSC. **Methods:** bmMSC are taken from the bone marrow of the rabbit then cultured hypoxia (O₂ 1%), normoxia (O₂ 21%), and normo-hypoxic cultures up to 10 passage. At 2,4 passage (early passage) and 7, 10 passage 7, 10 (late passage) investigate viability, apoptosis, stemness, and senescence. **Results:** Hypoxia was significantly different ($p < 0.05$) to maintaining viability and stemness also decreased the number of apoptosis and senescence while the passage did not differ significantly ($p > 0.05$) to decreased oct4 and senescence expression in late passage. In late passage, normoxia cultures occur more amino acid mutations of oct4 than hypoxia cultures and normo-hypoxic cultures. Hypoxia can induced stemness by increasing HIF- α expression and oct4 expression while the passage is associated with decreasing oct4 expression. **Conclusions:** Hypoxia can increasing viability and stemness of bmMSC and decreasing of apoptosis and stemness of bmMSC. Hypoxia is capable of up regulation oct4 after decreasing in normoxia culture.

Keywords: mesenchymal stem cell, O₂ concentration, passage, stemness