

Pengaruh pajanan sinar X CARM terhadap viabilitas dan waktu penggandaan populasi sel punca mesenkimal = Effectivity of the combination of hydroxyapatite and gentamicin in the healing of tibial chronic osteomyelitis in rabbit model / Alam Rahmat Kusnadi

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Abstrak

[ABSTRAK

Pendahuluan: Sel punca mesenkimal (SPM) sebagai salah satu alternatif terapi kasus sulit dapat diperoleh dari jaringan adiposa. Kemampuan SPM dalam rekayasa jaringan membutuhkan prosedur implantasi SPM yang aman dan bebas kontaminasi. Tindakan minimal invasive pada kasus cedera medulla spinalis dengan terapi implantasi SPM dapat menyebabkan sel tersebut terpajan radiasi sinar-x c-arm. Viabilitas dan waktu penggandaan populasi (WPP) merupakan salah satu komponen utama keberhasilan prosedur implantasi tersebut. Penelitian ini bertujuan mengetahui efek pajanan sinar-x c-arm terhadap viabilitas dan WPP SPM.

Metode: Penelitian ini adalah penelitian eksperimental SPM jaringan adiposa pasca cryopreservation. Sel punca pasca thaw dan propagasi kemudian dilakukan pajanan radiasi sinar-x dengan c-arm. Sel punca kemudian di kultur untuk menilai viabilitas dan waktu penggandaan populasi. Uji Generalized Linear Model untuk menilai perbedaan viabilitas antara besar dosis radiasi. Uji Spearman menilai korelasi perbedaan viabilitas kelompok pasca-radiasi, dan pasca radiasi dan kultur. Uji Kruskal-Wallis menilai WPP kelompok pasca-radiasi antara masing-masing besar dosis. Uji Wilcoxon menilai WPP antara kelompok pre-radiasi dengan kelompok pasca-radiasi.

Hasil: Waktu konfluensi kultur sel pasca radiasi rata-rata 4.33 hari. Rerata perbedaan viabilitas antara besar dosis radiasi tidak terdapat perbedaan yang bermakna secara statistik ($p>0.05$). Didapatkan korelasi positif viabilitas pasca radiasi dengan besar dosis radiasi namun tidak bermakna secara statistik ($p>0.05$) namun didapatkan korelasi negatif viabilitas pasca radiasi dan kultur dengan besar dosis radiasi dan bermakna secara statistik. Tidak didapatkan perbedaan bermakna median WPP antara kelompok pre-radiasi dan pasca-radiasi ($p>0.05$) dan perbedaan WPP diantara kelompok pasca radiasi ($p>0.05$).

Kesimpulan: Tidak terdapat perbedaan secara statistic viabilitas dan WPP SPM jaringan adiposa pasca pajanan radiasi sinar-x c-arm sampai sampai dosis radiasi 32.34 mSv.

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ABSTRACT

Introduction. The use of adipose tissue derived mesenchymal stem cells (MSCs) in tissue engineering require implantation procedure that is safe and free of contamination. Minimally invasive procedure in the case of spinal cord injury using a c-arm device for MSC implantation causes x-ray exposure to the implanted cells. Viability and population doubling time (PDT) is a major component of the success of the implantation procedure. This study aims to determine the effect of c-arm x-ray exposure on MSC viability and PDT.

Methods. This was an experimental study that used cryopreserved adipose tissue derived MSCs. Cells were thawed, propagated, and exposed to varying doses of c-arm x-ray radiation. Stem cell viability was measured, and then the cells were cultured to assess their PDT. Generalized linear models test was used to compare cell viability between post-thaw, post-propagation, post-radiation, post-culture post-radiation, and

control and between radiation dose groups. Kruskal-Wallis test assessed PDT between various radiation doses in post-radiation groups. Wilcoxon test assessed PDT between pre-radiation and post-radiation groups.

Results. Mean confluence period of adipose MSCs post radiation was 4.33 days. There was no statistically significant difference in MSC mean viability after exposure to x-ray radiation between each group and control ($p > 0.05$). There was no significant positive correlation between post radiation viability and radiation dose ($p > 0.05$), however, there was significant negative correlation between post radiation post culture viability and radiation dose. There were no significant differences in PDT between pre- and post-culture post radiation groups and between various radiation doses in post-radiation groups ($p > 0.05$).

Conclusion. No statistical differences in MSC viability and PDT after x-ray radiation exposure of c-arm up to 32.34 mSv; Introduction. The use of adipose tissue derived mesenchymal stem cells (MSCs) in tissue engineering require implantation procedure that is safe and free of contamination. Minimally invasive procedure in the case of spinal cord injury using a c-arm device for MSC implantation causes x-ray exposure to the implanted cells. Viability and population doubling time (PDT) is a major component of the success of the implantation procedure. This study aims to determine the effect of c-arm x-ray exposure on MSC viability and PDT.

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