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ANALISIS GEN KOLAGEN TIPE II BIOMARKER KONDROGENESIS *ADIPOSE MESENCHYMAL STEM CELL* DENGAN PENAMBAHAN *PLATELET-RICH PLASMA* PADA *SCAFFOLD NANOFIBER* PHA DAN *SILK*

RINCIAN HALAMAN (xxi + 106 halaman, 13 tabel, 6 bagan, 8 lampiran)

ABSTRAK

Tujuan

Kartilago merupakan jaringan avaskular sehingga apabila mengalami kerusakan sulit untuk memperbaiki dirinya sendiri. Rekayasa jaringan dapat digunakan untuk memperbaiki kerusakan kartilago. Penelitian ini dilakukan untuk mengetahui potensi *adipose derived stem cells* (ADSCs), campuran *scaffold nanofiber polyhydroxyalkanoate* (PHA) dan *silk*, dan diberi tambahan platelet-rich plasma (PRP) sebagai komponen rekayasa jaringan.

Metode

ADSCs dikultur pada *scaffold nanofiber silk* dan PHA/*silk* rasio 3:1 dalam media *Dulbecco's Modified Eagle's Medium* (DMEM) dengan dan tanpa penambahan PRP 10% selama 21 hari untuk melihat kemampuan untuk berdiferensiasi menjadi kartilago yang ditandai dengan ekspresi kolagen tipe II. Ekspresi gen dianalisis menggunakan RT-qPCR.

Hasil

Peningkatan ekspresi gen kolagen tipe II tertinggi terjadi pada kelompok perlakuan kultur ADSCs scaffold *silk* tanpa penambahan PRP 10% sebesar 6.04 kali lipat , sedangkan kelompok perlakuan dengan penambahan PRP 10% hanya 2.59 kali lipat terhadap kontrol. Kelompok perlakuan kultur ADSCs pada campuran *scaffold nanofiber* PHA dan *silk* rasio 3:1 mengalami penurunan ekspresi gen kolagen tipe II baik dengan dan tanpa PRP 10%.

Kesimpulan

Penelitian ini menunjukan bahwa penambahan PRP 10% pada media kultur kondrogenesis ADSCs pada *scaffold nanofiber* PHA dan *silk* dapat meningkatkan ekspresi gen kolagen tipe II meskipun belum maksimal. Hal tersebut bisa disebabkan karena preparasi PRP yang beragam.

Daftar Pustaka **:** 65 (2013-2023)

Kata Kunci **:** *Adipose Mesenchymal Stem Cell*, Kondrogenesis, Kolagen Tipe II, PHA, PRP*, Scaffold Nanofiber*, *Silk*

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ANALYSIS OF TYPE II COLLAGEN EXPRESSION AS A BIOMARKER OF CHONDROGENIC DIFFERENTIATION ADIPOSE MESENCHYMAL STEM CELLS INDUCED BY PLATELET-RICH PLASMA ON PHA AND *SILK* NANOFIBER SCAFFOLD

PAGES DETAIL (xxi + 106 pages, 13 tabels, 6 pictures, 8 appendices)

ABSTRACT

Objective

Cartilage is avascular tissue, making it difficult to repair itself when damaged. Tissue engineering can be use for repair cartilage damage. This research aims to explore the potential of adipose-derived stem cells (ADSCs), a combination of nanofiber polyhydroxyalkanoate (PHA) and silk scaffold, with the addition of platelet-rich plasma (PRP) as components of tissue engineering.

Method

ADSCs were cultured on a silk and PHA/silk nanofiber scaffold with a 3:1 ratio in Dulbecco's Modified Eagle's Medium (DMEM), both with and without the addition of 10% platelet-rich plasma (PRP) for 21 days to assess their potential to differentiate into cartilage, as indicated by the expression of type II collagen. Gene expression was analyzed using RT-qPCR.

Result

The highest increase in type II collagen gene expression occurred in the ADSCs cultured on the silk scaffold without 10% PRP addition, showing a 6.04-fold upregulation. In contrast, the treatment group with the addition of 10% PRP exhibited a 2.59-fold increase compared to the control. The ADSCs cultured on the mixed nanofiber scaffold of PHA and silk with a 3:1 ratio experienced a decrease in type II collagen gene expression, both with and without 10% PRP supplementation.

Conclusion

This study indicates that 10% PRP addition to the chondrogenic culture media of ADSCs on a PHA and silk nanofiber scaffold can enhance the expression of type II collagen genes, although not to its maximum potential. This result could be attributed to the diverse preparation methods of PRP.

References **:** 65 (2013-2023)

Keywords **:** *Adipose Mesenchymal Stem Cell*, *Chondrogenesis*, PHA, PRP*, Scaffold nanofiber*, *Silk Fibroin, Type II Collagen*