Synovial fluid-derived Exosomal-piRNAs as Biomarkers for Osteoarthritis

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INTRODUCTION:

Exosomes, membrane bound vesicles secreted by various cells, can mediate intercellular communication via their contents, including lipids, nucleic acids, and proteins. One of the nucleic acid contents in exosomes is PIWI-interacting RNAs(piRNAs), a novel type of small non-coding RNAs(sncRNAs, ~26–31 nucleotides). Post-transcriptionally, these piRNAs molecules can induce mRNA degradation[1,2], thus hindering protein synthesis[3]. Several piRNAs have been identified as down-regulated in chondrogenic mesenchymal stem cells[4]. Recent study in murine osteoarthritis(OA) model also reported that sncRNAs are novel markers of musculoskeletal ageing and OA[5]. This study aims to identify differentially expressed(DE) exosomal-piRNA in human OA synovial fluid(SF) and to examine their potential role in OA.

METHODS:

OA and non-OA SF samples were procured from arthroplasty and arthroscopy subjects respectively(Ethics reference number: 20164-2398). SF exosomal-total RNA(TR) were extracted using exoRNeasy kit and quantified using Nanodrop™ 2000 spectrophotometer. Fifty nanogram of exosomal-TR were used for Illumina NovaSeq SE50 next generation sequencing(NGS) analysis to identified the piRNAs. The piRNA identified were analyzed with bioinformatics analysis for the DE profiles. The DE piRNAs were further analyzed for their role in OA.

RESULTS:

The exosomal-TR were successfully extracted from the SF samples and observed as sncRNAs in the electropherogram(Figure 1) and agarose gel(Figure 2).

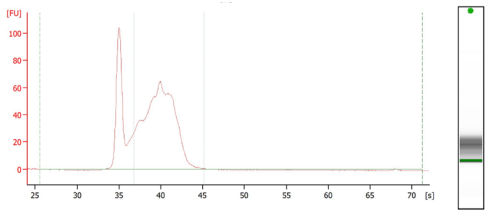

Figure 1: Representative electropherogram of SF exosomal-TR showed abundant of sncRNA.

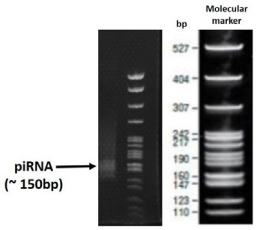

Figure 2: Representative agarose gel image of SF exosomal-TR NGS library. The 150bp bands correspond to piRNAs(30nt).

DISCUSSIONS:

piR-hsa-23209 and piR-hsa-2107 were piRNAs down-regulated in chondrogenic differentiation[4].

CONCLUSION:

The DE OA SF derived exosomal-piRNA can be identified. Future studies shall investigate their roles in OA progression.

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