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## ADIPOSE-DERIVED MESENCHYMAL STEM CELLS: POTENTIAL FOR THERAPEUTICS

**Shigeki Sugii<sup>1,2\*</sup>**

<sup>1</sup>Singapore Bioimaging Consortium, A\*STAR, 138667 Singapore

<sup>2</sup>Duke-NUS Medical School, Singapore, 169857 Singapore

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\*Corresponding author:  
Shigeki Sugii  
email:  
shigeki\_sugii@sbic.a-  
star.edu.sg

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### SUMMARY

Adipose tissue is a scalable and readily attainable source of proliferating, multipotent adipose-derived stem cells (ASCs), holding great therapeutic potentials. However, more work is necessary to fully understand properties of ASCs in order to maximize their therapeutic potentials. We are interested in identifying novel biomarkers that predict characteristics of ASC functions. In our studies, we performed various experimental approaches including comprehensive image-based high content screening, whole genome-wide gene expression analyses, metabolomics, stem cell function and differentiation assays. We identified novel cell surface markers, CD10 and CD200, which indicate how well ASCs can differentiate into mature functional adipocytes. In addition, novel pathways of retinoid metabolism and oxidative stress were uncovered. Excessive retinoic acid pathway in visceral fat-derived ASCs resulted in interfering with their adipocyte differentiation capacities, which was reversed by inhibitors of its pathway. It was also found that high oxidative stress associated with ageing or visceral obesity affects ASC's ability for differentiation, proliferation, migration and senescence. Treatment with anti-oxidants was effective in reducing reactive oxygen species and improving these ASC properties. Together we demonstrated that specific cell surface markers and metabolic cascades can serve as prospective markers and/or regulate cellular functions of ASCs, which may be useful for further development of cell therapeutic activities using ASCs and other MSCs.