

# Cellular senescence is similar between regional adipose tissue depots in individuals with obesity and type 2 diabetes

Kerri Z. Delaney<sup>1</sup>, Tamara Tchkonja<sup>2</sup>, James Kirkland<sup>2</sup>, Ronald Denis<sup>3</sup>, Henri Atlas<sup>3</sup>, Radu Pescarus<sup>3</sup>, Pierre Y. Garneau<sup>3</sup>, Michael Tsoukas, José A. Morais<sup>4</sup>, Sylvia Santosa<sup>1</sup>

<sup>1</sup>Department of Health, Kinesiology and Applied Physiology, Concordia University, Montreal, Quebec, Canada. <sup>2</sup>Robert and Arlene Kogod Center on Aging, Mayo Clinic, Rochester, Minnesota, USA. <sup>3</sup>Department du Chirurgie, Hôpital du Sacré-Coeur de Montréal, Montréal, Quebec, Canada.

<sup>4</sup>Division of Geriatric Medicine, Department of Medicine, McGill University, Montreal, Quebec, Canada

## Background

It is conceivable that different regions of adipose tissue have different senescent profiles contributing uniquely to type 2 diabetes as the expansion of abdominal subcutaneous adipose tissue (abSAT) and visceral AT (VAT) is more associated with type 2 diabetes than femoral SAT (fmSAT).

## Objective

To determine regional differences in markers of cellular senescence and how these compare in obese individuals with and without type 2 diabetes.

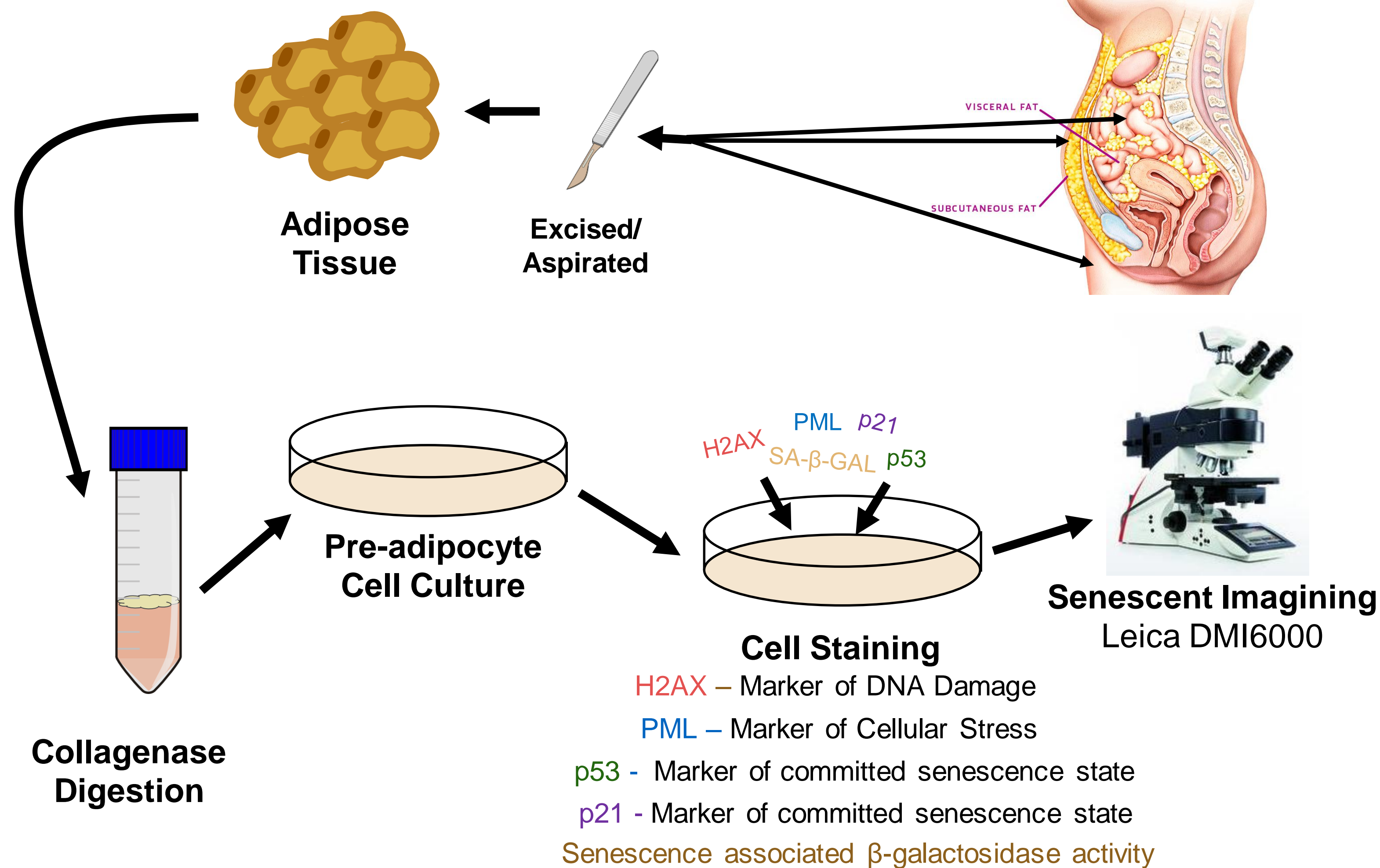
## Methods

Participants:

	Obese (n=5)	Obese + Diabetes (n=5)
Age (years)	43 ± 6	46 ± 5
BMI (kg/m <sup>2</sup> )	44.3 ± 5.5	46.8 ± 5.8
Adipose tissue mass (kg)		
Android	6.1 ± 1.4	6.3 ± 1.2
Gynoid	10.7 ± 2.0	10.2 ± 2.1
Visceral	1.0 ± 1.2	2.0 ± 1.0
Total	120.3 ± 14.2	124.8 ± 11.3

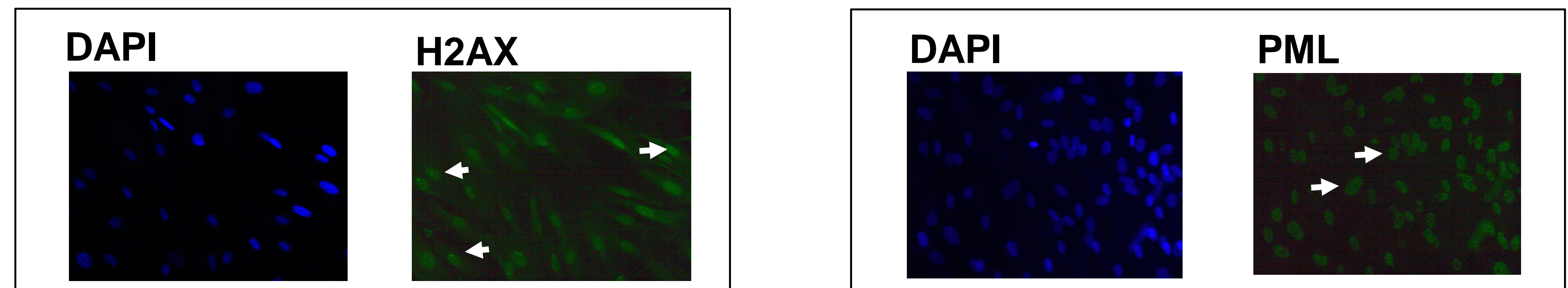
Data are Mean ± SD. All comparisons are non-significant.

### Adipose Tissue Processing and Senescence Analysis



## Results

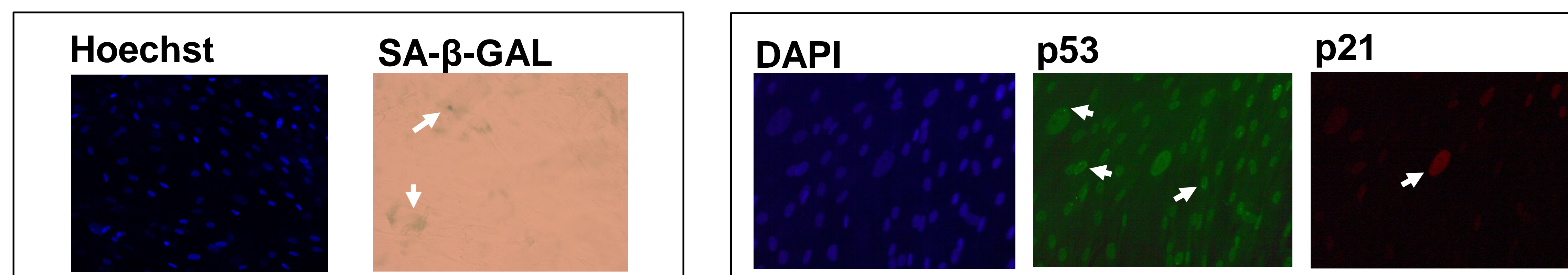
### Regional and Between Group Comparisons of DNA Damage & Cellular Stress



	Obese			Obese + Diabetes		
	abSAT	fmSAT	VAT	abSAT	fmSAT	VAT
<b>H2AX</b> (% positive cells/total cells)	10.25 ± 2.00	7.03 ± 2.26	3.76 <sup>A</sup> ± 0.71	9.18 ± 1.60	14.0a ± 1.56	5.3 <sup>T</sup> ± 0.71
<b>PML</b> (mean intensity)	0.06 ± 0.01	0.08 ± 0.01	0.07 ± 0.01	0.05 ± 0.01	0.05 ± 0.01	0.07 ± 0.02

Data are Mean ± SD. Between Depot Comparisons: <sup>A</sup> sig. from abSAT p<0.01, <sup>a</sup> sig. from abSAT p<0.05, <sup>T</sup> sig. from fmSAT p<0.01.

### Regional and Between Group Comparisons of Markers of Senescence



	Obese			Obese + Diabetes		
	abSAT	fmSAT	VAT	abSAT	fmSAT	VAT
<b>SA-β-GAL</b> (mean intensity)	1.48 ± 0.21	3.62 <sup>A</sup> ± 0.47	2.16 <sup>t</sup> ± 0.62	1.89 ± 0.41	2.95 ± 0.85	2.65 ± 0.69
<b>p53</b> (% positive cells/total cells)	35 ± 6	26 ± 4	10 <sup>A,t</sup> ± 1	26 ± 4	20 ± 3	12 <sup>A</sup> ± 2
<b>p53</b> (mean intensity)	0.07 ± 0.01	0.08 ± 0.01	0.09 ± 0.01	0.06* ± 0.00	0.06** ± 0.00	0.08 ± 0.02
<b>p21</b> (mean intensity)	0.05 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	0.04 ± 0.00	0.05** ± 0.00	0.07 ± 0.02

Data are Mean ± SD. Between Depot Comparisons: <sup>A</sup> sig. from abSAT p<0.01, <sup>a</sup> sig. from abSAT p<0.05, <sup>T</sup> sig. from fmSAT p<0.01, <sup>t</sup> sig. from fmSAT p<0.01. Between group comparisons: \*\* sig. from like depot p<0.01, \* sig. from like depot p<0.05.

## Conclusions

- Subcutaneous adipose tissue depots are positive for more cellular senescence markers than VAT.
- Many regional patterns of senescence are similar between individuals with obesity and diabetes however, overall individuals with obesity alone had greater levels of senescence.

Funding:

