IS ALL FAT CREATED EQUAL? A FIRST COMPARATIVE STUDY OF CHONDROGENESIS POTENTIAL BETWEEN SUBCUTANEOUS AND PERI-OVARIAN ADIPOSE TISSUES IN DOGS.

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Introduction

Osteoarthritis (OA) is a multifactorial disease whose pathogenesis is not completely understood. The pathology is characterized by degenerative loss of articular cartilage and affects entire joints; in dogs, it mainly involves elbow (52.9%), shoulder (30.2%), hip (28.0%), and stifle joints (25.4%)[1]. Tissue engineering represents a promising approach for the management of osteoarthritis (OA) in dogs, particularly when combined with conventional therapies, with the aim of improving the animal's quality of life.

Aim

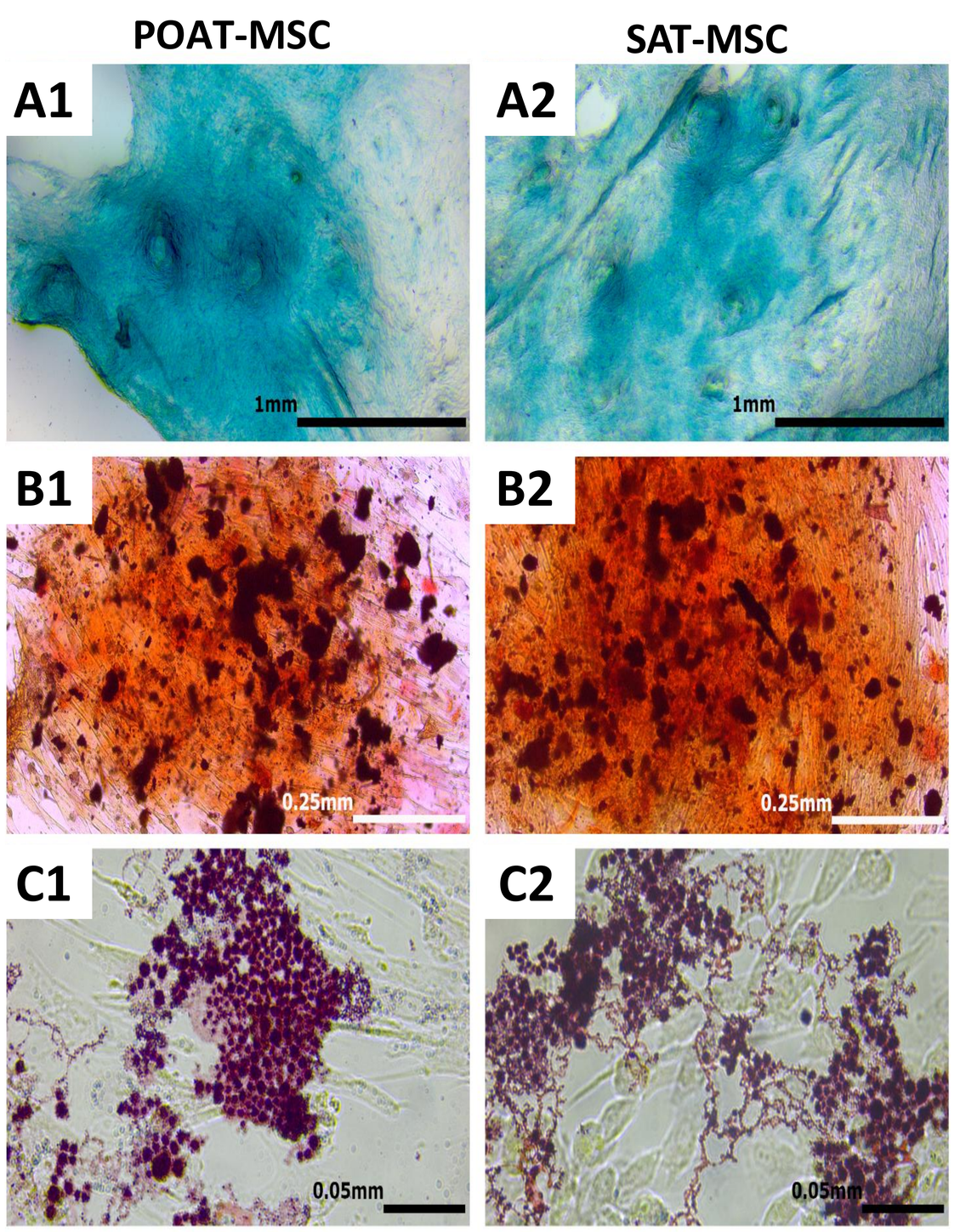
This study evaluates the chondrogenic potential of canine adipose-derived mesenchymal stromal cells (AT-MSCs) from abdominal subcutaneous (SAT-MSCs) and peri-ovarian adipose tissue (POAT-MSCs) to determine their suitability for future regenerative OA therapies.

Material and methods

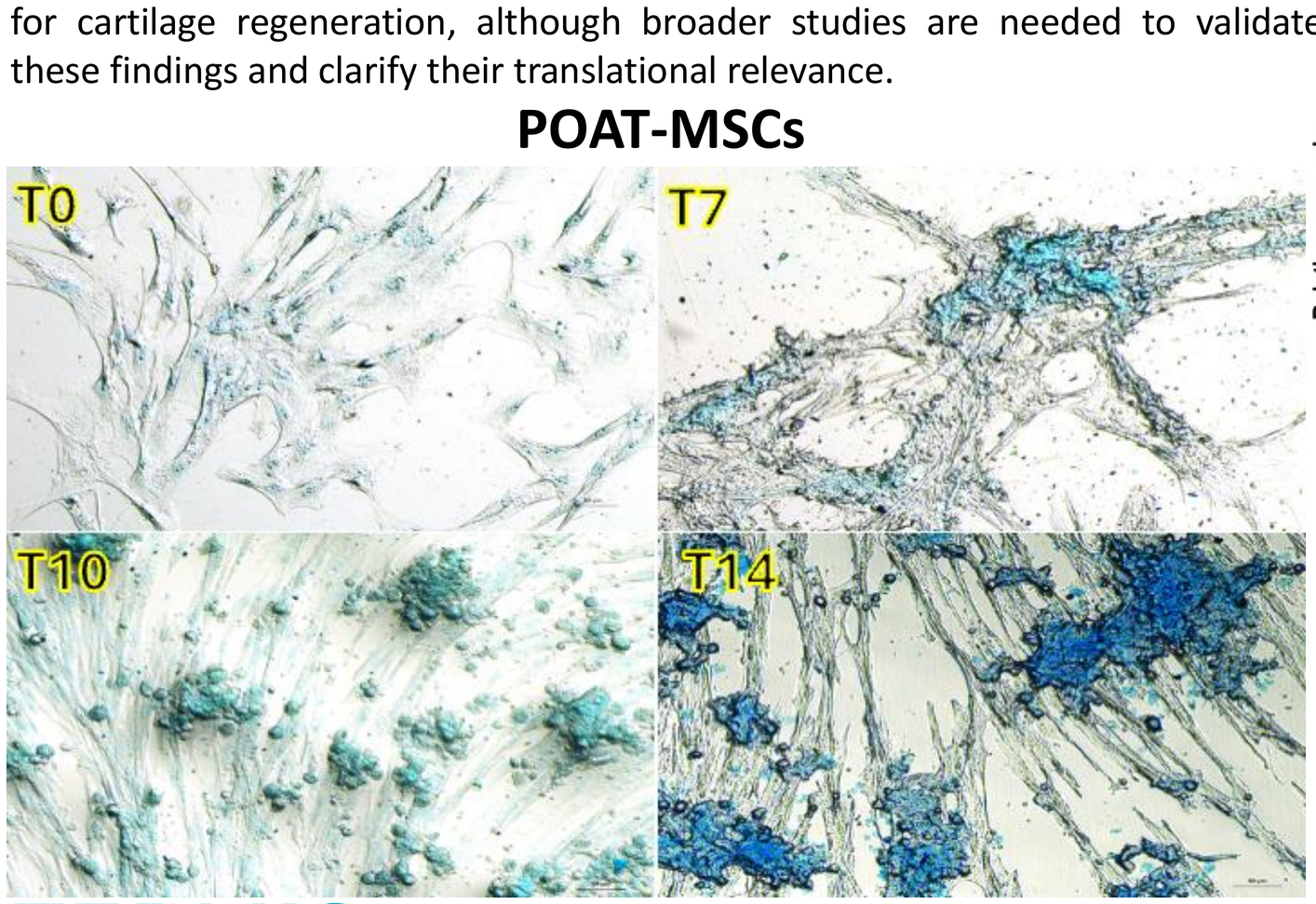
Adipose tissue was collected during ovariectomy from 5 Labrador Retrievers (mean age: 14 months) (OPBA_137_2021). AT-MSCs were isolated and characterized following International Society for Cellular Therapy guidelines (doubling time, growth curves, colony-forming units, immunophenotyping, and trilineage differentiation). Chondrogenic differentiation was assessed by extracellular matrix staining (Alcian Blue) and qPCR analysis of cartilage markers (COL1, 2, 10 and SOX9) at different time points (T0 = no differentiation, T7 = 7 days of differentiation, T10 = 10 days of differentiation, T14 = 14 days of differentiation).

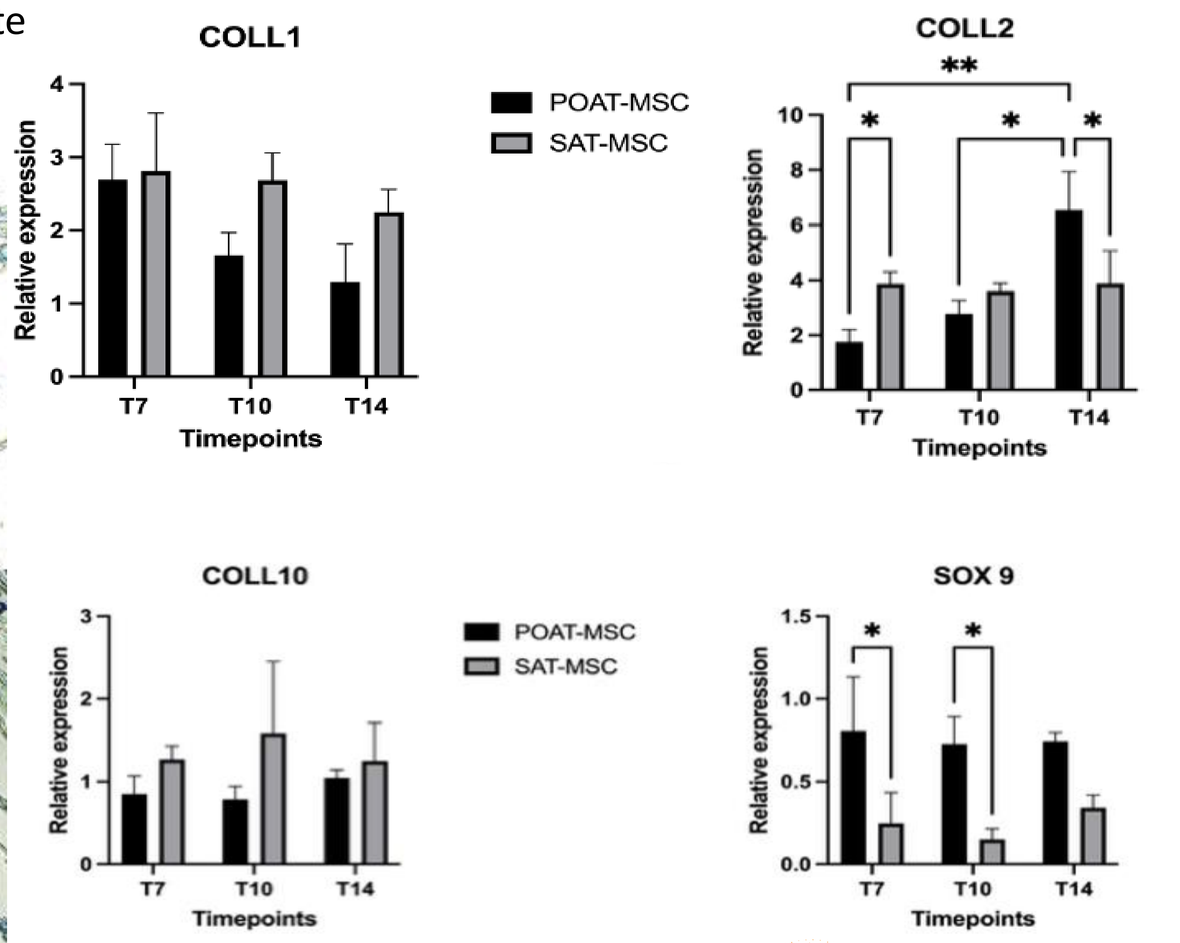
Results and Discussion

About MSCs characterization, no significant differences emerged between SAT- and POAT-MSCs. Concerning chondrogenic potential, Alcian Blue staining showed a morphological divergence from T10 onward between POAT- and SAT-MSCs. qPCR confirmed these observations, revealing a significant rise in COL2 expression in POAT-MSCs (T7 vs. T14: $p<0.01$; T10 vs. T14: $p<0.05$), with no comparable increase in SAT-MSCs. When directly compared, POAT-MSCs expressed less COL2 at T7 ($p<0.05$) but more at T14 ($p<0.05$) than SAT-MSCs. These preliminary results suggest that POAT- and SAT-MSCs exhibit similar mesenchymal features, but POAT-MSCs show stronger chondrogenic performance, enhancing COL2 expression, a key chondrogenic marker. POAT may, therefore, represent a promising and potentially superior source of MSCs for cartilage regeneration, although broader studies are needed to validate these findings and clarify their translational relevance.



A) Chondrogenic differentiation B) Osteogenic differentiation C) Adipogenic differentiation





[1] Roitner, Moritz, Julius Klever, Sven Reese, e Andrea Meyer-Lindenberg. «Prevalence of Osteoarthritis in the Shoulder, Elbow, Hip and Stifle Joints of Dogs Older than 8 Years». The Veterinary Journal 305 (giugno 2024): 106132. https://doi.org/10.1016/j.tvjl.2024.106132.

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