

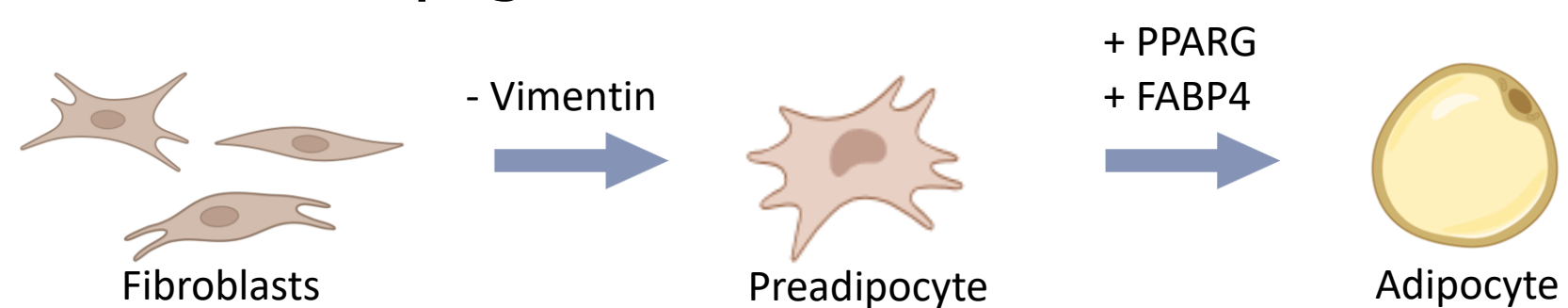
# Adipogenesis in Marine Mammals

## A Pilot Study

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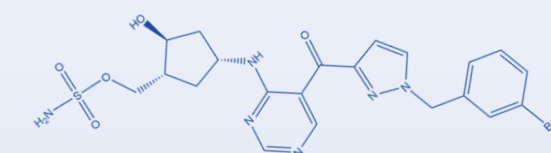
### 1 The Importance of Adipogenesis

Polar bears and Pilot whales are adapted to living in cold environments. They rely on a thick blubber layer for insulation and energy storage. Blubber mainly consists of **adipocytes** (fat cells). Fibroblasts differentiate into adipocytes through a process called **adipogenesis**:



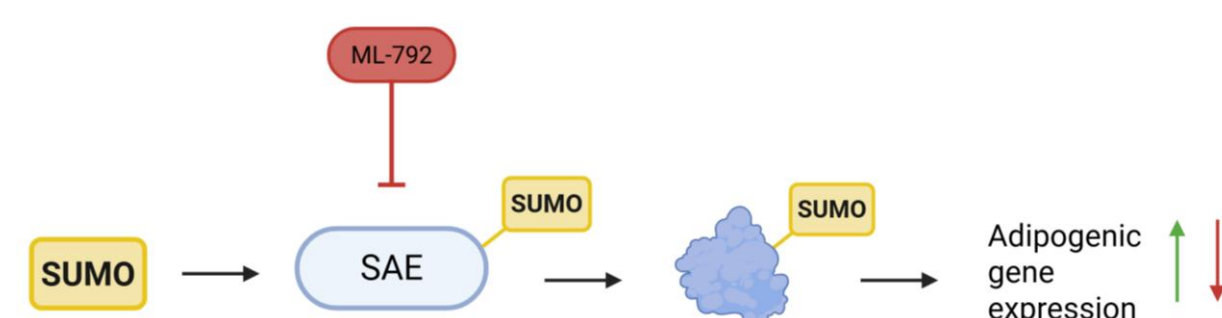
During differentiation, the cell starts to accumulate lipids (mainly triglycerides) in lipid droplets. Vimentin can be used as a marker for fibroblasts, while PPARG and FABP4 are mainly expressed in adipocytes. Understanding how adipogenesis is regulated in these animals is important to be able to predict the potential adverse effects of pollutants on this process.

### 2 ML-792 Inhibits SUMOylation

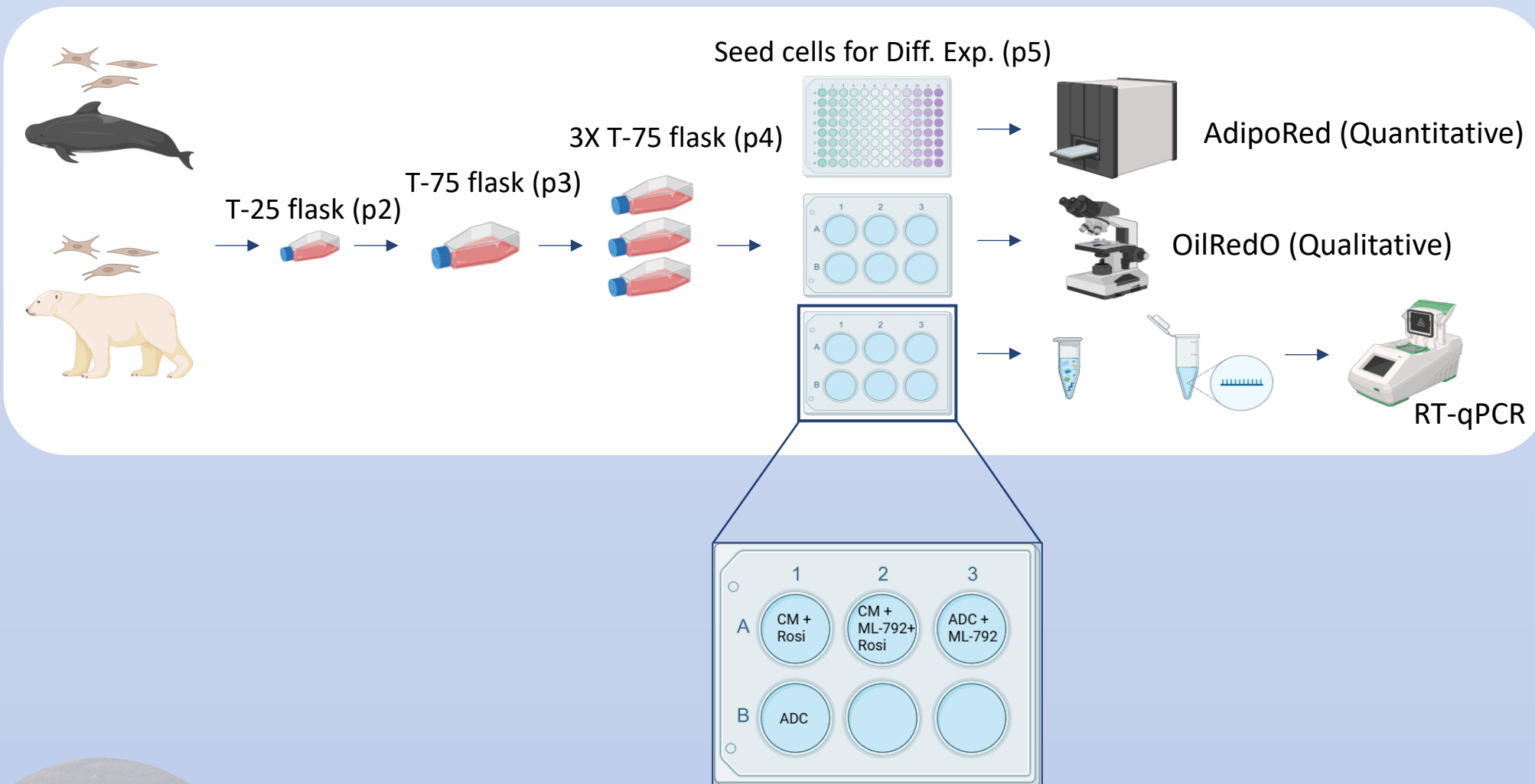


An **Adipocyte differentiation cocktail (ADC)** including insulin differentiates polar bear fibroblasts into adipocyte-like cells. However, ADC does not cause differentiation in whale fibroblasts, suggesting that adipogenesis is regulated differently in whales. To study this further, fibroblasts from both species were exposed to ML-792.

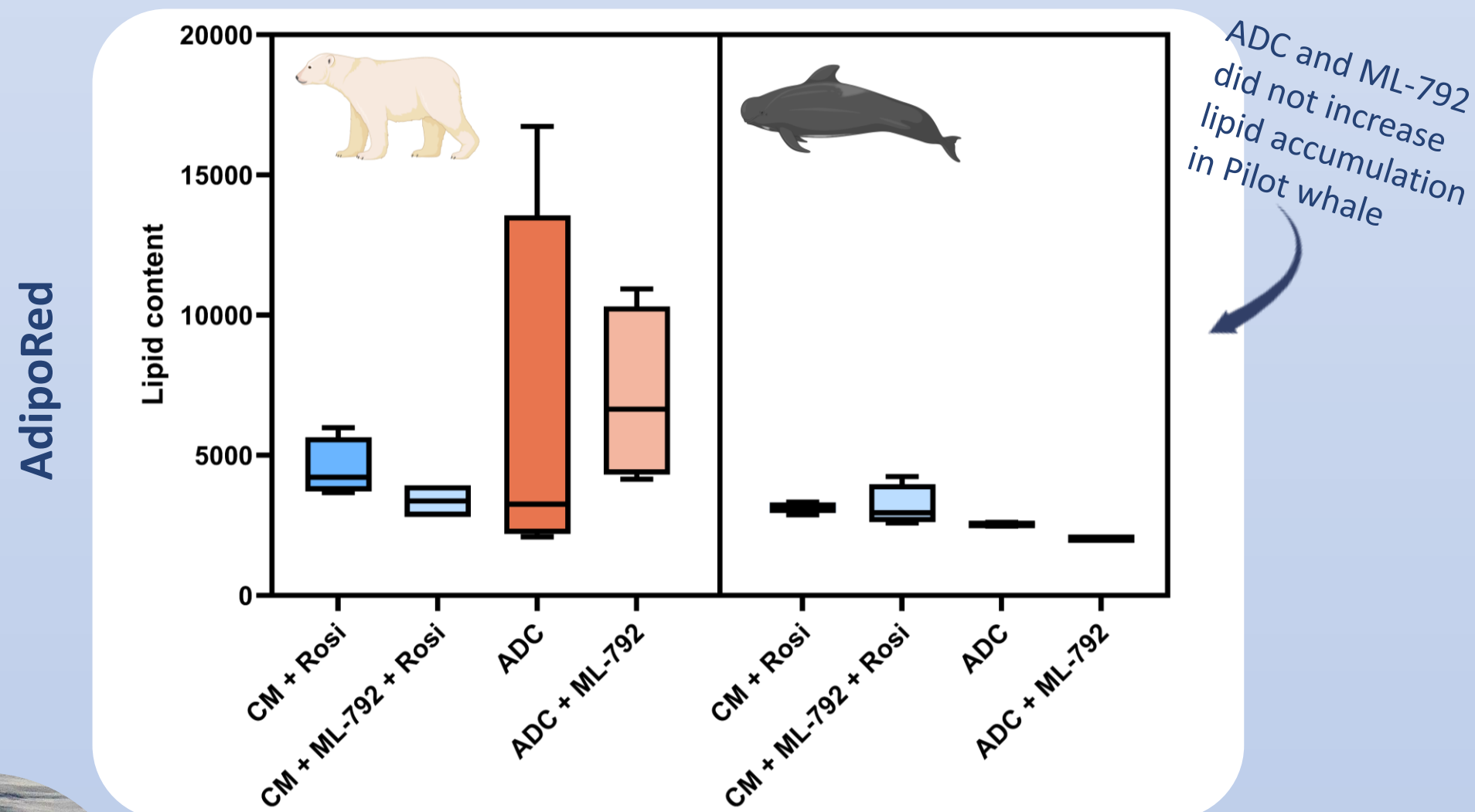
**ML-792** inhibits the SUMO-activating enzyme (SAE) and therefore inhibits SUMOylation. Several transcription factors that regulate adipogenesis undergo SUMOylation, so inhibiting this process may cause whale fibroblasts to differentiate.



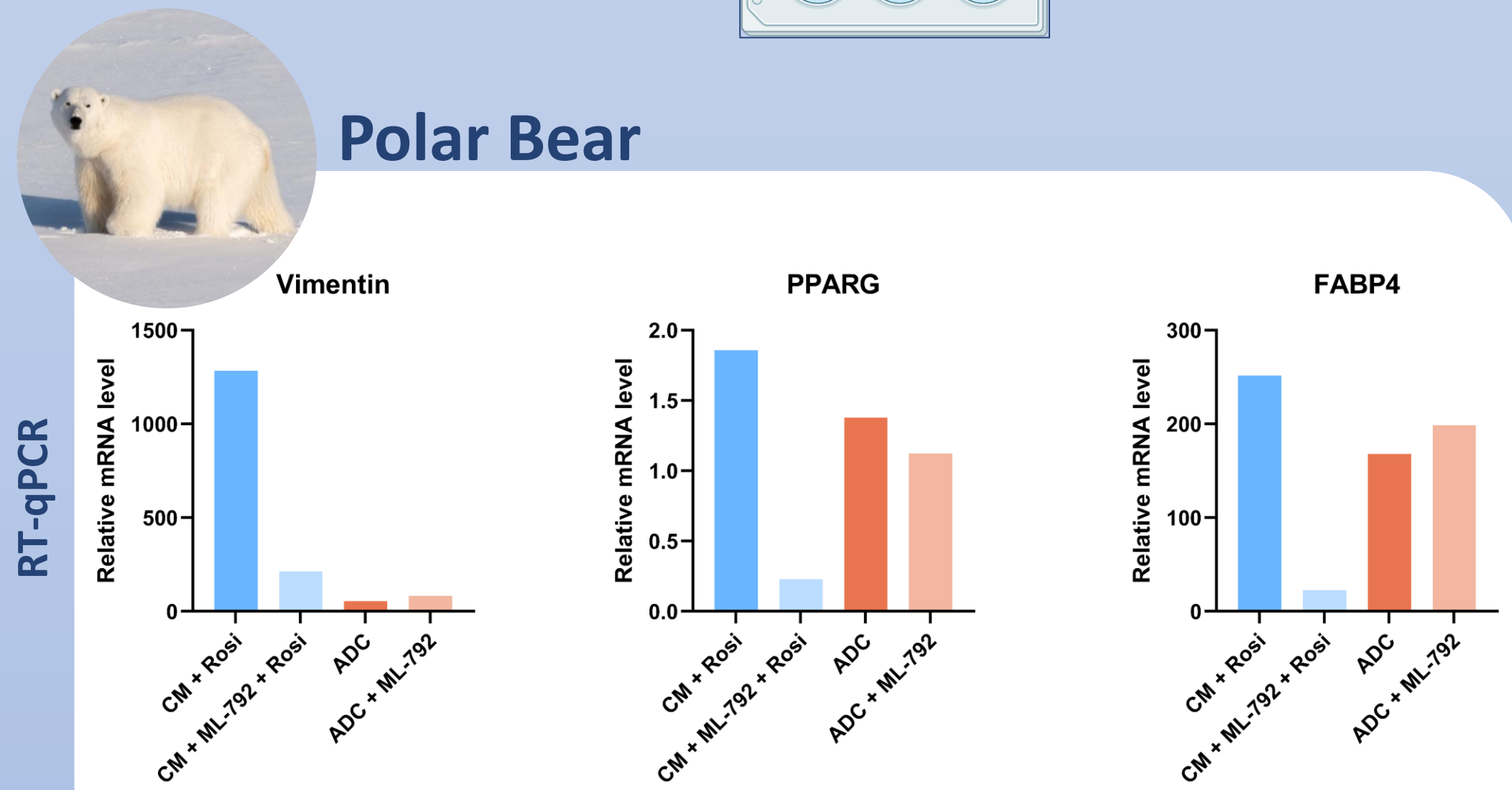
### 3 Work Flow and Experimental Setup



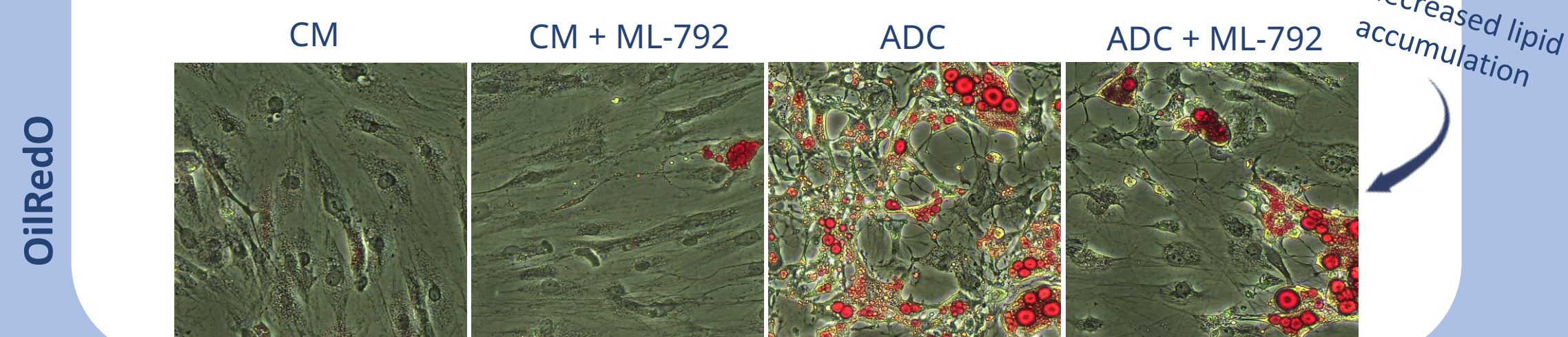
### Quantitative Assessment of Adipogenesis



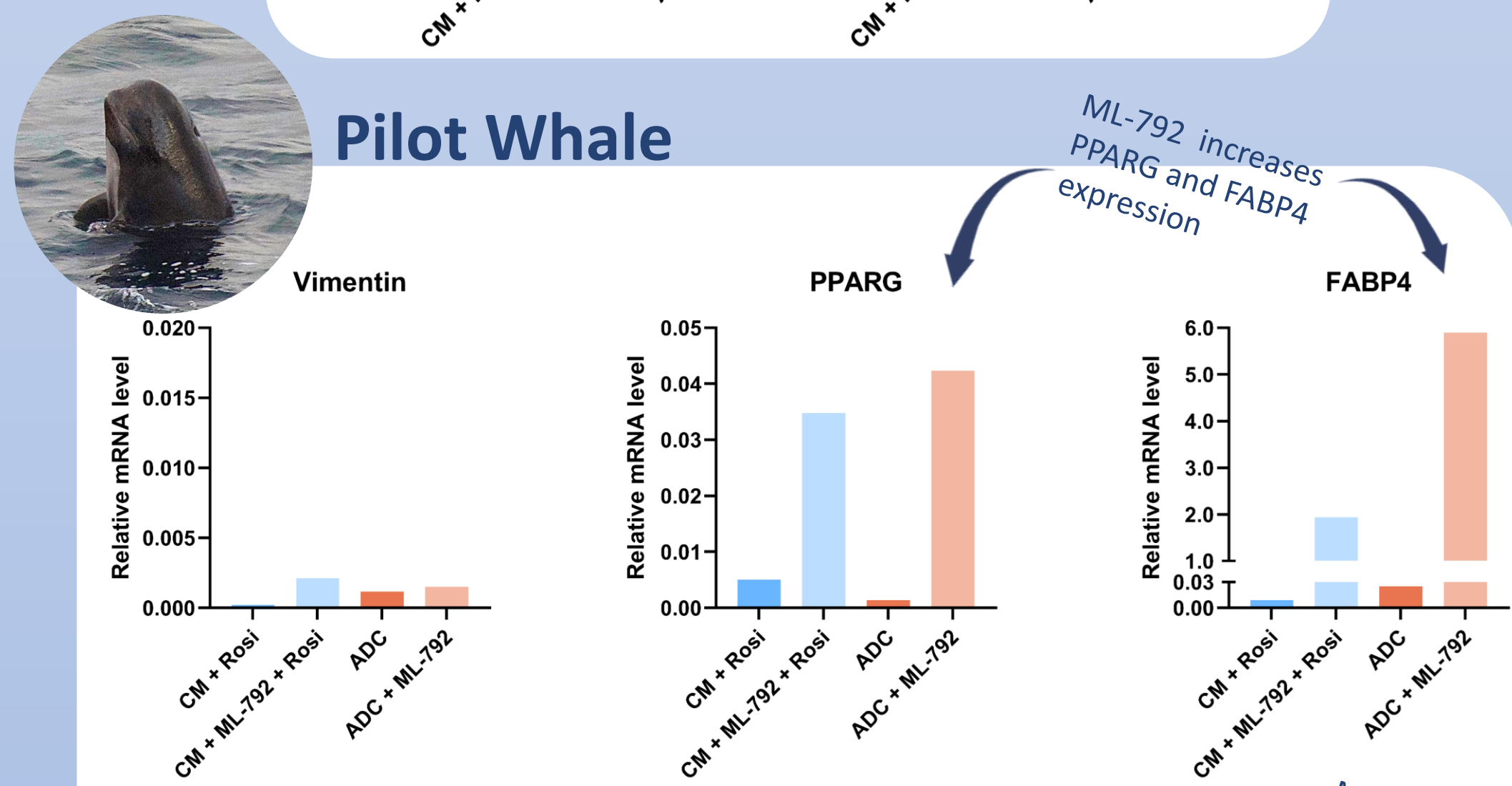
#### Polar Bear



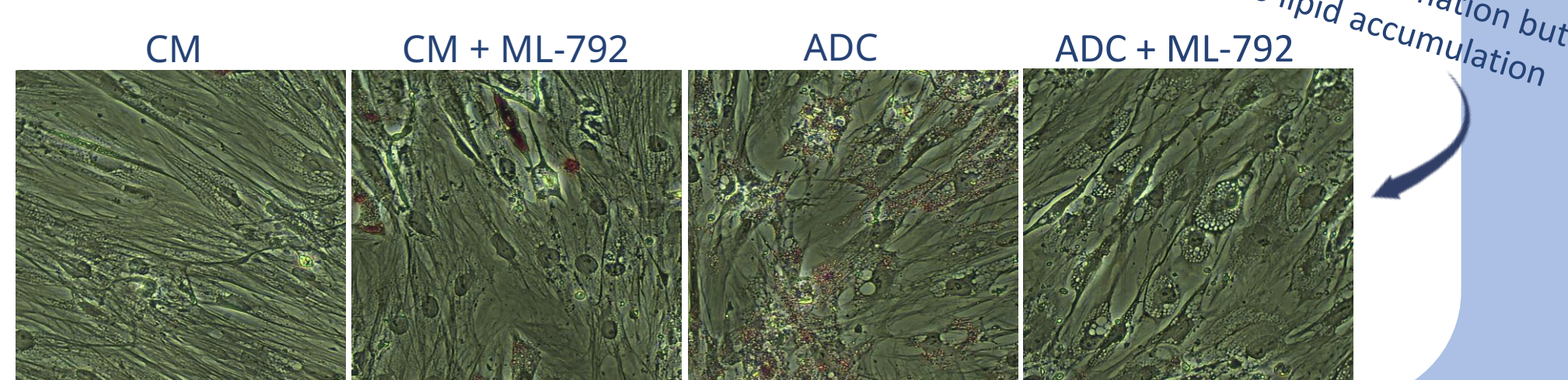
#### Qualitative Assessment of Adipogenesis



#### Pilot Whale



#### Qualitative Assessment of Adipogenesis



### 4 Conclusion

The differentiation cocktail (ADC) does not work in Pilot whale fibroblasts, so we wanted to see if adding ML-792 could make the cells differentiate. It caused vacuole formation but not lipid accumulation. This suggests that SUMOylation is not the factor that prevents us from differentiating whale fibroblasts into adipocytes. Future work should focus on finding an alternative cocktail that doesn't rely on insulin since whales are found to be naturally insulin resistant. This would increase our knowledge about the regulation of adipogenesis in whales and the potential of pollutants to disrupt this process.

