Determination of water balance in *O. orca* and *T. truncatus* using oxygen isotopes

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INTRODUCTION

- Cetacea maintain their water balance in salty environments without salt glands.
- Previous studies were only performed on small fasted dolphins and porpoises[a-d].
- Dietary free water and metabolic water are the main sources of water[e-g] **but their respective contributions remain unknown, especially in fed animals.**

AIM OF THE STUDY

- Estimate the contribution of each environmental water source to Cetacea body water pool.

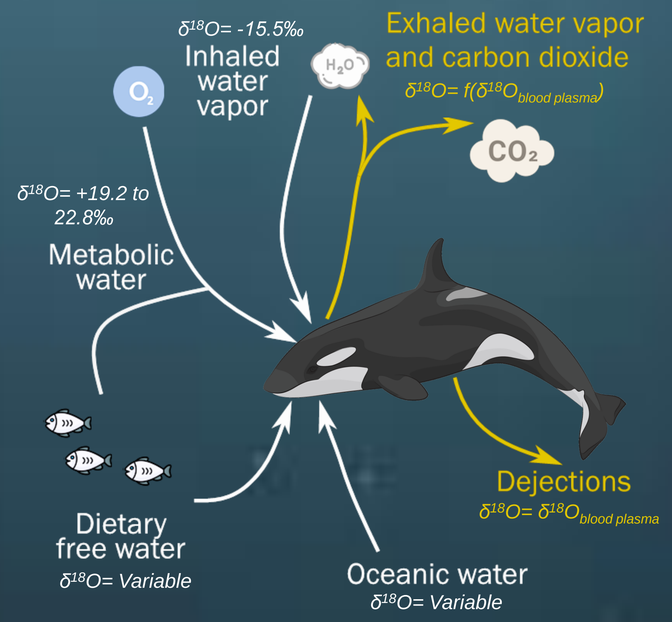

FIG. 1 | Inputs and outputs of oxygen in Cetacea

MATERIAL & METHODS

51 blood plasmas from 4 *Orcinus orca* and 9 *Tursiops truncatus* specimens hosted at Marineland (France).

Fish species (n = 14) and basin water (n = 23).

Analyses performed on a ISOflow™ system connected to a mass spectrometer PrecisION™.

Contribution of each source of water was predicted with the R program *isobxr*[h].

RESULTS

Water balance in O. orca *and* T. truncatus

- More than 90% of the water inputs are linked to **dietary free water and metabolic water production**.
- **Metabolic water** production is more important in ***O. orca than in T. truncatus***.

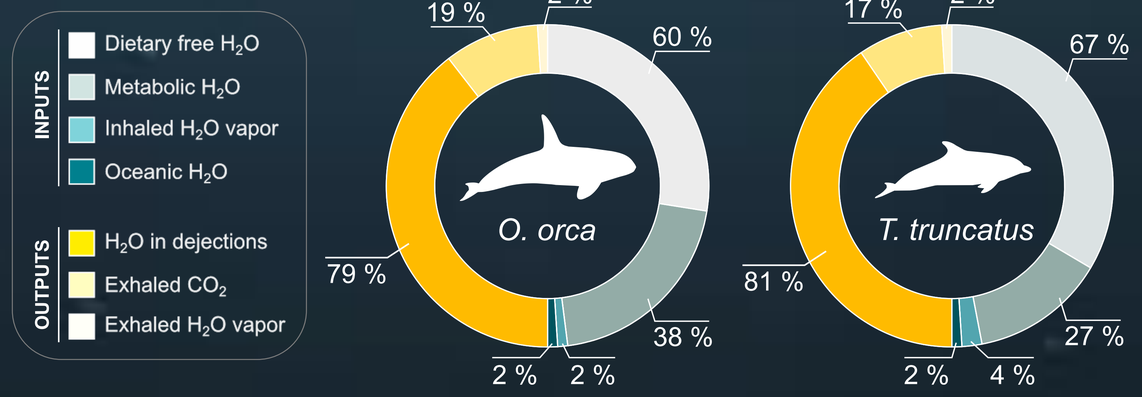

FIG. 2 | Proportions of each oxygen inputs and outputs for *O. orca* and *T. truncatus*.

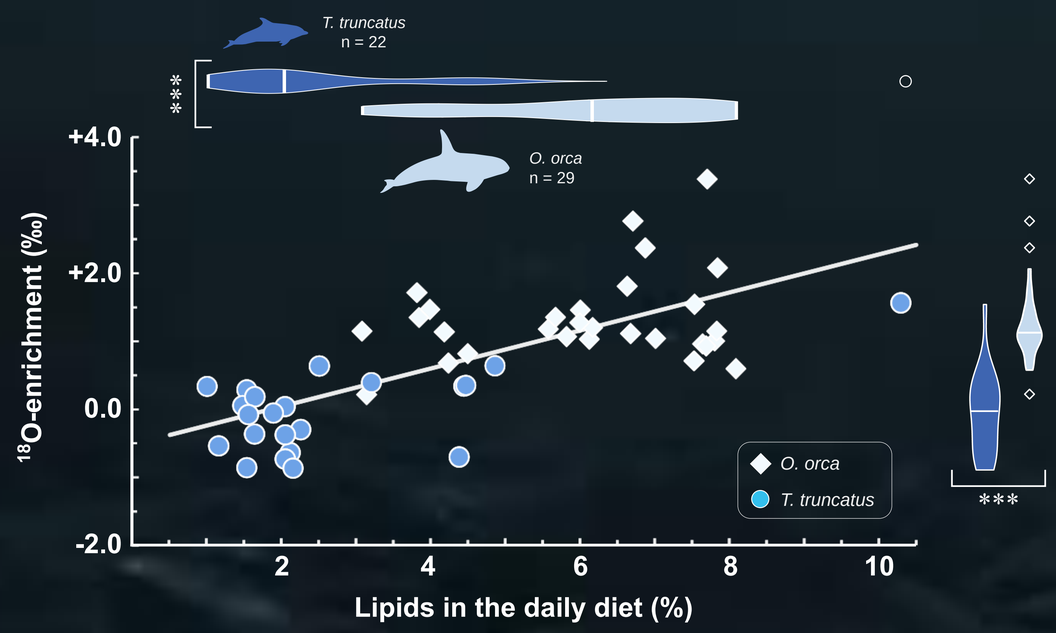

FIG. 3 | ^{18}O-enrichment ($\delta^{18}O_{blood\ plasma}$ values - $\delta^{18}O_{Dietary\ free\ water}$ values) lipids in the daily diet (in %). Violins graphs show the distribution of the values of each measurements. Asterisks represent the significance of the Mann-Whitney-Wilcoxon test: *** for p-value < 0.0001.

Why metabolic water production is more important in O. orca *than* T. truncatus*?*

The diet of ***O. orca* is significantly richer in lipids** than that of *T. truncatus*.

Lipid-rich diet leads to a more important positive shift between $\delta^{18}O_{blood\ plasma}$ and $\delta^{18}O_{dietary\ free\ water}$ values.

CONCLUSIONS & PERSPECTIVE

- **Dietary free water and metabolic water production** contribute to **more than 90% of the water inputs**.
- **Lipid-rich diet** leads to a **more important production of metabolic water.**
- **Δ'^{17}O method** could be helpful to precise the contribution of dietary free water and metabolic water[i,j].

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