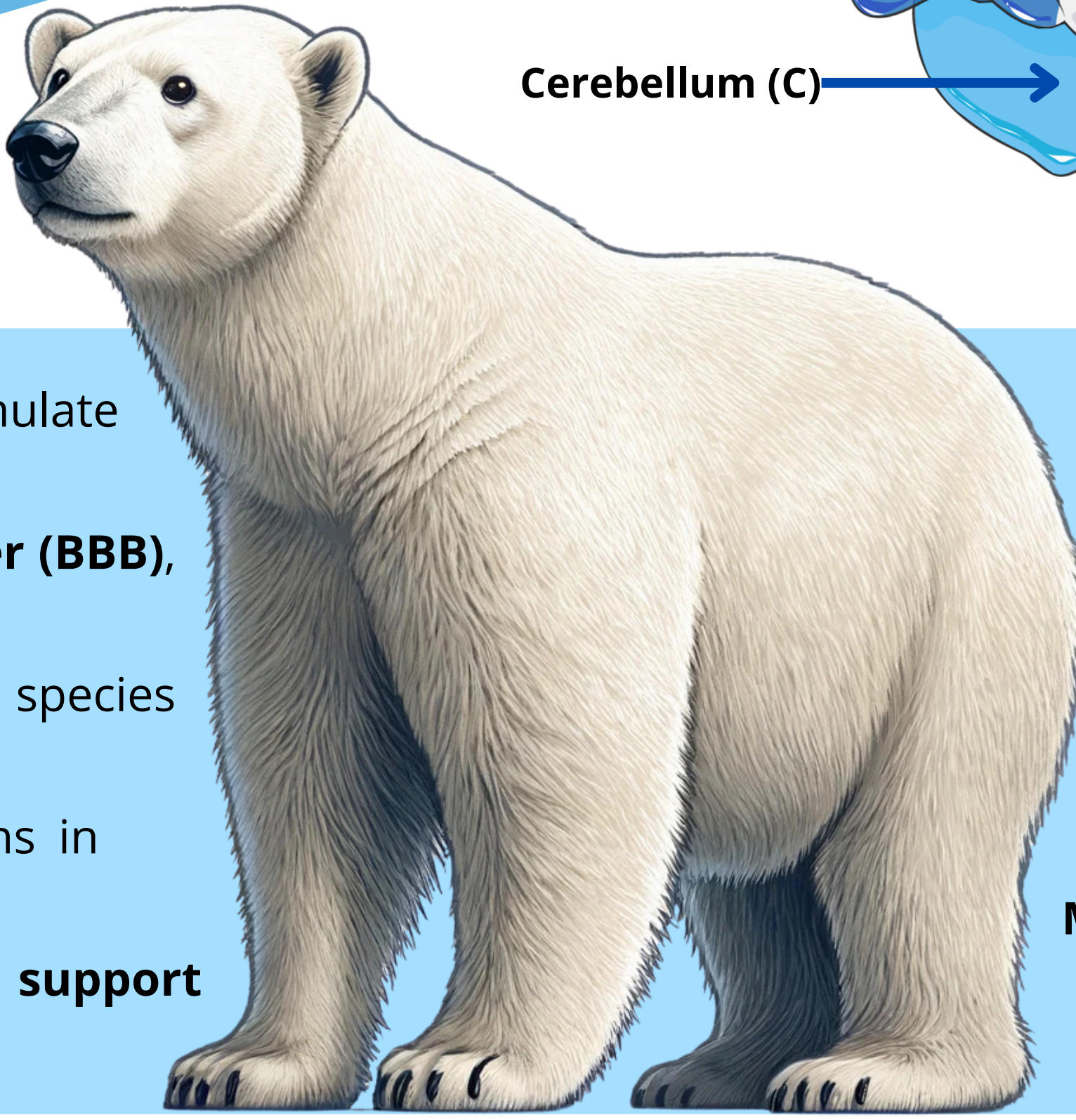
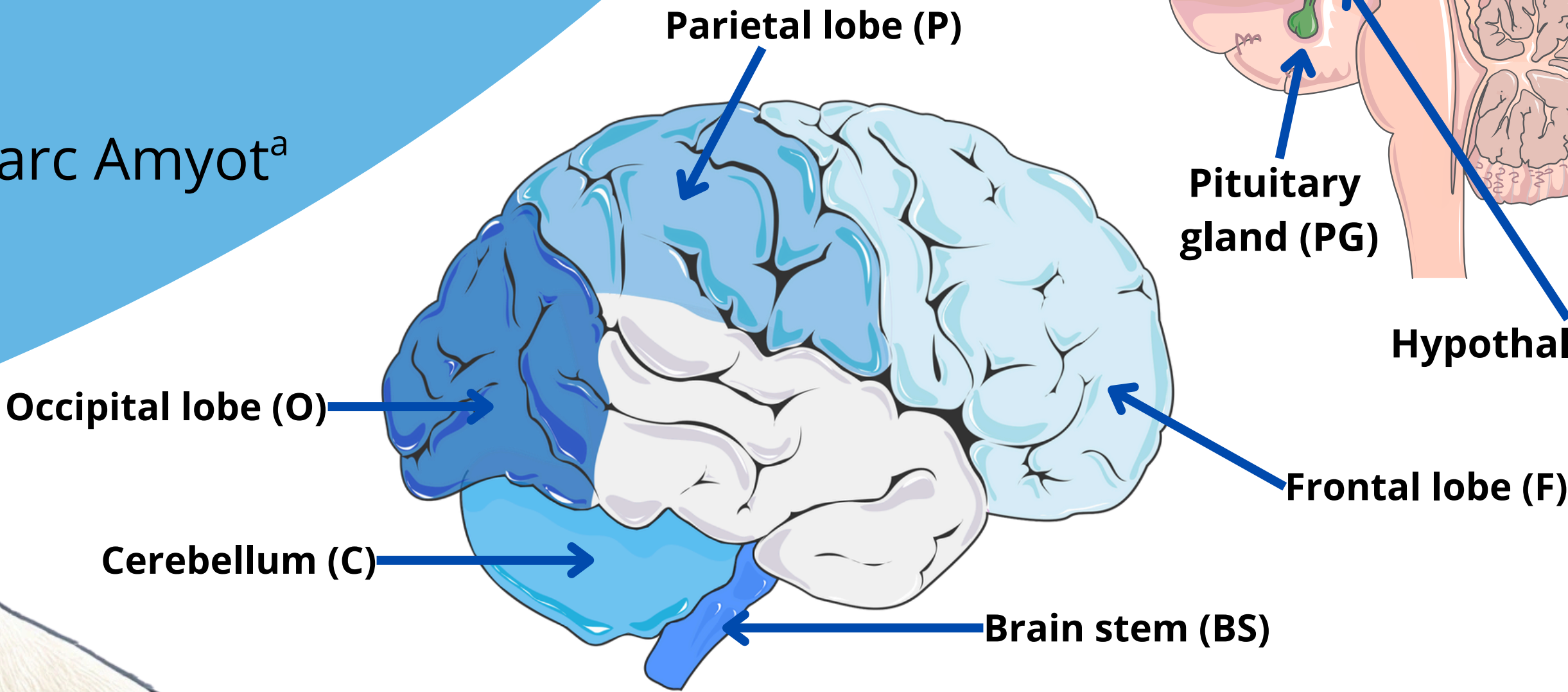
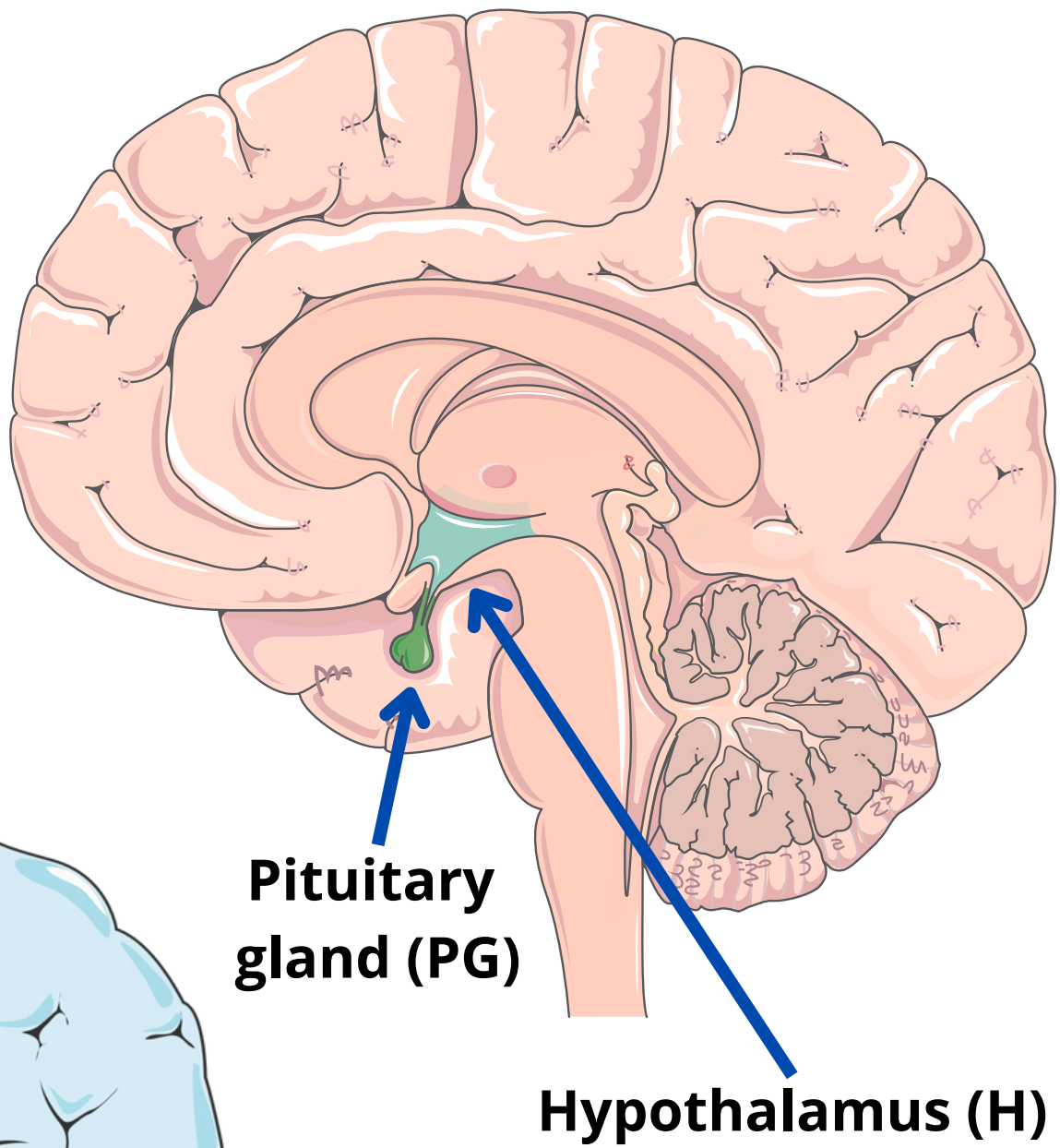


Selenium (Se) and Mercury (Hg) Dynamics in Polar Bear Brains: A Focus on Speciation and Biocummulation

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STUDY CONTEXT

METHODOLOGY

-  Polar bears (*Ursus maritimus*) are **apex predators** in the Arctic and accumulate **high levels of mercury (Hg)** through their marine-based diet¹
-  **Methylmercury (MeHg)** is a neurotoxin that crosses the **blood-brain barrier (BBB)**, making the brain a vulnerable target²
-  **Selenium (Se)** may protect against Hg toxicity, but only in certain chemical species (speciation)³
-  **Limited data exist** on Hg and Se distribution across distinct brain regions in polar bears
- Understanding these patterns is essential to assess **neurotoxic risk and support Arctic wildlife** health monitoring

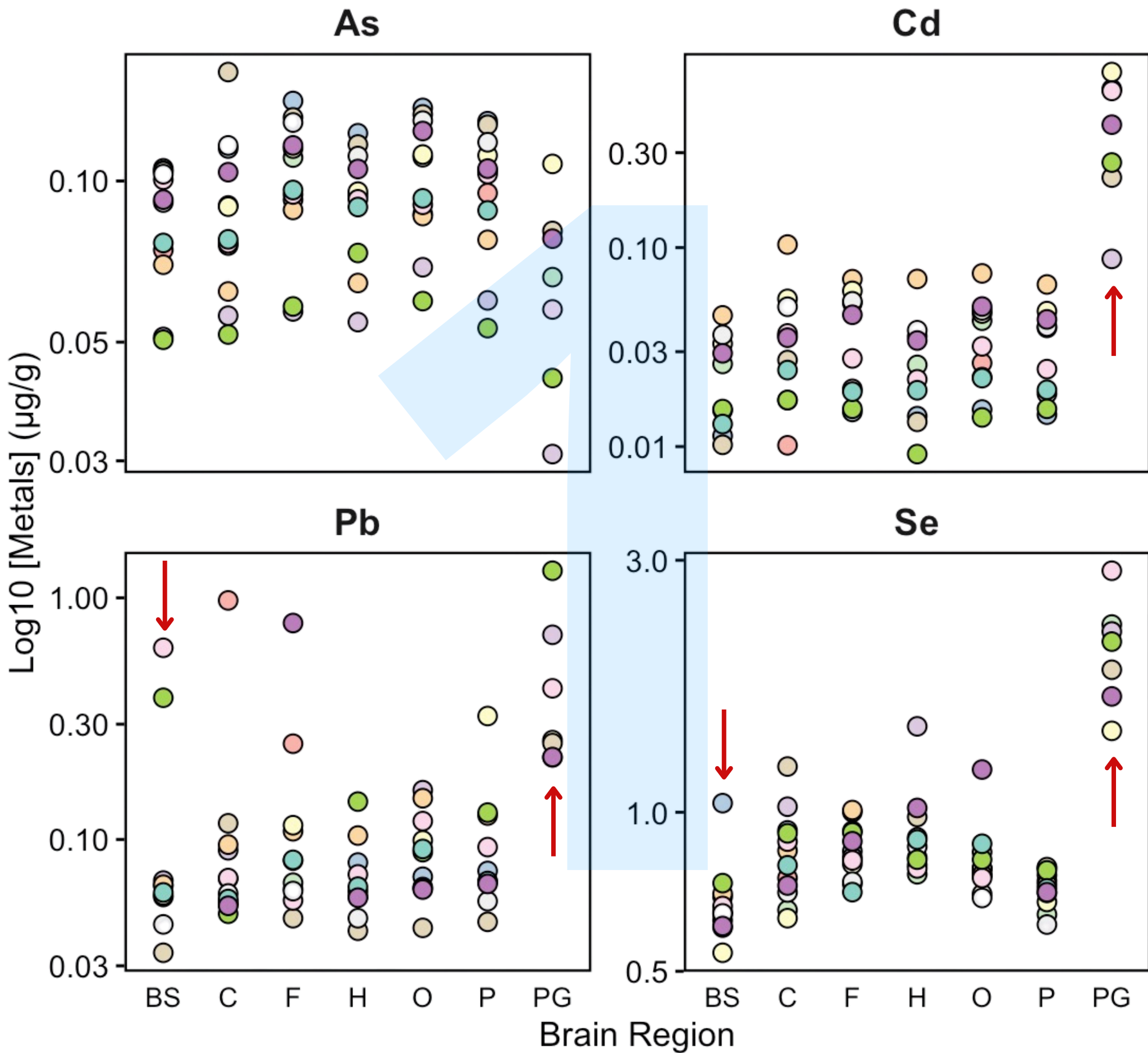
Samples: 12 polar bear brains from Nunavik, Quebec
Regions analyzed: frontal lobe (F), parietal lobe (P), occipital lobe (O), cerebellum (C), brain stem (BS), hypothalamus (H), pituitary gland (PG)
Tissue processing: triplicate per region using a 10 mm punch, then freeze-dried
THg: Direct mercury analyzer (DMA-80)
MeHg: Cold vapour atomic fluorescence spectrometry (CVAFS)
All metals and Se speciation: ICP-MS/MS
Lipids: Gravimetry | **Proteins:** %N

OBJECTIVES AND HYPOTHESES

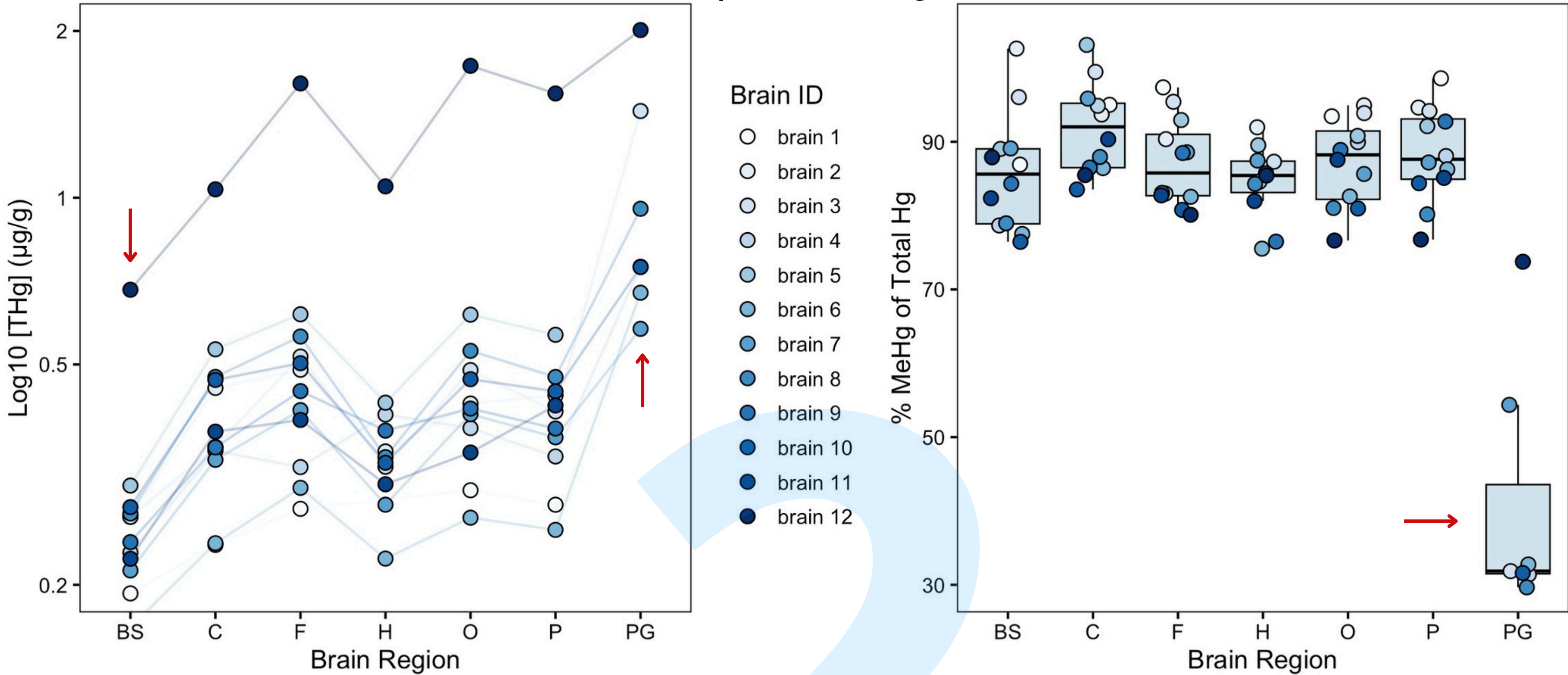
- Characterize the concentrations of **potentially toxic metals** within the seven brain regions. These metals are thought to accumulate in **region-specific patterns** related to brain function
- Evaluate the **bioaccumulation** and **speciation** of Hg and Se across seven brain regions in polar bears. Their concentrations and speciation are expected to **vary across brain regions** due to **region-specific differences in physiology, including protein content**

PRELIMINARY RESULTS

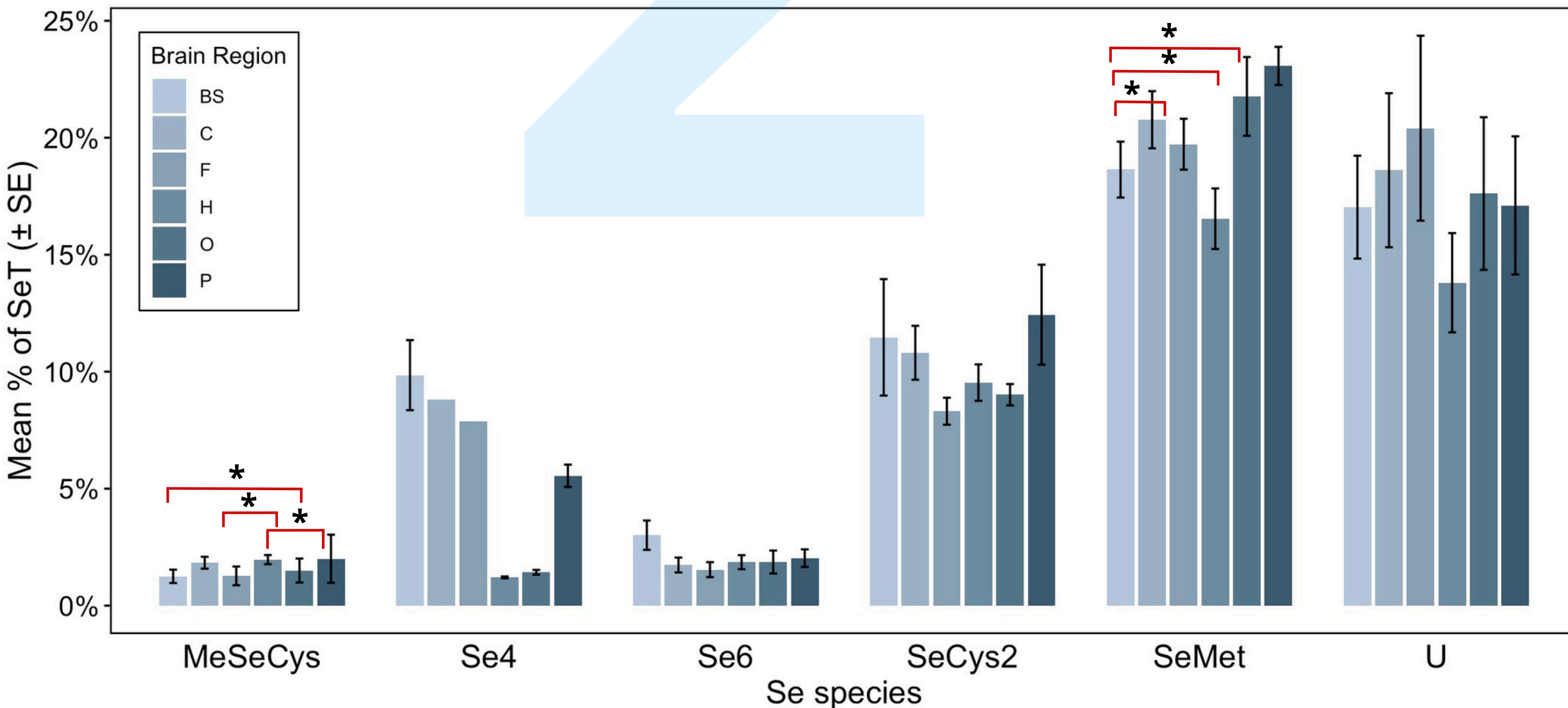
Pb, Cd and total Se concentrations are highest in the pituitary gland (PG) and lowest in the brainstem (BS) and cerebellum (C)



[THg] are highest in the PG and progressively decrease toward BS. In all regions except PG, the majority of Hg is present as MeHg







MeSeCys and SeMet are the dominant selenium species, varying regionally across the brain



Acknowledgments and Funding :



TAKE HOME AND...

-  **Cd, Pb, and Hg** accumulate unevenly across brain regions; co-occurring Se may offer **protection** against Hg toxicity
-  The **PG**, located outside the **BBB**, exhibits higher levels of inorganic Hg, suggesting **increased** vulnerability to Hg accumulation
-  **MeHg** constitutes the majority of THg in most brain regions, raising concerns due to its potent **neurotoxicity**
-  **High percentages of MeHg** across brain regions may impair neurological functions, emphasizing the need for monitoring Hg exposure in polar bears

...NEXT STEPS

Integration of **protein/lipid** data with **PFAS** profiles to assess potential co-distribution patterns with Hg