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Localization of aquaporin-2, renal morphology and urine composition in the bottlenose dolphin and the Baird's beaked whale

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Abstract This study examined the distribution pattern of aquaporin-2 (AQP2), relative medullary thickness (RMT) and urine properties in the bottlenose dolphin *Tursiops truncatus* and Baird's beaked whale *Berardius bairdii*. Immunohistochemical studies revealed that AQP2 was localized in the collecting tubules/ducts of both species' renicules, as in terrestrial mammals. The collecting ducts with AQP2 were thinner and arranged more densely in the dolphin than in the whale. RMT values in the renicule were moderate in both species, but were significantly higher in the dolphin (6.0 ± 0.9) than the whale (4.9 ± 0.7). Urine of the bottlenose dolphin is comparatively concentrated (osmolality: 1715.7 ± 279.4 mOsm kg^{-1}, Na^+: 490.1 ± 87.9 mmol l^{-1}, Cl^-: 402.7 ± 79.6 mmol l^{-1}, K^+: 80.7 ± 25.8 mmol l^{-1}, urea nitrogen: 703.5 ± 253.9 mmol l^{-1}), while urine of the dead Baird's beaked whale is less concentrated (osmolality: 837.5 ± 293.8 mOsm kg^{-1}, Na^+: 192.9 ± 81.5 mmol l^{-1}, Cl^-: 159.9 ± 71.4 mmol l^{-1}, K^+: 44.3 ± 29.5 mmol l^{-1}, urea nitrogen: 270.7 ± 120.3 mmol l^{-1}). These data suggest it is possible that the differences in these renal morphological features may be related in some way to the difference in urine composition between the species, although further studies are necessary.

Keywords Osmoregulation · Urine osmolality · Aquaporin · Kidney · Collecting duct · Dolphin · Whale

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