

## Re: [AAT] Re: The human urinary system – comparative anatomy help request

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I'm giving a couple of tutorials to 1st year human anatomy students on Thursday about the kidney and the urinary system. I'm going to go through all the usual stuff of course. It's all laid out what I'm supposed to cover and I'm not going to deviate from the lesson plan very much but I just wondered if Marc or anyone here had any recommendations for AAT-related aspects that I might mention in the context of the session.

Hi Algis, DD & all,

Our kidneys can produce rel.diluted urine, but no strongly concentrated urine: max.urine concentration: beaver 550 milliosmol/liter, pig 1100, Hs 1400, dolphin 1700 (squid–eating dolphins a bit higher), cat 3200 etc.: from mammals who live in freshwater to sea mammals to land to desert inhabitants (I have no compar.figures on other primates, but I guess the same or a bit above Hs).

Most terr.mammals have 1 papil per kidney. Among primates, only Hs have more than 1 (10–15), although spider monkeys & capuchins sometimes have 2 or 3 papils/kidney, and chimps have their unique papil subdivided into 2 or 3 "sub"papils. If this division between papils is complete, we can speak of different kidneys = "renculi" (Lat.renculus = diminutive of "ren" kidney). Surnumerary kidneys are not rare in humans, but normally the human kidney surface is smooth, unlike most sea mammals (the only exception AFAIK are the semi–marine manatees).

Hs newborns have renculi, but shortly after birth the surface becomes smooth. Renculi are found in Cetacea (250–3000/kidney!), otters (esp.sea–otters), bears (pandas & polar bears) & Pinnipedia (c.200/kidney), okapis (but not giraffes), large herbivores (no real renculi, but lobulated surface = incompletely subdivided kidneys), dugongs (manatees & elephants have lobulated kidneys) & rhinos (which??), but not hippos.

Hs, beavers & swine have incompletely divided kidneys with smooth surface.

IOW: divided kidneys:

- 0) no division (most terr.mammals & primates),
- 1) subdivided papils (Pt),
- 2) different papils/kidneys (Hs, swine),
- 3) lobulated kidney surfaces (cow),

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4) renuli (most marine mammals).

Clearly, divided kidneys & larger kidneys allow filtering of more water at the same time (in parallel). But why is this important in cows & whales, but