**Supplemental Table 3. Effects of osmotic challenges on CNSS activity**

Abbreviations: AVT, arginine vasotocin;*crh*, corticotropin-releasing hormone; FW, freshwater; *nos*, nitric oxide synthase; POA, preoptic area; PTHrP and *pthrp*, parathyroid hormone-related protein; *pth1r*, *pth2r* and *pth3r*, PTHrP receptors; STC-1 and *stc-1*, stanniocalcin; SW, seawater; UI and *uts1*, urotensin I; UII and *uts2*, urotensin II; *uts2r1*, UII receptor.

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| **Species** | **Experimental procedures** | **Observations** | **References** |
| **Freshwater teleosts** | | | |
| Oriental loach *Misgurnus anguillicaudatus* | Single intraperitoneal injection of hypertonic saline (2% NaCl solution) to intact animals  Two intraperitoneal injection (12h interval) of hypertonic saline to intact animals  5 or 6 intraperitoneal injections of hypertonic saline to intact animals  Prolonged loading of 2% NaCl solution to intact animals  Same experiments in animals with spinal cord transected just anteriorly to the urophysis (= urophysis disconnected from anterior large cells)  Intact animals: 1.25% and 1% NaCl renewed at 12h-interval for 15 days (hypertonic media) or 0.75% saline (nearly isotonic media)  Intact animals : 0.5% and 0.25% NaCl for 15 days (hypotonic media) or 0.75% saline (nearly isotonic media)  Intact animals kept in re-distilled water renewed every 12h | Increased production of secretory material in posterior small Dahlgren cells in 30 min  Increased production of secretory material also in anterior large Dahlgren cells  Neurosecretory cells depleted of secretory material, vacuolated and urophysis almost vacant  Rapid depletion of secretory material in the urophysis prior to hyperactivity in small cells  Prolonged hypertonicity led to exhaustion of small cells and evacuated urophysis  Both small and large cells at rest – urophysis accumulates secretory material in considerable measure  Suppression of both production and discharge of neurosecretory material  Moderate production of many small cells and some large cells – urophysis charged with varying amount of secretory material  More secretory material in cells and in fiber tracts compared to controls | [34] |
| Mrigal carp  *Cirrhina mrigala* | Transfer to hyperosmotic saline for 1, 2 and 4h  Transfer back to FW | Depletion of neurosecretory material in the CNSS  Reappearance of neurosecretory material in the CNSS | [86] |
| Molly *Poecilia sphenops*  (*Molliensia sphenops* in the article) | Transfer to SW (1 week) | Decreased number of neurosecretory granules in urophysis  Increased blood cell infiltration of the urophysis | [304] |
| Zebrafish *Danio rerio* | Transfer to SW (30 ppt salinity) at 2, 3, 4, 5 or 6 days post fertilization (dpf) for 15 min | Increased *uts2α* and *uts2β* mRNA levels at 6dpf | [329] |
|  | Transfer to SW (30 ppt salinity) at 2, 3, 4, 5 dpf for 15 min | 2dpf: no change in *pthrp2* mRNA levels  3dpf: decreased *pth3r* mRNA levels  4dpf: decreased *pth2r* mRNA levels  5dpf: decreased *pthrp1* mRNA levels; increased *pth1r* and *pth2r* mRNA levels | [332] |
| **Seawater teleosts** | | | |
| Longjaw mudsucker *Gillichthys mirabilis* | Transfer to FW (6 days) | Depletion of toad-bladder water permeability factor (AVT)  No alteration of trout bladder-contracting factor (UII) | [320] |
|  | Urophyses sujected to high potassum ion *in vitro* | Depolarization and release of teleost bladder-contracting factor (UII) | [319] |
|  | Transfer to FW (24h) | Increased UI and UII immunoreactivity in urophysis | [324] |
| White seabream *Diplodus sargus* | Transfer to FW for 15, 30, 45 and 90 min | Increased UI immunoreactivity in urophysis | [323] |
| Bogue *Boops boops* | Transfer to FW for different periods | Increased neurosecretory granules in urophysis | [305] |
| Sea bass *Dicentrarchus labrax* | Transfer (gradually in 15 days= 2 days at each intermediate salinities 11-7-3 ‰) to FW for 24h | Decreased size of posterior Dahlgren cells  No change in UI and UII immunoreactivities in urophysis (large individual variability) | [300] |
| Mummichog *Fundulus heteroclitus* | Chronic acclimation to FW (30 days)  Acute acclimation to FW (24h)  Acute acclimation to SW (24h) | Reduced *uts2r1* mRNA levels in gills  No change in *uts2r1* mRNA levels in gills  Increased *uts2r1* mRNA levels in gills | [137] |
| **Amphihaline teleots** | | | |
| Brook trout *Salvelinus fontinalis* | FW to deionized water for 3 days  FW to deionized water for 7 or 10 days  FW then progressive adaptation to SW (day 1 25% SW - day 2 50% SW - day 3 75% SW - day 4 and afterwards 100% SW) for 24h  FW then progressive adaptation to SW (day 1 25% SW - day 2 50% SW - day 3 75% SW - day 4 and afterwards 100% SW) for 3, 7, and 10 days  FW to deionized water for 3 days  FW to SW for 1 or 7 days | Larger neurosecretory cells  Increased activity  No longer hyperactivity – size similar to FW fish – poor in secretory granules  Some cells similar to control FW cells and other show signs of enhanced secretion production (enlarged cell size, indented nucleus occupied by more abundant euchromatin and several nucleoli, developed rough endoplasmic reticulum, active Golgi complex, primary lysosomes)  No sign of stimulation of secretion (similar to control FW cells)  More monoaminergic fibers in the CNSS  Less monoaminergic fibers in the CNSS | [298]  [331] |
| European flounder *Platichthys flesus* | Transfer from SW to FW for 1, 2, 4 or 8 days  Transfer from FW to SW for 1, 2, 4 or 8 days | Decreased urophysial UII content after 1 day  Increased urophysial UI and UII content at day 1  Increased urophysial UI content at day 2 | [301] |
| Transfer from SW to FW for 1, 4, 8h or 1, 3, 6 days | Decreased plasma AVT at 8h, 1, 3 and 6 days  Decreased plasma UII at 1 and 3 days  Increased urophysial UII content at 1 and 4h, and 3 days | [327] |
| Transfer from FW to SW for 4, 8 or 24h | Increased plasma AVT at 8 and 24h | [201] |
| Transfer from SW to FW for 8 or 24h  Transfer from FW to SW for 8 or 24h | 8h: increased *uts2* mRNA levels in CNSS; decreased plasma UII; decreased *uts2r1* mRNA levels in kidney  24h: increased *uts2* mRNA levels in CNSS; increased urophysial UII content; decreased *uts2r1* mRNA in kidney and gill  8h: decreased *uts2* mRNA levels in CNSS  24h: increased *uts2r1* mRNA levels in kidney | [135] |
| Transfer from SW to FW for 8 or 24h  Transfer from FW to SW for 8 or 24h | 8h: increased CNSS *uts1* mRNA levels  24h: no change in CNSS *uts1* mRNA levels and urophysial UI content  8h and 24h: no change in CNSS *uts1* mRNA levels and urophysial UI content | [326] |
| Transfer from SW to FW for 8 or 24h  Transfer from FW to SW for 8 or 24h | 8h and 24h: no change in CNSS *nos* mRNA levels  8h: increased CNSS *nos* mRNA levels  24h: no change in CNSS *nos* mRNA levels | [65] |
| Rainbow trout *Oncorhynchus mykiss* | Transfer from FW to SW for 2, 10 or 48h  Transfer from FW to SW for 6, 24, 72h or 7 days | 2h: increased urophyseal UII immunoreactivity; decreased urophyseal UI immunoreactivity  10h: decreased urophyseal UI and UII immunoreactivity  48h: no change in urophyseal UI and UII immunoreactivity  24h: increased CNSS *uts1* mRNA levels  72h and 7 days: increased CNSS *uts1* and *crh* mRNA levels | [325]  [72] |