GP 155

Plasma Apelin concentrations in Patients with Polyuria-Polydipsia Syndrome

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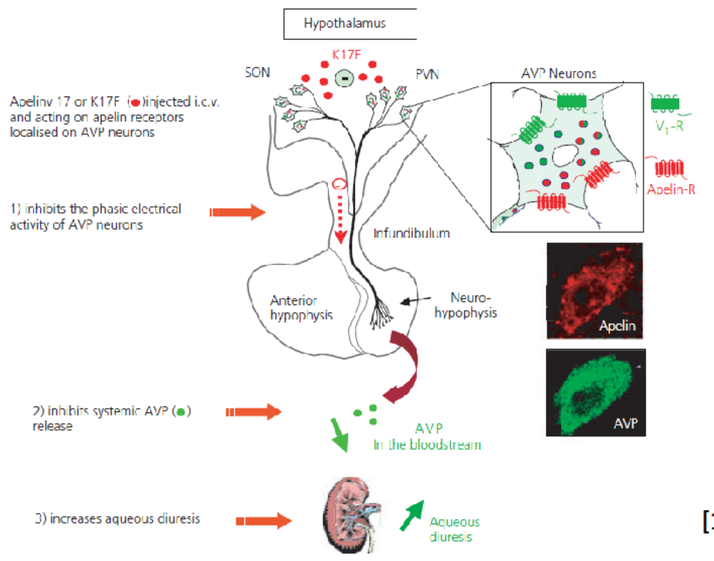
Background & Aim

Background:

Apelin and arginine-vasopressin (AVP) are antagonists in the regulation of body fluid and osmotic homeostasis and act oppositely in healthy volunteers.
In patients with SIADH apelin levels were inadequately low in comparison to high AVP levels.

[1, 2]



Aim:

To investigate plasma apelin levels and their relation to AVP/copeptin (surrogate marker for AVP) in patients with polyuria-polydipsia syndrome.

[1]

Methods

Plasma apelin and copeptin concentrations were measured in 41 patients with polyuria-polydipsia syndrome (15 central diabetes insipidus (cDI), 7 nephrogenic DI (nDI), 19 primary polydipsia (PP)) and were compared to those in 113 healthy volunteers.

Results

Table 1: Baseline Characteristics

	Healthy volunteers (n=113)	Complete central DI (n=15)	Primary Polydipsia (n=19)	Complete nephrogenic DI (n=7)	p-value
Age	47 (35; 61)	50 (42; 58)	45 (30; 50)	61 (55; 65)	0.12
BMI (kg/m²)	24 (22; 26)	25 (23; 29)	26 (20; 29)	26 (25; 28)	0.10
Sex, female	58 (51%)	9 (60%)	13 (68.4%)	5 (71.4%)	0.43
History of a brain tumor	n.a.	6 (40%)	1 (5%)	0 (0%)	0.02
History of trans-sphenoidal surgery	n.a.	7 (46.7%)	1 (5%)	0 (0%)	0.02
Blood pressure systolic (mmHg)	124 (116; 134)	121 (115; 137)	124 (110; 131)	137 (117; 140)	0.53
Heart rate (bpm)	66 (59; 74)	70 (67; 77)	76 (63; 81)	83 (79; 85)	0.0005
Clinical volume status: Hypo-/eu-/hypervolaemic (euvolaemic %)	n.a.	3/12/0 (80%)	2/14/0 (87.5%)	3/1/0 (25%)	0.039
Hemoglobin (g/l)	n.a.	140 (130; 148)	136 (134; 143)	128 (115; 138)	0.31
Hematocrit (l/l)	0.41 (0.39; 0.43)	0.39 (0.38; 0.44)	0.40 (0.38; 0.43)	0.37 (0.34; 0.4)	0.13
Creatinine (umol/l)	76 (65; 84)	75 (63; 85)	69 (62; 74)	146 (125; 266)	<0.0001
Albumine (g/l)	n.a.	39 (34; 40)	37 (36; 42)	37 (32; 39)	0.16
Plasma sodium (mmol/l)	140 (139; 141)	142 (142; 144)	141 (140; 142)	143 (142; 146)	<0.001
Plasma osmolality (mOsmol/kg H_2O)	288 (285; 291)	297 (292; 307)	294 (290; 301)	306 (303; 312)	<0.001
Diuretics	0 (0%)	1 (6.7%)	0 (0%)	0 (0%)	0.54
Lithium	0 (0%)	0 (0%)	1 (5.3%)	5 (71.4%)	<0.001
Antiepileptics	0 (0%)	1 (6.7%)	2 (10.5%)	2 (28.6%)	0.29
Corticosteroids	0 (0%)	6 (40%)	2 (10.5%)	0 (0%)	0.06
Desmopressin	0 (0%)	9 (60%)	0 (0%)	0 (0%)	<0.001
Birth control pill (% of females)	0 (0%)	2 (22%)	3 (23%)	0 (0%)	<0.001

Table 2: Plasma apelin and copeptin levels

	Healthy volunteers (n= 113)	Complete central DI (n=15)	Primary polydipsia (n=19)	Complete nephrogenic DI (n=7)	p-value
Plasma copeptin (pmol/l)	4.1 (2.6; 6.9)	1.9 (1.9; 2.5)	3.9 (2.2; 4.7)	56.7 (39.7; 70)	<0.001
Plasma apelin (pmol/l)	254 (225; 311)	209 (174; 241)	190 (172; 215)	413 (332; 504)	<0.001
Plasma apelin/copeptin (pmol/pmol)	57 (37; 102)	89 (73; 135)	53 (38; 92)	7 (6; 10)	<0.001

Figure 1: Plasma apelin concentrations

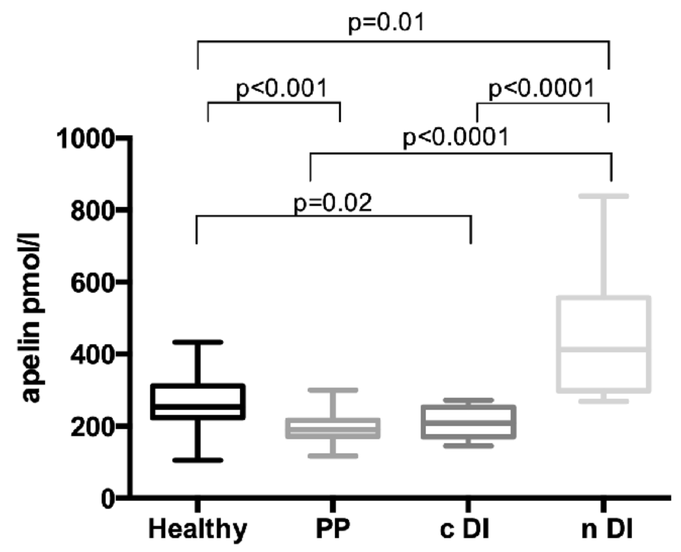
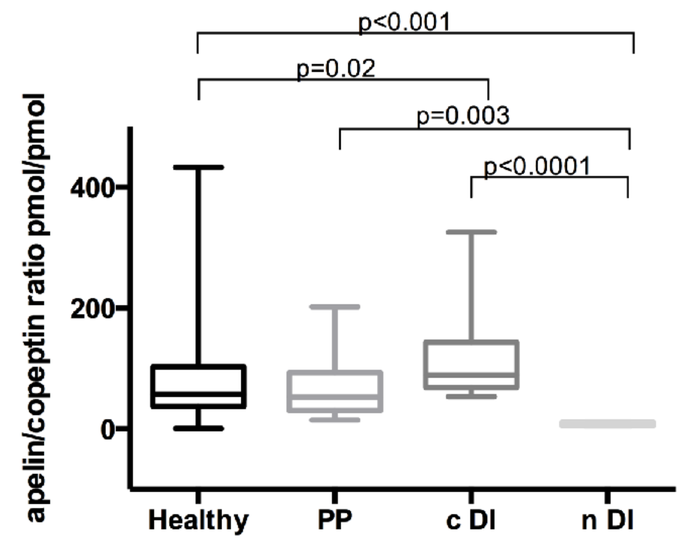


Figure 2: Plasma apelin to copeptin ratios



Summary & Conclusion

- In **primary polydipsia**, **normal plasma apelin to copeptin ratio** attests a normal water homeostasis.
- In contrast, in patients with **central or nephrogenic DI** the **increased or decreased apelin to copeptin ratio**, respectively, reflects a disturbed osmotic and body fluid homeostasis.

References

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(2) Blanchard, A. et. al., *An abnormal apelin/vasopressin balance may contribute to water retention in patients with the syndrome of inappropriate antidiuretic hormone (SIADH) and heart failure. JCEM. 2013;98:2084-2089.*