

# The Role of Urine AVP in the Diagnostic Pathway of Polyuria and Polydipsia Syndrome

C. Giacomozzi<sup>1</sup>, G. Lucchini<sup>2</sup>, M.T. Benatti<sup>3</sup>, S. Fasoli<sup>1</sup>

<sup>1</sup>Paediatric Endocrinology, Paediatric Unit, Carlo Poma Hospital - ASST- Mantova

<sup>2</sup>Biostatistics Service, Carlo Poma Hospital - ASST-Mantova

<sup>3</sup>Immunoassay Service, Laboratory Unit, Carlo Poma Hospital - ASST-Mantova

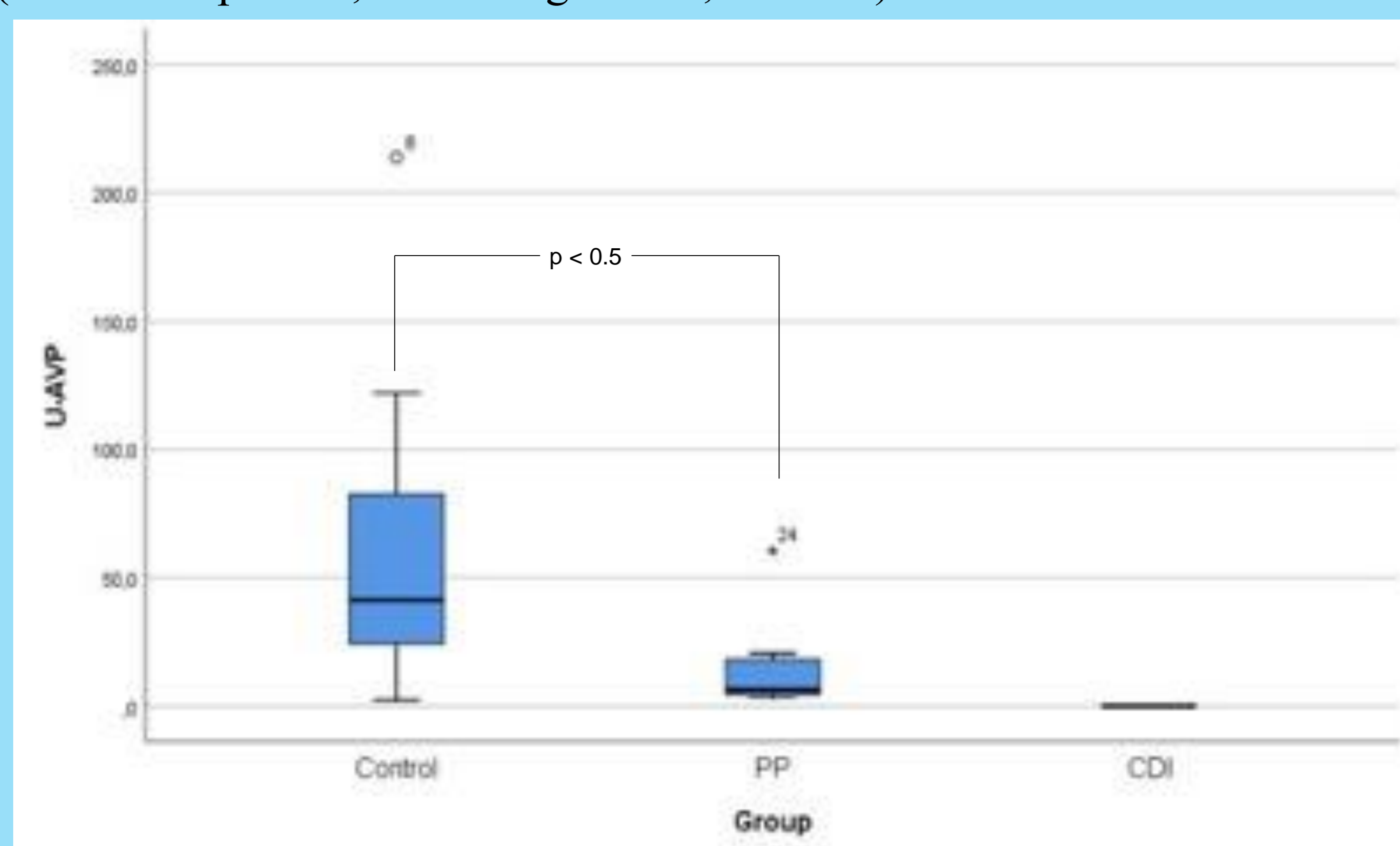
Topic: Pituitary; Abstract serial number: 1254; Poster Code: P3-277

## INTRODUCTION AND OBJECTIVES

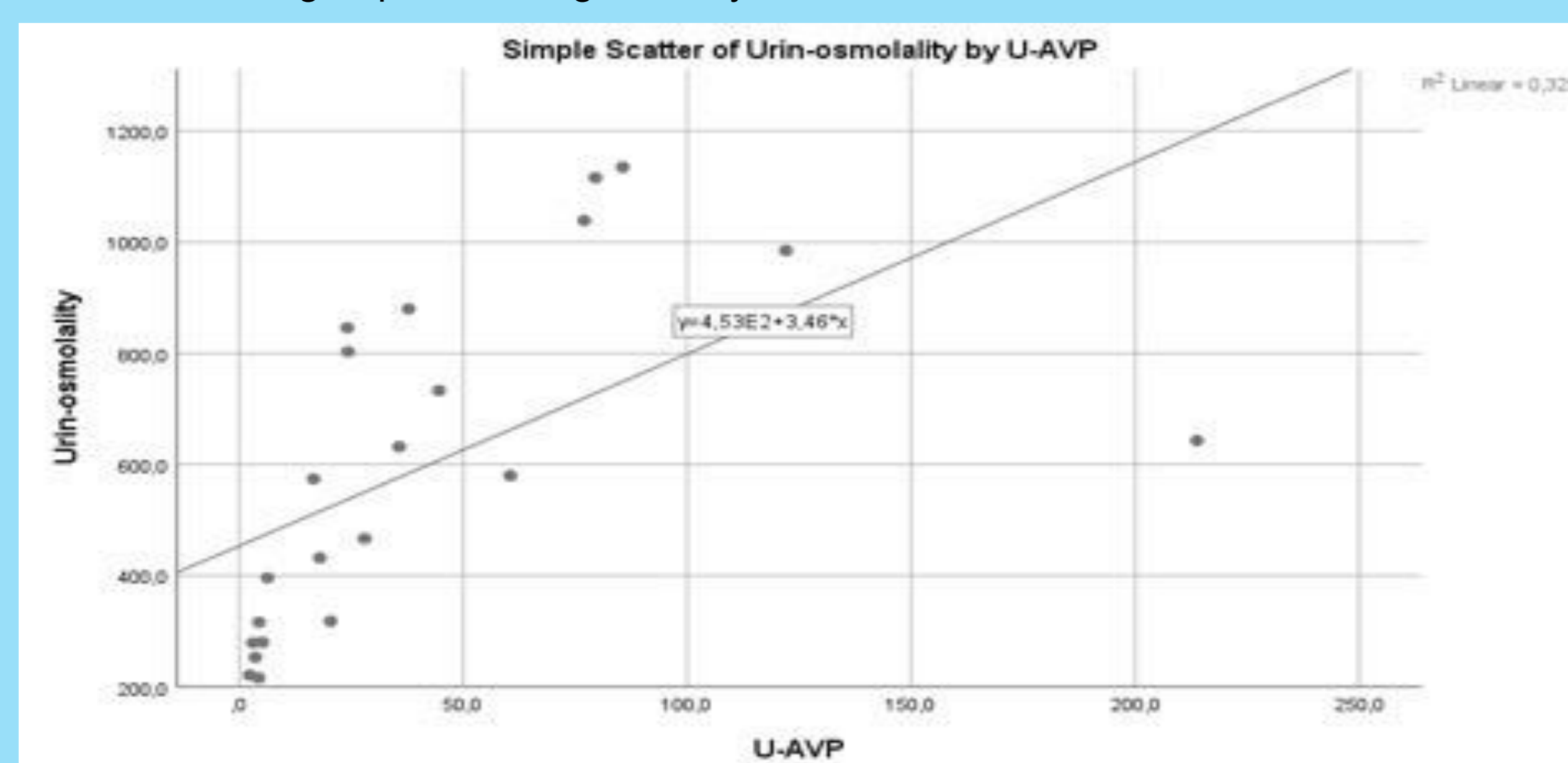
Polyuria and polydipsia syndrome (PPS) workup is not straightforward, especially in children. Basal investigations are often not reliable in distinguishing among diabetes insipidus (DI), central (CDI) or nephrogenic (NDI), and primary polydipsia (PP). Water deprivation test (WDT) is often essential, although uncomfortable and not always reliable enough to recognize partial DI. Hypertonic saline stimulation and copeptin measurement are not widely available. Plasma AVP investigation is not routinely used in the diagnostic pathway as AVP measurement is technically difficult for the hormone instability and the high in vitro thermolability. Urine AVP (U-AVP) assessment, on the contrary, is not biased by the same complications and was firstly proposed in early 2000s, but not further developed later on. We investigated U-AVP in a small group of patients with PPS and in a control group.

## METHODS

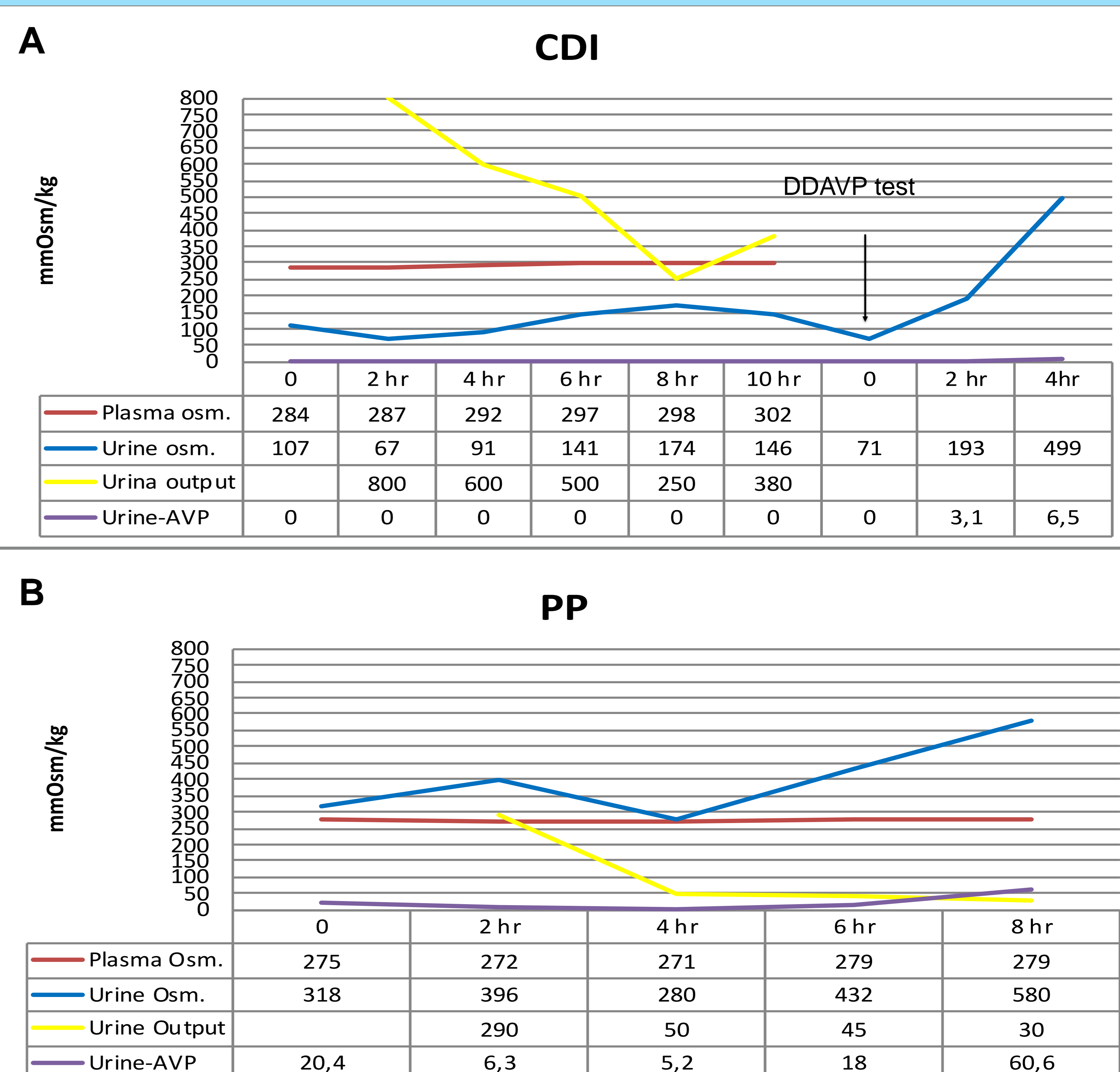
We retrospectively assessed AVP in urine samples of patients presenting with PPS (2M,3F), after more common causes of polyuria were excluded. Urine samples were collected as basal and during WDT, along with plasma and urine osmolality (PO-UO). Patients were diagnosed with CDI (1M,1F) and PP (1M,2F) on the basis of PO and UO values during WDT, according to standard reference ranges. DDAVP test was performed to discriminate NDI from CDI. Furthermore, we collected blood and urine samples for PO, UO and U-AVP in a control group (5M,8F) including 8 isolated idiopathic GHD, 3 familial short stature, 1 central hypothyroidism and 1 idiopathic central precocious puberty. None of controls had history of PPS and all of them had normal neurohypophyseal bright spot at MRI. Mean age was 13.6 yr, 2.2 yr and 10.7 yr for CDI, PP and controls, respectively. Among the 38 urine samples overall collected and analyzed for U-AVP, 18 were basals and 20 from WDT. Controls did not undergo to WDT. SPSS program was used for statistical analysis. Commercial RIA kit was used for U-AVP analysis (Euria-Vasopressin, Euro Diagnostica, Sweden).



**Fig.1:** Basal U-AVP resulted significantly lower in PP than controls. Furthermore, U-AVP was undetectable in CDI group but not significantly different from PP.



**Fig.2:** Pearson Correlation Test: Urine osmolality and Urine-AVP resulted directly correlated both in controls and PP group (total samples n° 22), p<0.01, r<sup>2</sup>=0.32.



**Fig.3:** Water Deprivation Test results in two patients with: A) Central Diabetes Insipidus and B) Primary Polydipsia. A) Patient with CDI shows plasma osmolality over 300 mOsm/kg after 10 hours and undetectable Urine-AVP at any time. Urine-AVP starts to be detectable after DDAVP test. B) On the contrary, patient with PP shows: measurable level of Urine-AVP since the basal time; decrease due to drinking during test and significant increase later on when carefully monitored by nurses. Urine output is shown in ml. Urine AVP is shown in pmol/l.

## RESULTS

U-AVP was measurable in all urine samples collected in control and PP groups (basals and WDT samples). Mean U-AVP was significantly higher in controls than PP patients, 59.9 vs 15.3 pmol/l respectively (p<0.5). U-AVP was undetectable on basal urine samples of CDI patients (figure 1). U-AVP was directly correlated to urine osmolality both in controls and PP subjects (p<0.01, R<sup>2</sup>=0.32) (figure 2). U-AVP increased and decreased during WDT in PP patients, according to water intake or deprivation time (figure 3B). Conversely, CDI patients did not show significant U-AVP increase to prevent PO over 300 mmOsm/kg. U-AVP increased in CDI patients during DDAVP test (figure 3A).

## CONCLUSIONS

We demonstrate that AVP can be directly, easily and painless assessed in urine. Normal basal U-AVP can rule out DI preventing further invasive investigations. U-AVP seems helpful in distinguishing CDI from PP during WDT, and makes DDAVP test needless since. Elevated basal U-AVP, associated to low urine osmolality, might be diagnostic for NDI. U-AVP may play also a role in the assessment of adherence to treatment in CDI patients. Undoubtedly, larger cohorts are needed to validate the few data presented. Anyway, U-AVP analysis might be a new tool in the diagnostic pathway of the PPS and to co-adjuvate clinical decisions.

## REFERENCES

- Christ-Crain M, Bichet DG, Fenske WK, Goldman MB, Rittig S, Verbalis JG, Verkman AS. Diabetes insipidus. *Nat Rev Dis Primers*. 2019 Aug 8;5(1):54.
- El-Farhan N, Hampton D, Penney M. Measurements of Arginine Vasopressin. *Hormone assays in biological fluids: second edition, Methods in Molecular Biology*, vol 1065, Chapter 8. Springer Science Business Media New York 2013.
- Diederich S, Eckmanns T, Exner P, Al-Saadi N, Bähr V, Oelkers W. Differential diagnosis of polyuric/polydipsic syndromes with the aid of urinary vasopressin measurement in adults. *Clin Endocrinol (Oxf)*. 2001 May;54(5):665-71. Erratum in: *Clin Endocrinol (Oxf)* 2001 Oct;55(4):563.
- Dunger DB, Seckl JR, Grant DB, Yeoman L, Lightman SL. A short water deprivation test incorporating urinary arginine vasopressin estimations for the investigation of posterior pituitary function in children. *Acta Endocrinol (Copenh)* 1988 Jan;117(1):13-8.

