

Polycystic Ovarian Syndrome and Obstructive Sleep Apnea: A Dynamic Duo for Cardiorenal Risk?

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Polycystic ovarian syndrome

- Most common endocrine disorder among reproductive age women
- Defined by high androgens, irregular infrequent periods, and polycystic ovaries.¹
- High testosterone contributes to insulin resistance.²

Obstructive Sleep Apnea

- A sleep breathing disorder that results in the cessation of breathing during sleep.
- Affects 2-5% of women worldwide.³
- Rates of OSA are 5-30 times higher in woman with PCOS than in the general population.⁴

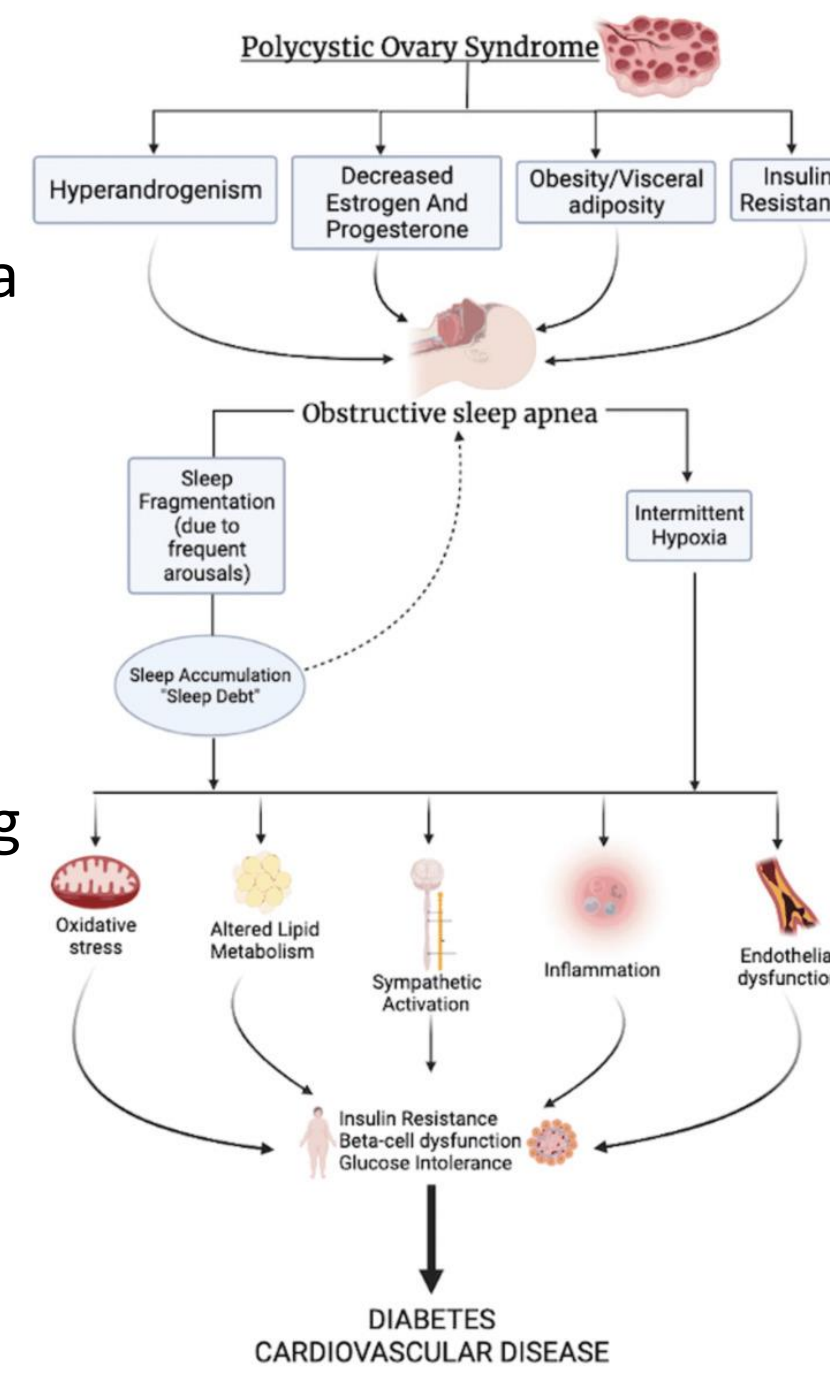


Figure 1.⁵

Cardiovascular Risk Factors

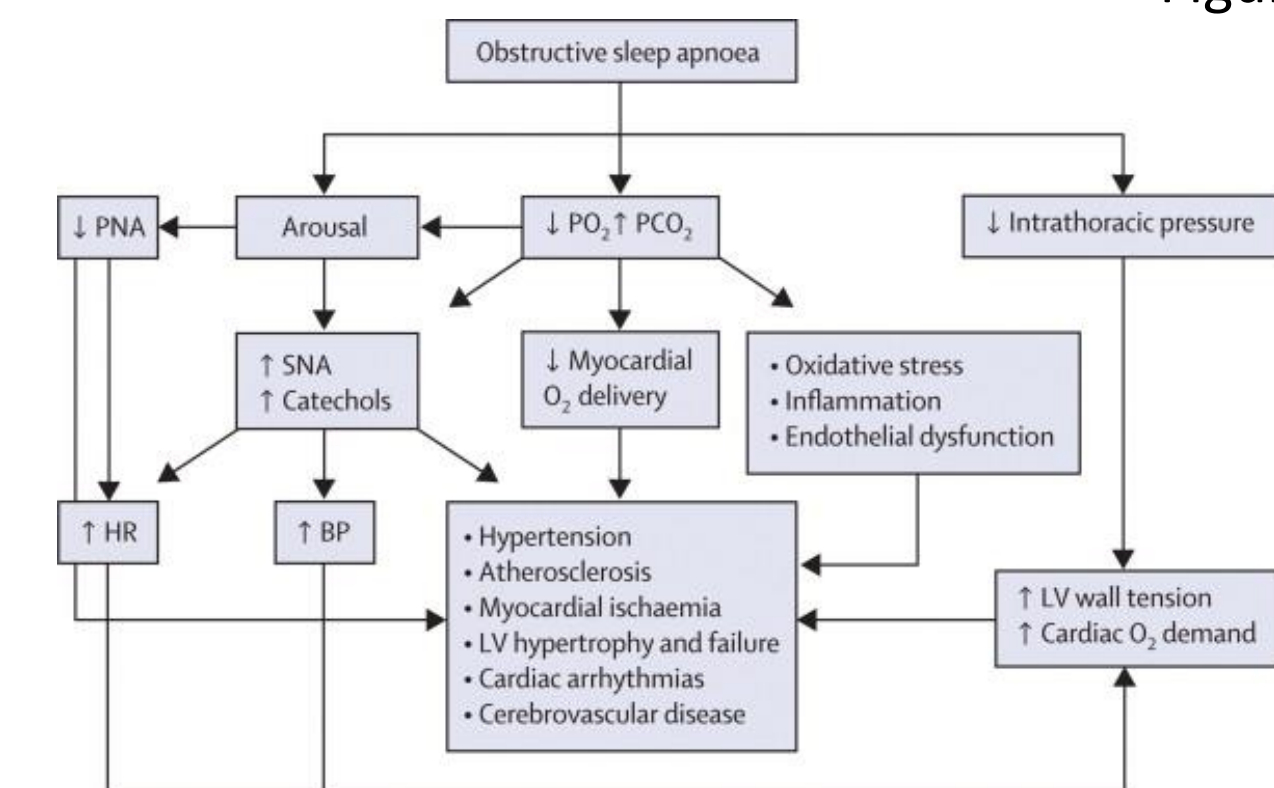


Figure 2.⁶

Renal Risk factors of OSA

- Hypoxia contributes to reactive oxygen species damaging structural units of the kidney
- OSA patients have higher levels of proteinuria, RAS activation, and endothelial cell dysfunction
- Hypertension is a leading cause of chronic kidney disease⁷

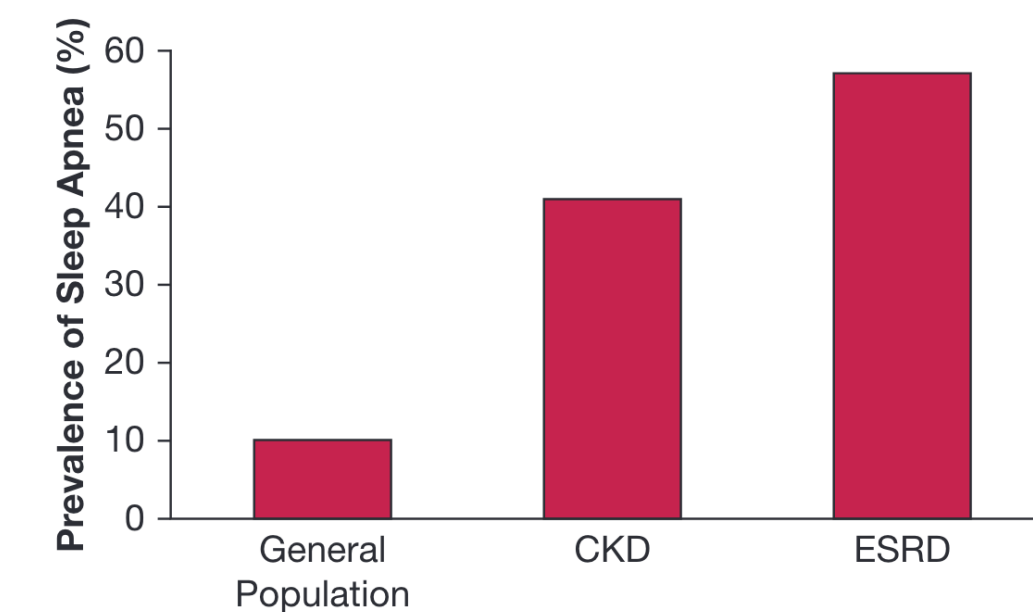


Figure 3. Prevalence of Chronic Kidney Disease (CKD) and End State Renal Disease (ESRD) in OSA patients compared to the general public.⁷

Hypothesis

Given that OSA is independently associated with the development of hypertension, glomerular dysfunction, and proteinuria, we hypothesize that OSA in women with PCOS contributes to or exacerbates the development of renal damage, hypertension, and the progression of CKD

A review of the literature was performed using the National Library of Medicine and Clinical Key. Articles published between January 1998 and July 2023 were selected for review. Randomized controlled trials, observational studies, reviews, and systematic reviews were all included. Search terms include 'polycystic ovarian syndrome', 'obstructive sleep apnea', 'chronic kidney disease', 'cardiovascular risk', and 'hypertension'. Based on presenter discretion articles were chosen and in total 60 articles were reviewed and chosen for inclusion, all articles that were chosen were full text articles.

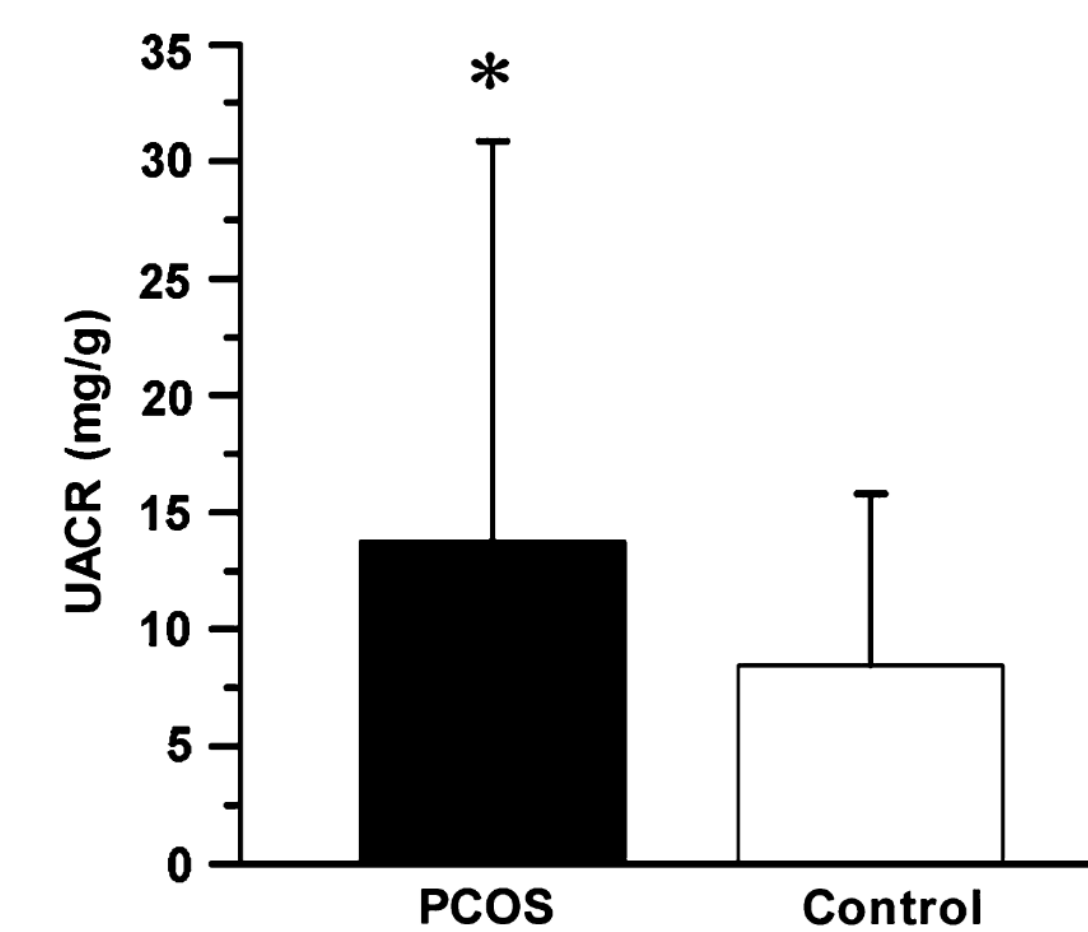


Figure 4. Urinary Albumin to Creatinine in PCOS patients vs. Controls⁸

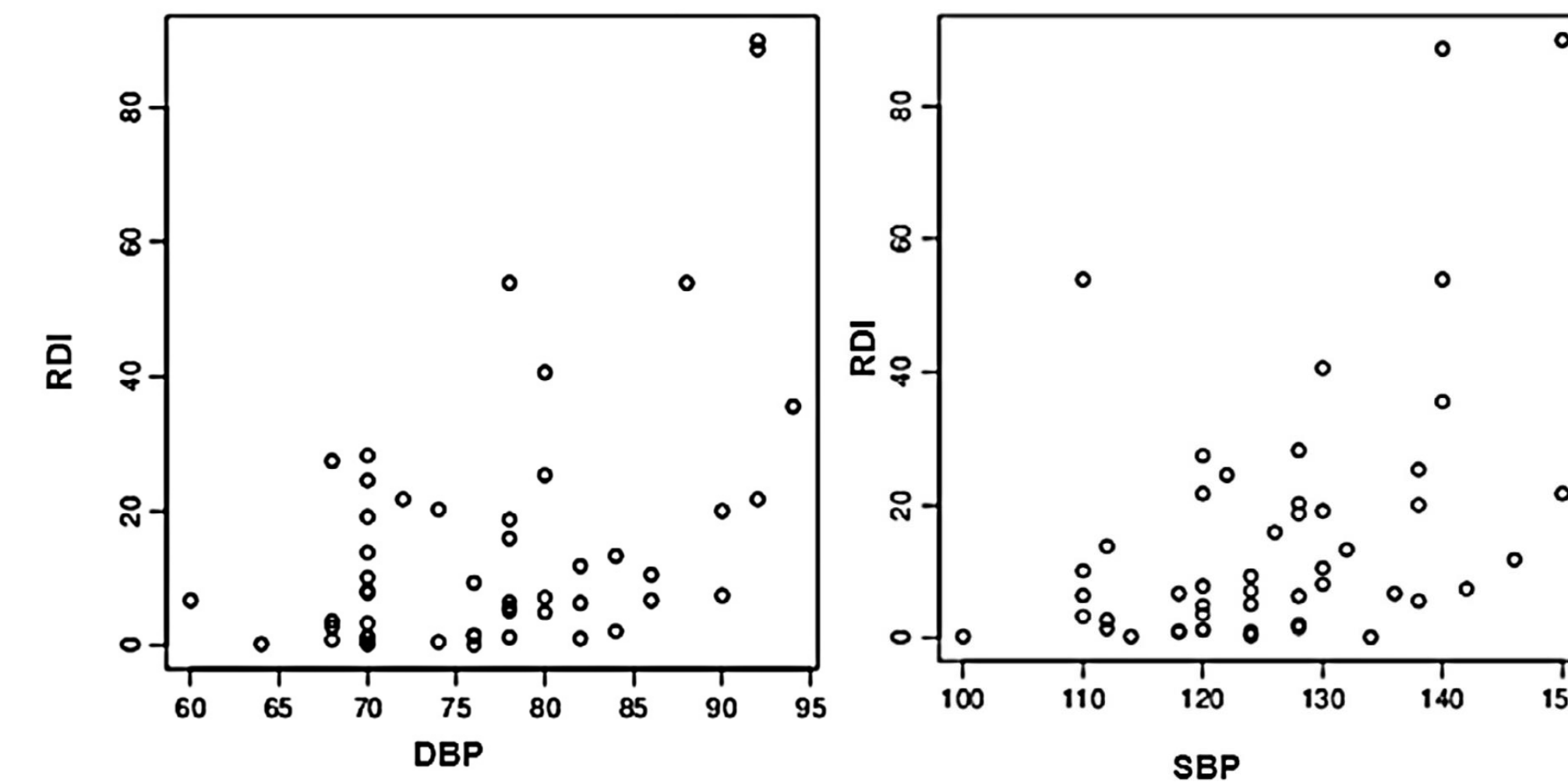


Figure 5 and 6. between respiratory distress index diastolic blood pressure (DBP) and systolic blood pressure (SBP) and the correlation⁹

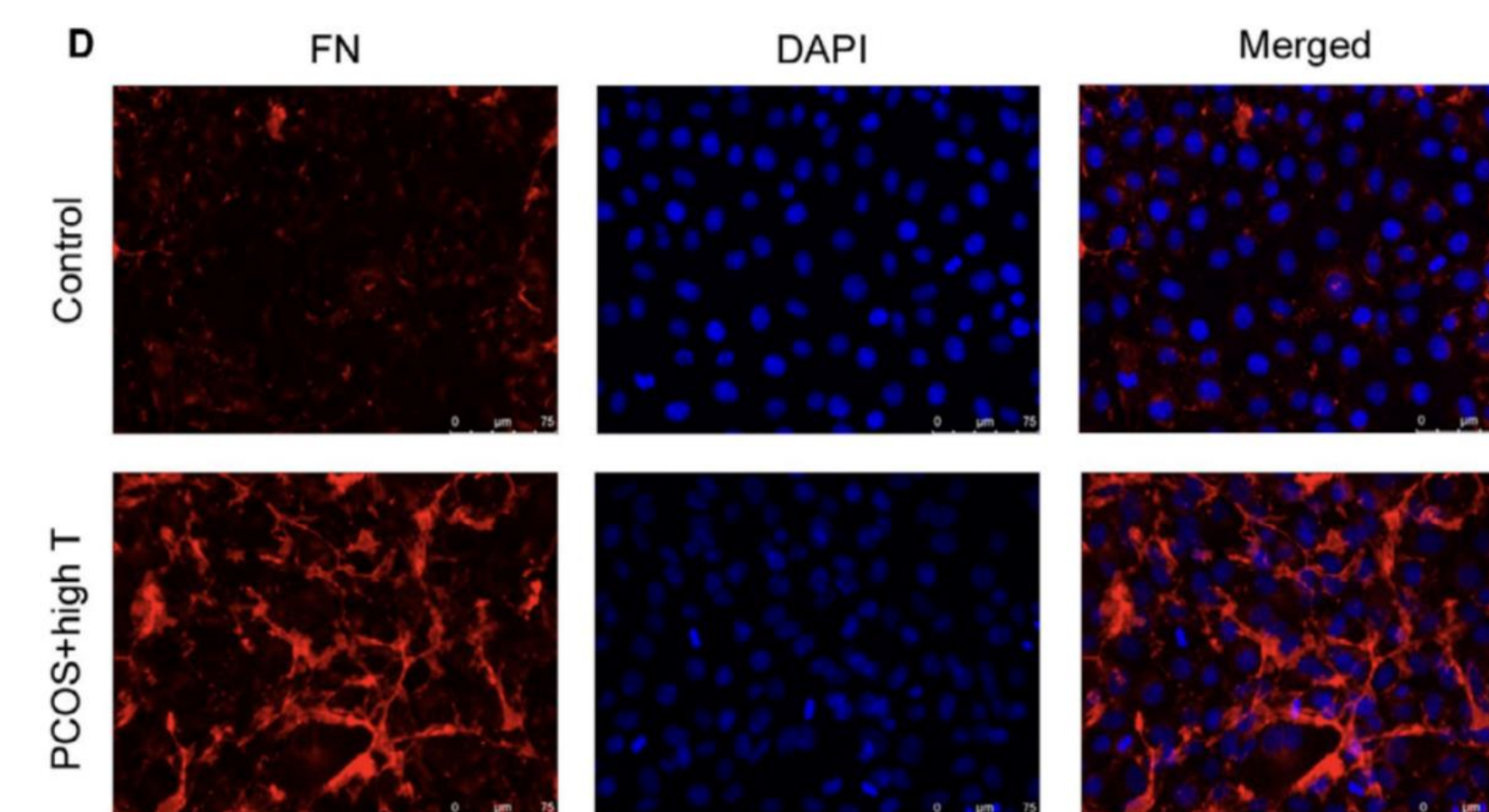


Figure 7. Human-derived renal proximal tube cells treated with follicular fluid from PCOS patients with high testosterone⁸

	PCOS (n=140)	Control (n=60)	P values
Total-C (mg/dL)	166.7 ± 37.3	156.5 ± 23	0.46
LDL-C (mg/dL)	94.2 ± 30	87.3 ± 24.2	0.3
TG (mg/dL)	93.9 ± 52.6	78.8 ± 48.5	0.08
HDL-C (mg/dL)	54.2 ± 17.5	52.6 ± 14.6	0.26
UAE (mg/ml)	13 ± 6.1	7 ± 3	0.021
Uric acid (mg/dL)	4.36 ± 1.3	3.2 ± 0.7	0.002
CRP (mg/L)	4.4 ± 3.4	2.12 ± 1.5	0.01

Figure 8. Biochemical parameters of PCOS patients Total-C; Total cholesterol, LDL-C; Low-density cholesterol, TG; Triglycerides, HDL-C; High-density cholesterol, UAE; Urinary albumin excretion, CRP; C-reactive protein¹⁰

- Microalbuminuria was found in approximately 25% of PCOS patients, compared to 7.2% of the general population.
- Hyperinsulinemia is associated with increased mesangial cell hyperplasia, glomerular filtration rate, and vascular permeability.¹¹
- In patients with PCOS who have obstructive sleep apnea, systolic and diastolic blood pressure are significantly higher than patients with PCOS who do not have sleep-disordered breathing.⁹

- Hypertension is exacerbated in patients with PCOS and OSA or other forms of sleep disordered breathing.
- OSA is prevalent in patients with PCOS, resulting in increased risk of CKD and possible progression to ESRD.
- There is a lack of evidence connecting patients with PCOS and OSA to adverse renal outcomes
- More research is needed on the intersection between PCOS and OSA and its cardiorenal impact.

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