



# MPBS1-01: THE INFLUENCE OF RENAL CANCER ON THE URINARY MICROBIOME: A PILOT STUDY



Rohit Bhatt, Andrew Brevik, Kalon Morgan, Andrei D. Cumpnas, Sohrab N. Ali, Akhil Peta, Lillian Xie, Rajiv Karani, Pengbo Jiang, Roshan M. Patel, Ralph V. Clayman, Jaime Landman

Department of Urology, University of California, Irvine, Orange, CA, USA

## INTRODUCTION

The purpose of this study was to examine the differences in the urinary microbiome between patients with simple or low-risk (Bosniak I, II, IIF) renal cyst(s) and individuals with newly diagnosed, clear cell renal cell carcinoma (ccRCC).

## METHODS

- 20 patients with renal cysts and 20 patients with ccRCC were prospectively evaluated.
- 9 patients with renal cysts had 2 mid-stream urine samples collected, one at the first clinic visit and the second at a median of 159 days later (range: 84-595 days).
- 9 patients with ccRCC had 2 mid-stream urine samples collected, one pre-operatively and the second post-operatively, at a median of 102 days later (range: 44-401 days).
- 16S rRNA sequencing of the urine samples yielded a number of amplicon sequence variants (ASVs) which was used to identify bacterial species and microbial richness.

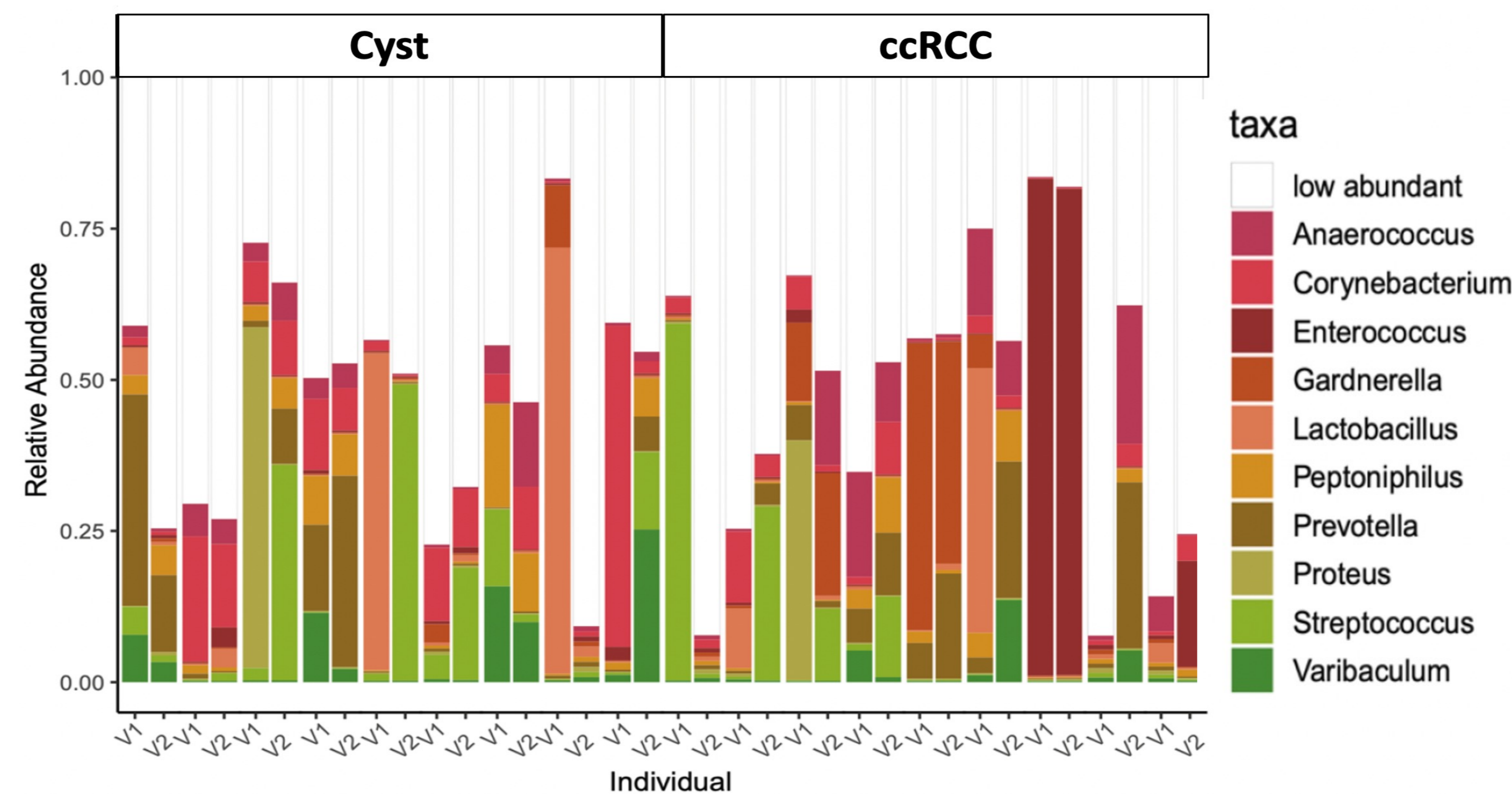
## RESULTS

- Patients with renal cysts were older and more often female when compared to those with ccRCC ( $p < 0.01$ ) (Table 1).
- The mean number of ASVs, or bacterial richness, was found to be significantly decreased in the ccRCC group when compared to those with renal cysts ( $p < 0.01$ ) (Table 1).
- There was no difference in bacterial species distribution between the 2 groups, as determined by the Pielou evenness and Shannon diversity indices (Table 1).

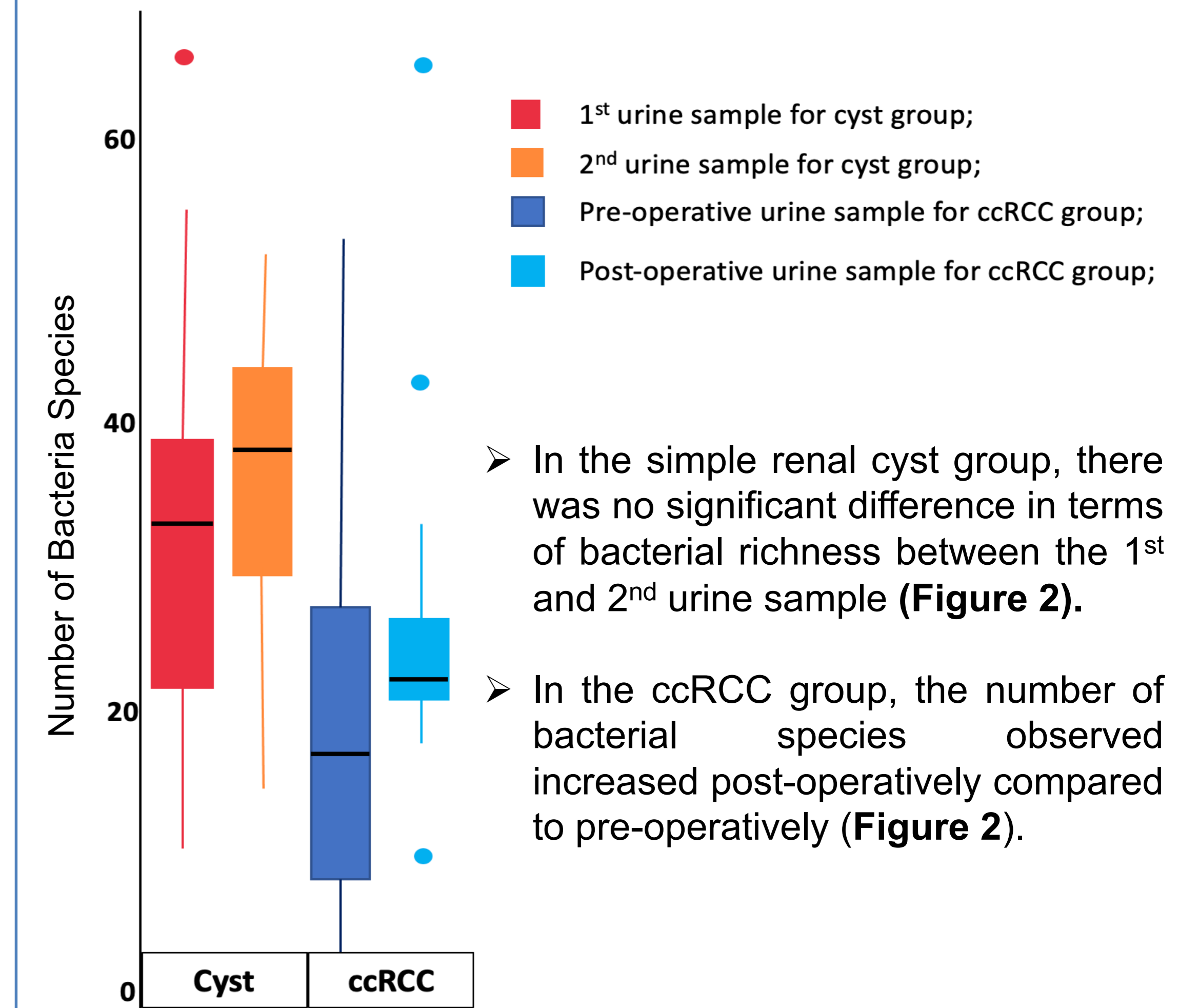
	Cyst Group n=26	ccRCC Group n=27	p-value
Age (years), mean $\pm$ SD	65.4 $\pm$ 8.3	52.6 $\pm$ 11.5	< 0.01
Sex, no. (%) Male	11 (42)	25 (93)	< 0.01*
Richness (ASVs), mean $\pm$ SD	33.5 $\pm$ 14.8	22.6 $\pm$ 14.5	< 0.01
Shannon diversity index, mean $\pm$ SD	1.88 $\pm$ 0.81	1.59 $\pm$ 0.87	0.21
Pielou evenness, mean $\pm$ SD	0.54 $\pm$ 0.18	0.52 $\pm$ 0.19	0.83

**Table 1.** Overview of distributions of age, sex, and alpha diversity metrics by disease state. (\*p-value calculated with chi-squared test; all other p-values were calculated using t-test)

- *Gardnerella* and *Enterococcus* were found to have a relative abundance > 2% in the ccRCC group.
- In the simple renal cyst group, there was increased abundance of *Proteus*, *Streptococcus*, and *Varibaculum* (Figure 1).



**Figure 1.** Relative abundance of the ten most abundant taxa in patients with two urine samples (V1-1<sup>st</sup> urine sample; V2-2<sup>nd</sup> urine sample)



**Figure 2.** Number of bacterial species stratified by group and visit

- In the simple renal cyst group, there was no significant difference in terms of bacterial richness between the 1<sup>st</sup> and 2<sup>nd</sup> urine sample (Figure 2).
- In the ccRCC group, the number of bacterial species observed increased post-operatively compared to pre-operatively (Figure 2).

## CONCLUSIONS

- A decreased microbial richness (ASVs) was observed in the ccRCC group.
- Bacterial richness (ASVs) increased post-operatively in the ccRCC group, but it did not equal that of renal cysts.
- *Gardnerella* and *Enterococcus* were found to have a relative abundance > 2% in the ccRCC group.