

# Alterations in resting-state functional connectivity in patients with congenital adrenal hyperplasia

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## INTRODUCTION

Patients with CAH are treated with life-long glucocorticoid replacement therapy. Negative effects on cognition, brain structure and function during working memory tasks have been identified (1,2).

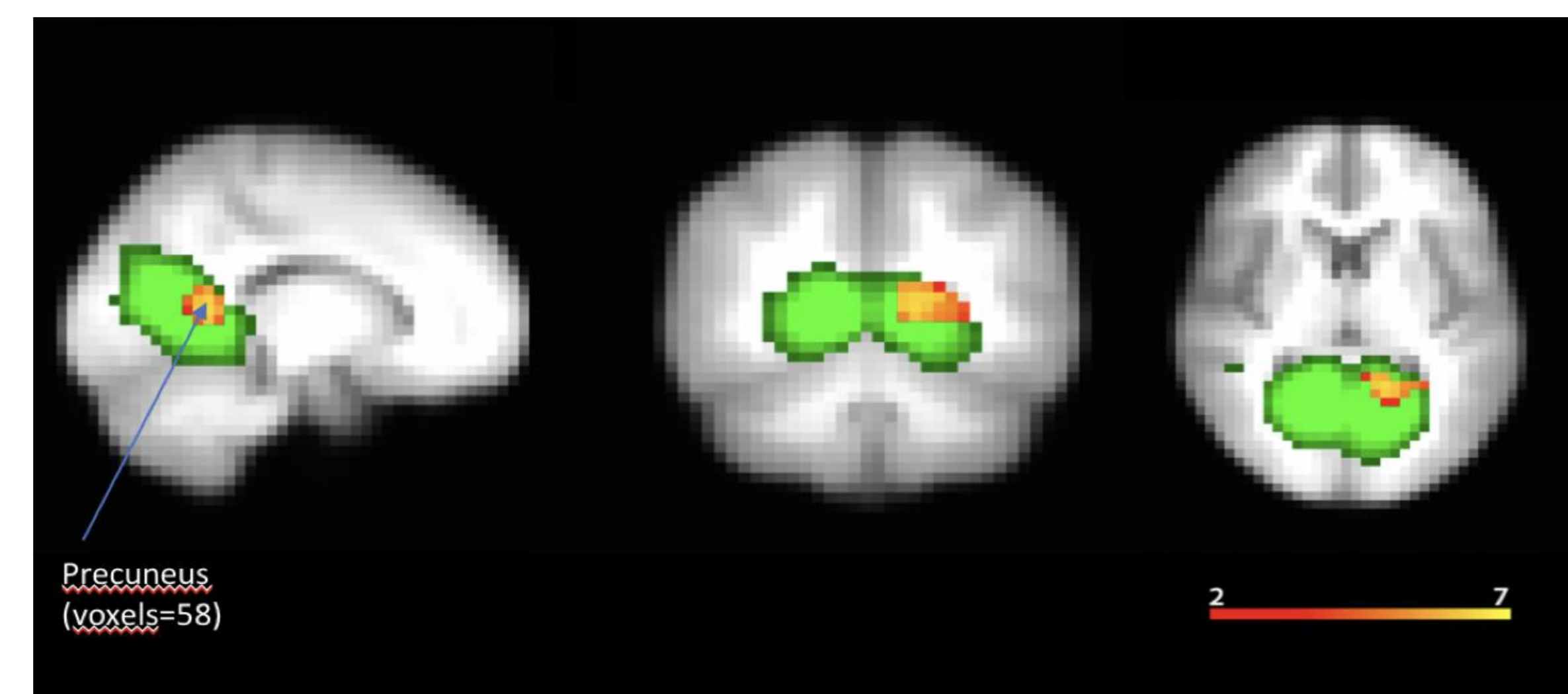
Thus, altered structure, as a result of prolonged cortisol imbalance, might result in altered connectivity of both working memory and default mode network.

## AIM

To investigate resting-state functional connectivity in patients with CAH compared with healthy untreated controls and the association between functional connectivity in our region of interest (ROI) and disease severity, dose of GC and visuo-spatial working memory.

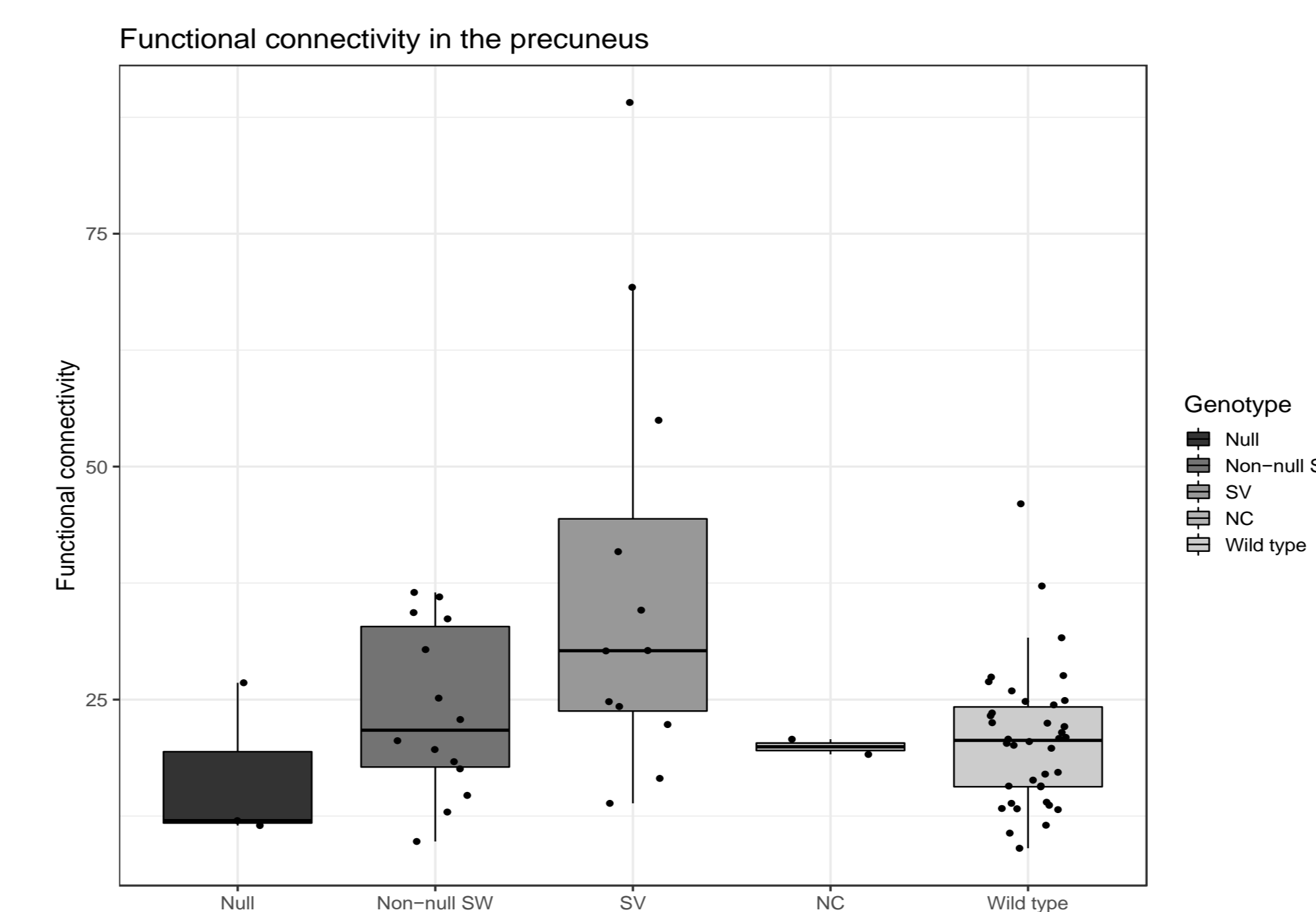
## RESULTS

- Patients with CAH showed increased functional connectivity in the precuneus compared with controls (Fig. 1). However, activity was not associated with executive functions.

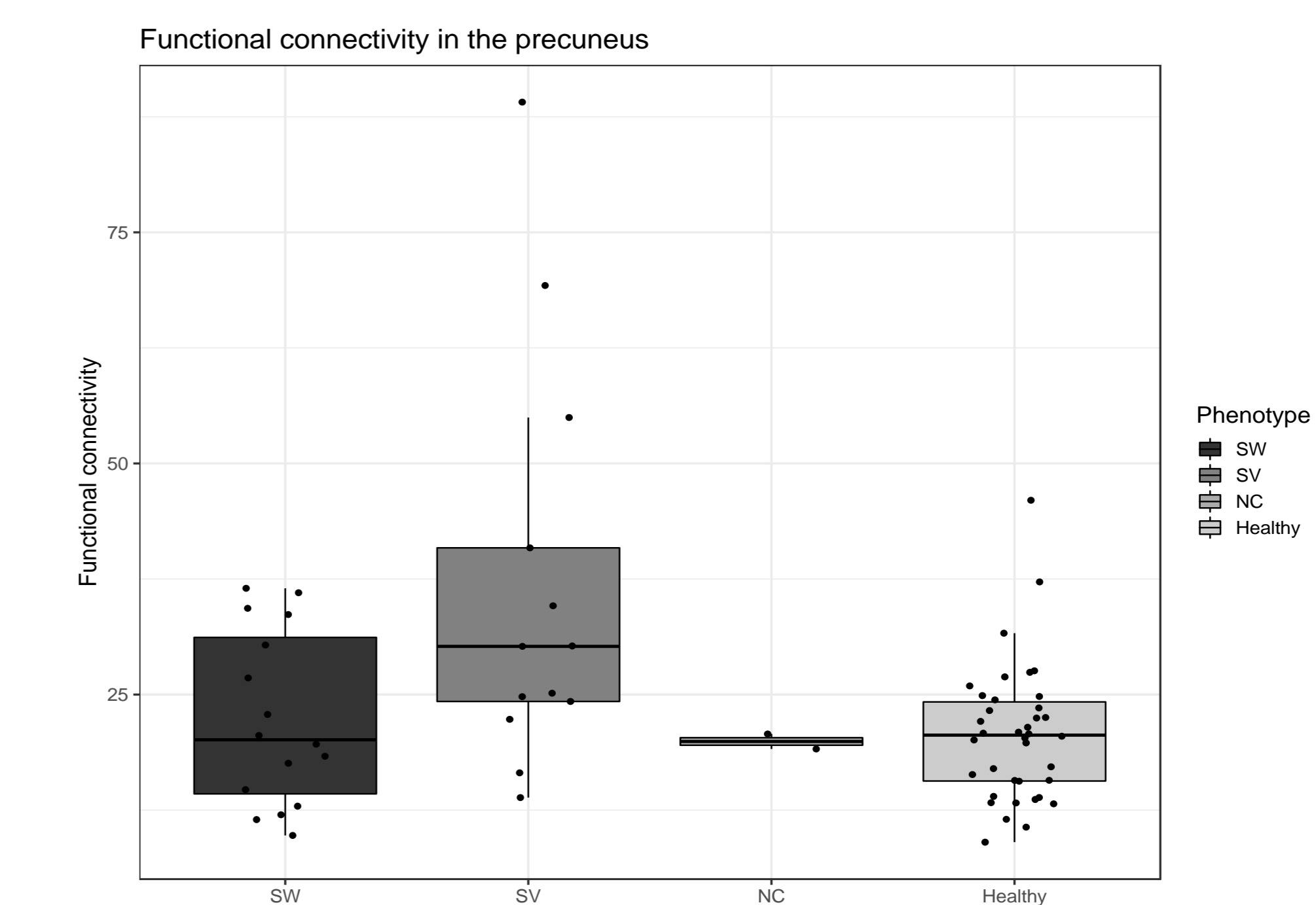


**Figure 1**  
Within network connectivity  
The DMN is overlaid on the average MNI-152 brain in green colour. Within DMN, significant group differences were observed for a cluster encompassing the precuneus region (peak MNI coordinates: -50, -14, 8; P= 0.008)

- In the ROI analyses (precuneus) patients with the null genotype showed reduced functional connectivity, whereas patients with non-null and simple virilising genotypes exhibited increased functional connectivity in the precuneus (Fig. 2 A, 2B)



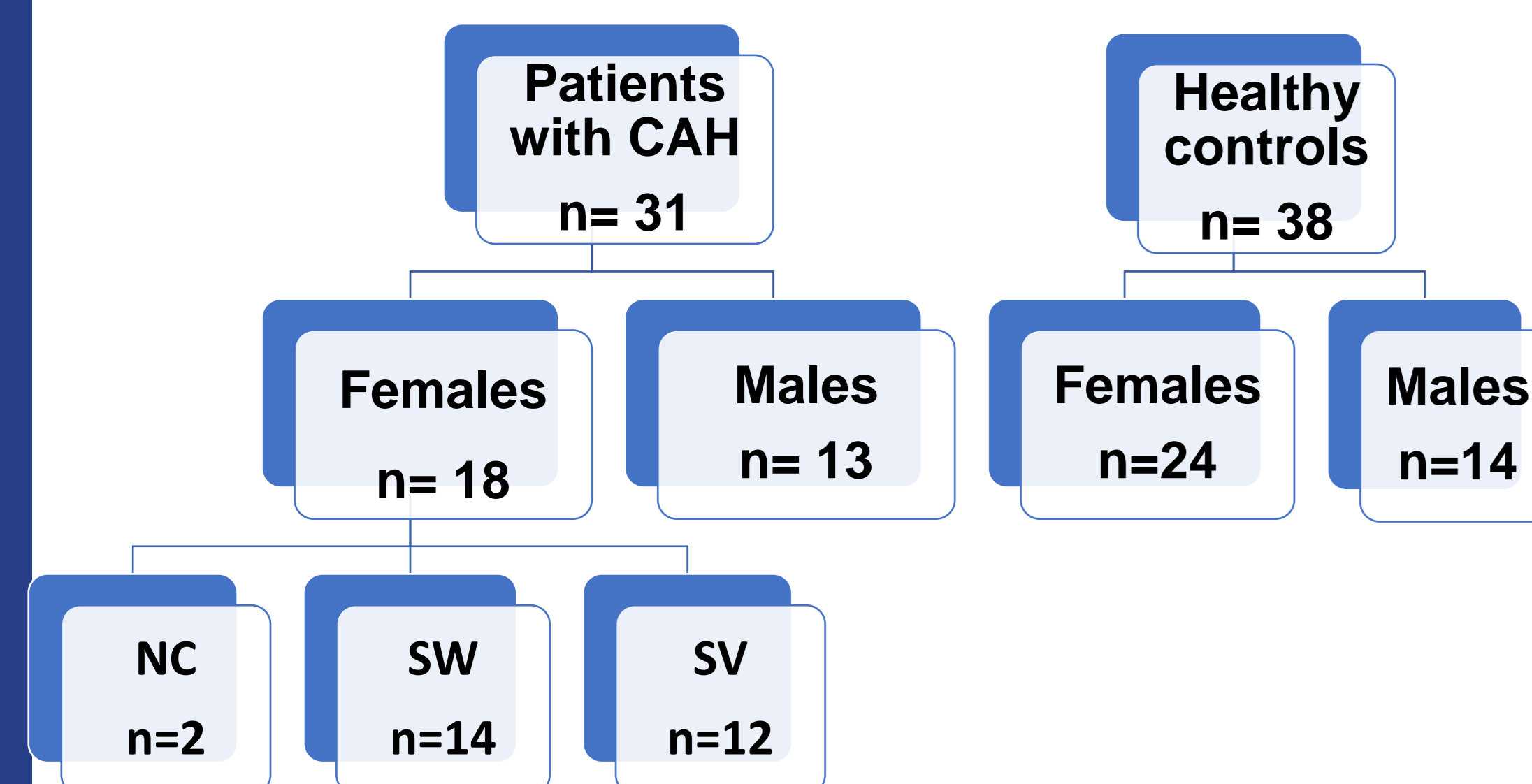
**Figure 2A**  
Null n=3; Non-null SW n= 14; SV n= 12; NC n=2  
Wild-type (Control) n= 38



**Figure 2B**  
SW n=16; SV n= 13; NC n=2; Wild-type (Control) n= 38

## COHORT

Age range: 16-33 years, Mean age: 23.8 years



NC =non-classic; SW =salt-wasting; SV =simple-virilising

## METHOD

- Resting-state functional magnetic resonance images were pre-processed using FMRIB's Software Libraries
- After data pre-processing, the "aggressive" option of the ICA-based automatic removal of motion artifacts (ICA-AROMA) was used to identify and remove motion artifacts from the time series
- To extract resting-state networks independent component analyses (ICA) was performed.
- Dual regression was used to regress the obtained group ICA components back into the individual participant's space for all 69 participants

## CONCLUSIONS

- Patients with CAH show altered functional connectivity during rest in the precuneus.
- This change may reflect a functional reorganisation in response to the CAH disease.
- The change in functional connectivity may depend on the severity of CAH.
- Larger study groups are needed for in depth evaluation of sex- and genotype-specific differences in resting-state functional connectivity in patients with CAH

## REFERENCES

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- Van't Westeinde A, Karlsson L, Thomsen Sandberg M, Nordenstrom A, Padilla N, Lajic S. Altered Gray Matter Structure and White Matter Microstructure in Patients with Congenital Adrenal Hyperplasia: Relevance for Working Memory Performance. *Cereb Cortex* 2019

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