

# Correlation Between Pubertal Growth and Testicular Volume in Boys – a Longitudinal Study



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## Introduction

Few studies have investigated how the pubertal increase in testicular volume is related to pubertal growth spurt in a longitudinal setting. Increased testicular volume, indicating onset of puberty in boys, mirrors the enhanced testosterone production in the testicles which also give rise to the pubertal growth spurt. The QEPS-growth model makes it possible to conduct detailed analyses of pubertal growth and separate total growth into specific pubertal (P-function) height gain and basic growth (QES-functions) (Fig1)<sup>1,2</sup>.

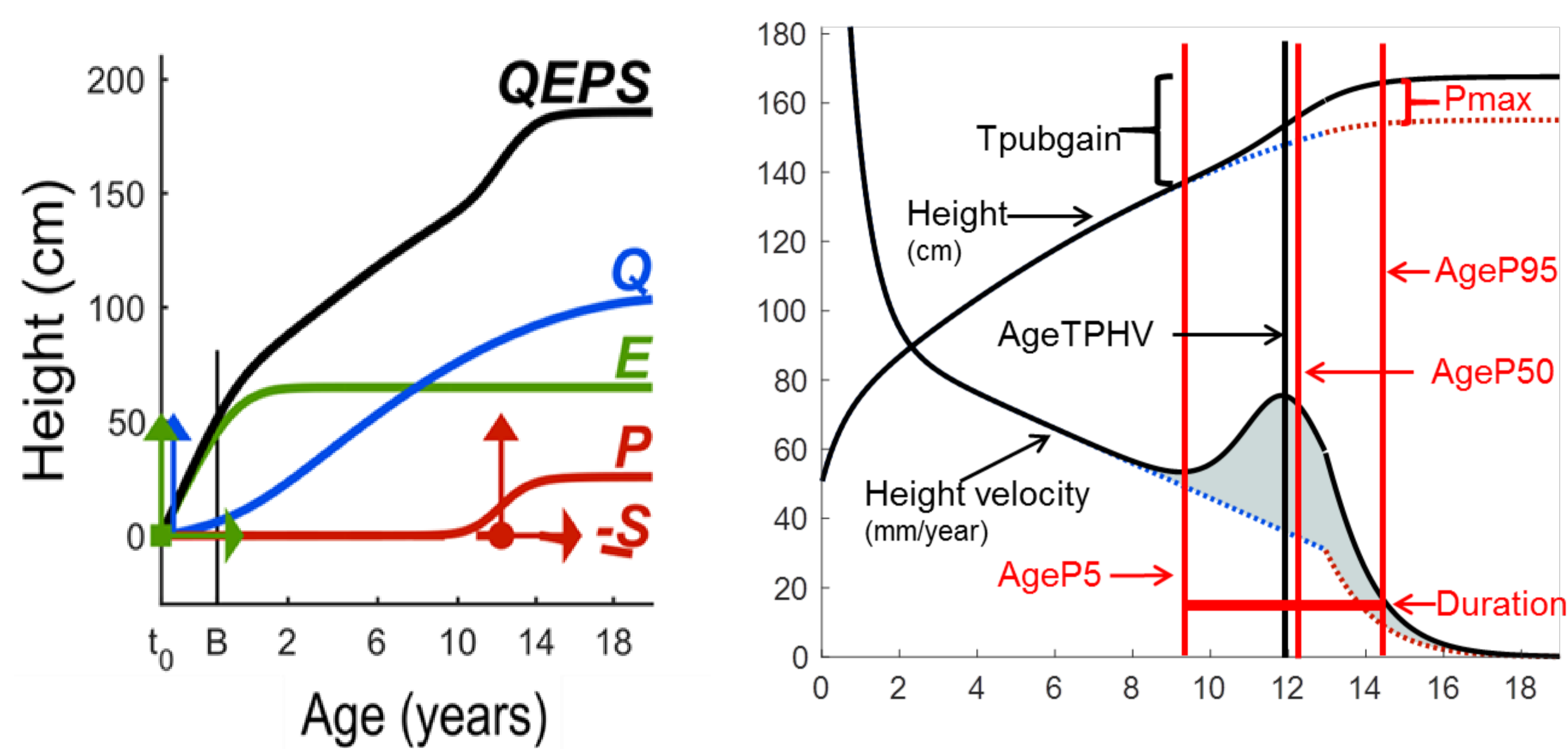


Fig.1 QEPS growth model (left), with pubertal growth functions (right).

## Objective

To investigate the relationship between increase in testicular volume in healthy boys with their pubertal growth spurt. To visualize the individual variation in the relation between testicular volume and the attained specific pubertal height gain.

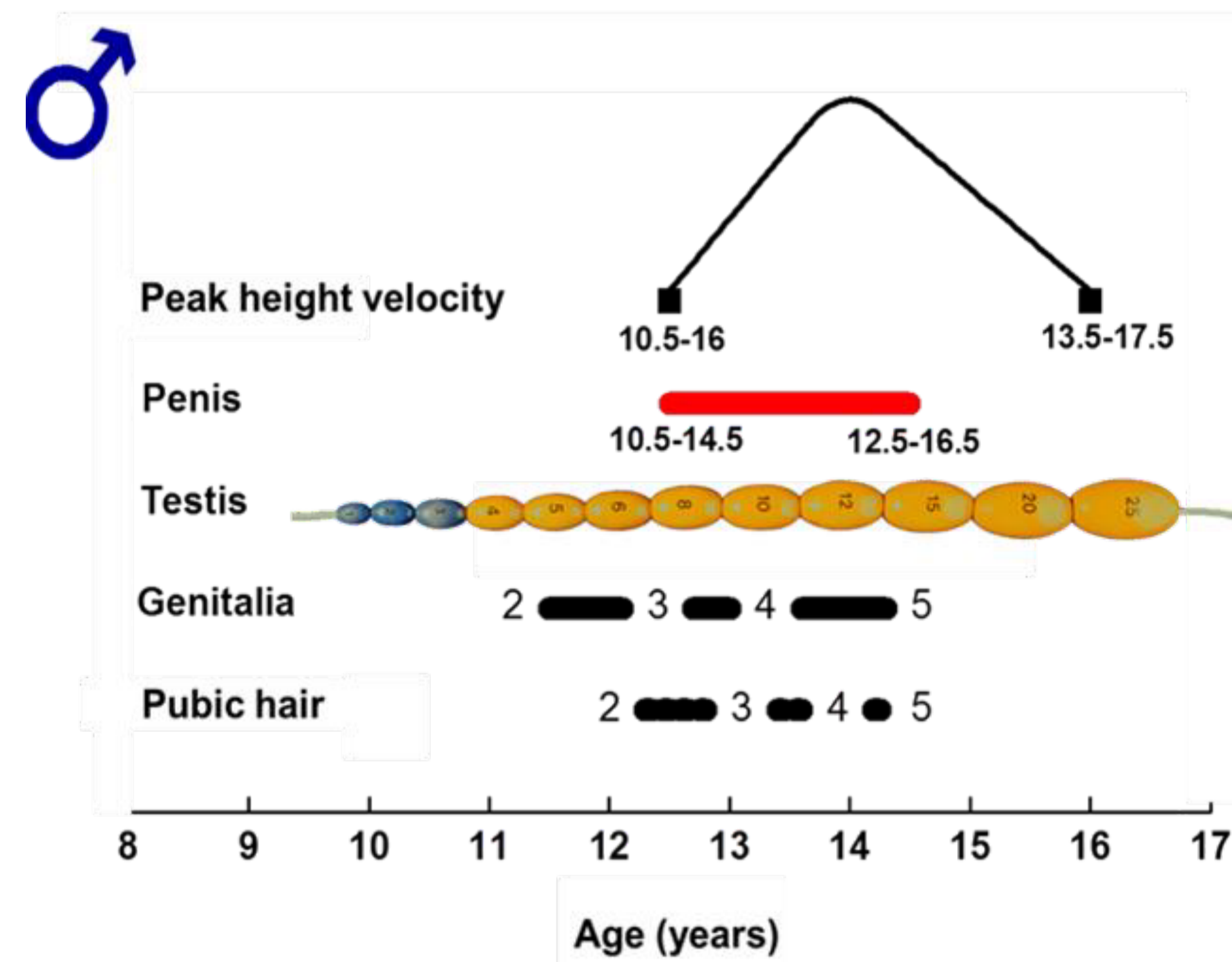


Fig.2. Pubertal development in boys (modified from Tanner<sup>3</sup>).

## Methods

The study group included 31 healthy boys, longitudinally followed during puberty with 1-4 yearly visits, including height measurements and assessments by trained paediatric endocrinologists of testicular volumes, by the method of Prader<sup>4</sup>. Testicular volume during puberty was assessed in median 5 times (range 2-26). Analyses of growth patterns were done with the QEPS-growth model<sup>1,2</sup> and pubertal heights expressed in both cm and in QEPS-growth estimates, i.e. how many % of the specific P-function-pubertal growth was attained at each visit. The testicular volume was related to % of Pmax, the specific P-function-pubertal gain attained (P%).

## Conclusion

- The specific pubertal gain in height has for the first time been analysed/visualized in relation to testicular volume during puberty.
- We found a dose-response like relation and high correlation between testicular volume and specific pubertal height gain, demonstrating the validity of the QEPS-model in this new setting.
- Each boy followed his trajectory, with broad inter-individual variation in testicular volumes and P%, of the specific P-function-pubertal height gain (Pmax).

## Results

As expected, there was a high correlation between testicular volume and the specific P-function-pubertal gain (>90% explained), and each boy followed his trajectory (Fig 3). However, the inter individual variation was considerable: at testicular volume 3 ml, median 6%, "P6%", (range 0.2-24%) of the specific P-function-pubertal growth was reached. Corresponding values at 4, 6, 8, 10, 12, 15, 20 and 25 ml testicular volume were 14, 18, 35, 40, 58, 80, 95 and 98% (Table 1).

Table 1. Median and range of P%; % of specific P-function-pubertal height gain attained at different testicular volumes.

Testis volume	3ml	4ml	6ml	8ml	10ml	12ml	15ml	20ml	25ml
P%, median	6	14	18	35	40	58	80	95	98
P%, range	0.2-24	2-31	3-48	13-55	16-65	9-86	44-98	62-100	92-100
Visits, n	34	17	13	20	17	21	39	35	10

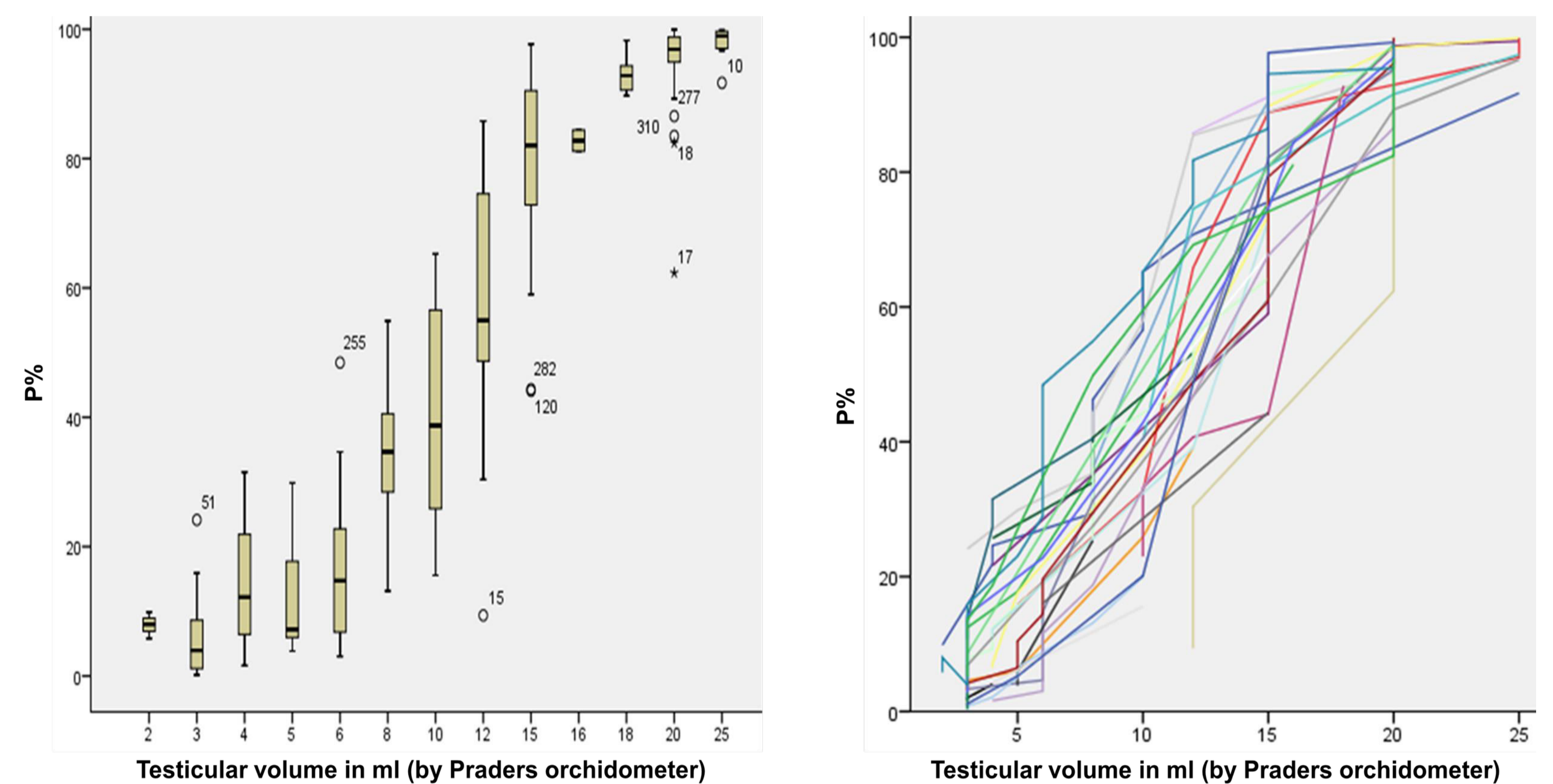


Fig.3 Specific pubertal height gain P% is related to the testicular volume, to the left median values with Inter-Quartile Range, mild (o) and extreme (\*) outliers, to the right all individual testicular trajectories.

## References:

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