How to Measure Peak Height Velocity (PHV)?[1]

What is PHV?
PHV is directly linked to the Development Age of athletes. PHV is a measure of the maximum rate of growth in stature during a growth spurt. The age of maximum velocity of growth is called the age at PHV.

As many of you know, PHV is a key component of the Long Term Athlete Development (LTAD) principles.

Why is it important to know when PHV occurs?
Each athlete grows at a different rate; therefore a coach can have, on the same team or training group, early, average and/or late maturers.

All coaches should be monitoring PHV in order to adapt training accordingly. PHV in girls occurs at about 12 years of age. Usually the first physical sign of adolescence is breast budding, which occurs slightly after the onset of the growth spurt. Shortly thereafter, pubic hair begins to grow. Menarche, or the onset of menstruation, comes rather late in the growth spurt, occurring after PHV is achieved. The sequences of developmental events normally occur 2 or more years earlier or later than average.

How to monitor PHV?
Due to seasonal variations and for consistency purposes, experts are recommending that all measurements are taken in the morning at a consistent time. (measures are more reliable after a rest day).

STEP 1:
As soon as the athlete turns 6 years of age, the coach should be measuring height every three months.

STEP 2:
Produce a chart with height on the vertical axis and age on the horizontal axis.

STEP 3:
As soon as the coach notices a small deceleration in growth followed by acceleration in growth, the coach should start to measure the arm span as well as the height of the athlete. Measurements of torso length should be done while the athlete is sitting on the floor next to a wall with bent knees (90 degrees). The average age for girls in this period of development is 10 years.

STEP 4:
Similar Charts to the above should be developed to display all three measurements. Consistent acceleration in growth should be noticed at this time. **The athletes' training has to be adapted according to the windows of trainability.**

STEP 5:
PHV is the highest point of growth acceleration. After PHV is attained, a deceleration in growth will happen. Continue to monitor growth for 12 to 18 months after PHV. **The athletes' training has to be adapted according to the windows of trainability.** Please refer to the figures below for details on the curve and how the chart should be constructed.

How long is the growth spurt?

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[1] References : **Canadian Sport for Life** published by Canada Sport Centres (Sport Canada);
Notes from Sport Canada Workshop – **How to measure PHV?** (Istvan Balyi)
Notes from Sheilagh Croxon and Charles Cardinal

The growth spurt can last anywhere from 1.5 years (for fast developers) to 5 years (for slow developers). Typically a girl grows on average 6cm in the first year of her growth spurt, 8cm in the second year, and 6cm in the third year.

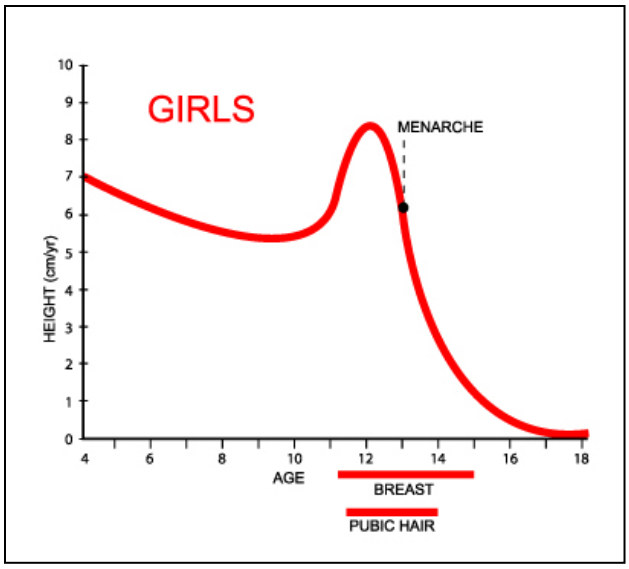
What are the windows of trainability?

The windows of trainability (accelerated adaptation to training) for 2 of the 5's are related to PHV so it is important to monitor it so these windows can be maximized.

1. Strength – there are 2 critical windows of accelerated adaptation to strength training: 1 – immediately following PHV and 2 – at the onset of menarche.

2. Stamina – the critical window of accelerated adaptation to aerobic training begins with the onset of PHV which is on average 10-11 years old in girls.

Maturity Events in Girls (Modified after Ross et al.1977)



Pacific Sport - Optimal Windows of Trainability (Balyi and Way, 2005)