BIO-BANDING
FREQUENTLY ASKED QUESTIONS

How does bio-banding work?
Within all youth sports teams, children are split (grouped) based on their date of birth and chronological age. Both within and outside of sports, children develop and mature at different times and rates. This can mean that within a chronological age group you can have players who are significantly more or less mature than each other, sometimes +/- 2-3 biological years.

While it is easy and simple to split children and young athletes chronologically, the differences in development and maturity can have a huge impact on the player's ability to play and progress in his or her sport. The reason for this is that children who are more developed or who mature earlier enter puberty quicker and thus benefit from increased physical stature, size and muscle mass. These benefits make them stronger, faster and more powerful which are significant benefits to have within most sports, especially soccer. On the other hand, less developed and later maturing young players enter puberty later and therefore do not benefit from the physical advantages related to this like early maturing athletes.

Most youth sports are dominated by early maturing players, and as the players progress to older age group competition levels, a large majority of players in the system are born within the first six months of the year. This is known as Relative Age Effect (RAE). However, once players reach the professional level, RAE dominance does not exist. For example, birth dates across both the U.S. Men's and Women's National Teams are very evenly distributed.

How can Bio-Banding help?
Bio-banding is a scientific answer to issues related to physical maturity. Bio-banding allows players to be grouped based on their maturity and biological maturity, and not upon their chronological age. By doing this, the massive swings in maturity that can be seen within the current chronological groupings are removed. By grouping players based on maturity, the physical advantages that early maturing players have when playing against less mature players are also reduced.

This has two obvious advantages. First, it allows an opportunity for late maturing players to stop being suppressed by the physicality of early maturers and to be able to play in a fair environment where they can thrive and develop their soccer ability. The second benefit is for early maturing players. If early maturing players become dependent on their physical ability, they may neglect their development in other areas that are much more important, such as technical, tactical and psychological. Players who dominate games and trainings within their chronological age group may be the ones who are in biggest danger of not progressing long-term. With bio-banding, early maturing players are taken out of an environment where they physically dominate and are positioned against players of similar maturity and physicality. By doing this, early maturing players then need to utilize and develop other attributes to be successful.

How do you Bio-Band?
The U.S. Soccer High Performance department recognizes the Khamis-Roche method of maturity assessment as the most useful and accurate non-invasive method for assessment. The method requires that player height and weight measurements are taken, along with final heights of parents. Once this information is collected, it is entered into a database spreadsheet and the Khamis-Roche algorithm is used to provide a variety of information on each player, including if they are early, on-time or late maturing, Peak Height Velocity (PHV) timing and also predicting the end height they will reach at adulthood. The Khamis-Roche method has been found to accurately predict end height with average error of only 2.2cm from childhood to adulthood.

By having each player's current height and predicted height, you are able to work out the current percentage that each player is at their final maturity/ adulthood height.

Examples
U-14 Player:
Current height = 149cm (4' 10")
Predicted final height = 172cm (5' 7")
This player is currently 86.6% of their final height.

U-16/17 Player:
Current height = 162cm (5' 3")
Predicted final height = 181cm (5' 11")
This player is currently 89.5% of their final height

By calculating each player within chronological age groups, it is possible to give a current percentage of final end height and bio-band players based on similar maturity.

Clubs are then able to set bio-bands that group players by similar percentages towards final maturity. For example, a tournament could be run to set the parameters at 5%: players grouped at 85-90% of final physical maturity or 90-95% etc.). This 5% parameter ensures that players taking part are of a similar maturity level. Doing so also puts a reduced emphasis on player physicality, which becomes more apparent when there are above large differences in normal chronological age groups.

Illustrated in the calculations above, the process of bio-banding could involve players from different chronological age groups playing together while also allowing for positional height variability (tendency for taller goalkeepers and defenders in chronological age groupings).

Why is it a good idea to group players by physical maturity?
By occasionally grouping players within training and games based upon physical maturity, you are able to create a new, different and challenging environment. By providing a challenging change of environment, the goal is that players will have to develop another aspect or attribute

to deal or cope with this challenge - something that can only be a seen as a positive. Bio-banding players brings positives for both early and late maturers:

Late Maturers
These players develop and go through puberty a lot later than early maturers which means they do not get the physical gains associated to puberty and maturity (speed, strength and power). This means that when they play and train with bigger, stronger and more mature players they can get suppressed and struggle to play a part within games and training. By providing an occasional platform for these players to be able to play without being physically dominated, this allows them to get more time on the ball and be able to express themselves both creatively, technically and tactically.

Early Maturers
Early Maturers are often the forgotten beneficiaries of bio-banding. By being more physically dominating for most of their lives in youth soccer, many players can often neglect the need and importance to develop other attributes (technical, tactical and psychological) which will be required when they become adult soccer players and physical advantages no longer exist. Bio-banding groups players of similar physicality together reduces the ability to use physicality as an advantage. This then increases the need to develop and use other attributes.

What can be learned from observing Bio-Banding?
Bio-banding players within an environment that is more even and not dominated by physicality is important both when scouting new players and making decisions on retaining current players. By looking at players in a physically neutral environment, youth players can be evaluated on their technical and tactical abilities rather than watching a game where a player could outshine opponents due to being significantly more mature than a player who looks less capable, but who in fact is simply less mature.

What age group is especially affected by the Relative Age Effect in soccer?
Relative Age Effect within youth soccer is very prevalent. The younger age groups are the most affected by this, but globally across all youth sports this is a continuing phenomenon. One could hypothesize that this is caused by the recruitment of players who benefit from early maturing; more physically developed players who, when playing in the games and being scouted, look like the most talented as they are dominating games and having the largest impact.

Which position benefits the most from Bio-Banding?
Bio-banding does not add massive benefits for any specific position. It supports development of all players and positions. However, we do know that certain positions within soccer are dominated by early maturing players and these appear to be positions within the spine of the field (goalkeepers, center backs, center forwards, etc.), while wider position players tend to be within a higher proportion of late maturing players.

Why shouldn’t young soccer players have to compete against physically more mature or less

mature players? People are different, sometimes to your disadvantage. Isn't that part of what you learn from playing sports?
Bio-Banding is an additional option for clubs and competition. It is not and will not ever be a replacement for the current chronological age system which does result in certain advantages.

Research around the "Underdog Theory" suggests that having a challenging or difficult environment can provide opportunities for players to overcome the adversity of a situation and develop coping skills to do so. However, not every player has the ability to overcome this on their own and then there is a danger that a talented player could be lost due to them not being able to cope physically. Also, a large proportion of players within the system are early maturing players who could often rely on their physical ability. By bio-banding players, a new and challenging environment is created which could prevent plateaus in development.

If anything, the current chronological system can benefit the smaller, less mature player, who consistently has an environment that is challenging. If they *CAN* overcome it, they will have developed many coping skills to do so which will undoubtedly be technically, tactically and psychologically based.