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## FIS Medical Committee Educational Series

Dr Jenny Shute, MA, BM, BCh (Oxon)  
Member of the FIS Medical Committee GBR

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### Apophyseal Injuries – Overuse

The points where tendons are attached to bones (known as 'apophyses') are relatively weak and are predisposed to inflammation and complete or partial avulsion (tearing) injuries. Injuries at these sites are particularly common in adolescents - the increased strain on the developing bones and musculature as athletes approach puberty results in periods of imbalance which predispose to inflammation and injury at these sites. In particular this occurs because bones grow ahead of muscles and other soft tissues, resulting in relatively tight musculature and excessive strain on the points of insertion into bone.

Injuries of the various non-articular apophyses appear to result from repeated tensile stress – i.e. they are injuries that appear to be related to overuse. Whilst injuries of this type may occur in athletes of all ages, they used to be considered rare in children – it is now recognised that they may account for up to 30-50% of sports injuries seen in young athletes.

**Apophyseal injuries** include:

- **Osgood-Schlatter's Disease** - osteochondritis at the growth plate of the tibial tuberosity on the anterior aspect of the tibia
- **Sinding-Larsen - Johansson Disease** - a similar condition at the proximal (near) end of the patellar tendon at its junction with the distal (far) pole of the patella. This is a common problem in ski jumpers – it is known as 'jumper's knee'
- **Sever's Disease** - apophysitis of the insertion of the Achilles tendon into the calcaneum (heel bone)

**Preventative measures** include muscle stretching and strengthening exercises, and the avoidance of high intensity repetitive training exercises both on and off the slopes. The duration, frequency and intensity of training should be carefully monitored, particularly in children and adolescent athletes - a varied and rounded programme that works on different techniques and skills during the training sessions (cross-training) will help to avoid the repetitive strains that are placed on the apophyses in for example, a full day of unvaried slalom gate training on an icy slope, or of box jumps. Recognition of fatigue is crucial, and adequate recovery time must be allowed.

Consideration must also be given to external factors such as terrain – for example jump training is better carried out on steeper slopes to reduce the impact of landing. Competition and training courses should be set in order to allow athletes steeper landing areas when the terrain drops away. Training on icy slopes creates additional strain on the apophyses; softer conditions are generally better in this regard. Good technical training will correct postural faults that aggravate the various tendon-bone junctions. In particular, backward lean will put excessive strain on the apophyses at either end of the patella tendon – this is to be avoided!

**The basis of treatment and rehabilitation** consists of the following:

- Stretching of the muscle-tendon unit
- Local application of ice
- Anti-inflammatory medication
- Alteration of activities to allow safe participation whilst reducing the stress at the apophyseal site
- Rest is known to reduce pain, but there is no evidence that it accelerates the healing process

Late complications are quite rare, but avulsion of the bony apophysis is occasionally seen, leading to the necessity for surgical intervention.

contact e-mail: [Jenny@snowsportGB.com](mailto:Jenny@snowsportGB.com)