INJECTABLES IN SPORT: THE EVIDENCE
Dr Patrick Whittaker (Radiology ST2), Dr Philip Robinson & Dr Emma Rowbotham (MSK Radiology Consultants), Leeds Teaching Hospitals

BACKGROUND
Injection therapy is integral to sports rehabilitation, aiming to achieve a reduction in pain and accelerate healing responses. A wide variety of options for injections exist, however the evidence base for their use tends to be limited in nature. This paper aims to explain the various techniques and assess the evidence for their use in clinical practice.

TENDINOSIS AND CORTICOSTEROIDS
Tendinosis is a very common problem in sports, accounting for up to 50% of all injuries. There are large socioeconomic and quality of life impacts associated with this type of injury. At present guided injection is often considered but currently there is poor evidence for injectables - the data available comes from small studies suffering from short follow up times often with concurrent confounding factors. Corticosteroids have been widely used for symptomatic relief since the 1950s, are inexpensive and easy to administer. They have anti-inflammatory effects as well as acting as an indirect vasodilator via suppression of prostacyclin. As such, whilst corticosteroid use is common place, there is little rationale given the lack of evidence of an inflammatory process in tendinosis. There is concern that they may exacerbate the healing process by suppressing inflammatory mediators, although there may be a role with regards to peritendinous inflammation. A systematic review of 41 studies showed consistent reduction of short term pain vs placebo or no intervention (1) however there was no difference in outcome at medium and long term intervals. Some studies have even shown worsening pain and function scores with regards to knee OA in the long term (2).

TENDON FENESTRATION
Also known as dry needling or ‘tenotomy’. In tendon fenestration a needle is passed repeatedly through areas of tissue. Resultant bleeding leads to the release of growth factors that stimulate tendon healing. Common sites for fenestration include the common extensor tendon at the elbow, patellar and gluteal tendons.

In 2008 McShane et al. saw 64% of patients with outcome deemed ‘excellent’ after tendon fenestration and physical therapy in common extensor tendonitis. A study of 58 patients in 2016 reported 93% with either excellent or good results. As such, this suggests that corticosteroid may be superfluous to the treatment of tendinopathy.

PLATELET RICH PLASMA (PRP)
Blood products aim to initiate a healing response by stimulating local fibroblast production. A large number of growth factors are involved at the cellular level, however the mechanism is poorly understood, encompassing both anti and pro-inflammatory effects.

Platelet rich plasma (PRP) yields a greater concentration of cytokines than HVI (10). A 2008 study by Chan et al. found similar short and long term improvements in cases of resistant AT (11).

HYALURONIC ACID (HA)
Hyaluronic acid is a glycosaminoglycan lubricant that occurs naturally in high concentrations throughout connective tissues and synovial fluid. In an inflammatory state there is an increase in the fluid content of the joint - reducing both the concentration of hyaluronic acid and synovial fluid viscosity. HA promotes endogenous synthesis of pro-inflammatory mediators, inhibits noiception and prevents cartilaginous degradation. Additionally exogenous HA may stimulate synthesis of endogenous HA, further reinforcing the effect. The safety profile of hyaluronic acid is good overall, with a lack of systemic side effects. Warmth, redness, local pain and joint effusion can occur for up to 3-4 days. Several cases of granulomatous synovitis have been noted.

OSTI et al. Demonstrated a reduction in pain and functional improvement with use in rotator cuff disease (6).

Other studies have shown improvements in outcome and reduction in recurrence of De Quervain’s tenosynovitis (7).

Navarro et al performed a randomised study of 306 patients looking at HA use in knee OA. The HA group showed significant symptomatic improvement against placebo at 40 months (8). At present however, NICE guidance recommends against hyaluronan injection for management of OA (9).

VOLUME ADHESIOTOMY
Volume distension uses injection of saline or dialk local anesthetic to break up adhesions which may form within the paratenon around a tendinopathic tendon. The Achilles’ tendon is the primary site for utilisation of this technique, however the techniques are recognised for paratenon disease and Kager fat pad stripping. The latter results in mechanical obliteration of neovessels with a large volume injection. A 2017 RCT of 60 men with chronic Achilles tendinopathy (AT) demonstrated a reduction in pain, improvement in activity level and reduced tendon thickness when treated with HVI or PRP in combination with eccentric training vs eccentric training alone (10). A 2019 study by Chan et al found similar short and long term improvements in cases of resistant AT (11).

PROLOTHERAPY
Proliferation therapy (formerly termed solerans treatment) involves injection of a small volume of irritant at the site of the painful tendon/ligamentous insertion. Hypertonic dextrose is used, resulting in osmotic rupture of local cells, sclerosis of neovascular association with tendinopathy and stimulation of growth factors to encourage collagen tissue healing. Pain is also reduced due to the inhibition of angiogenesis and associated innervation. Benefit has been shown in small studies for lateral epicondylitis (versus saline injection) (12) and there has been evidence of symptomatic improvement in cases involving Achilles tendinopathy (13). A systematic review of 17 studies concluded that there is low level evidence that prolotherapy can be used effectively in tendinopathy (14).

CONCLUSION
High quality evidence for injection therapy in sports injury is relatively sparse and highly dependent on technique, injectate preparation type and location of injury. Studies are often small in sample size, limited to specific sites and select intervention comparisons.

The available literature discourages corticosteroid injections in cases of tendinopathy. At present the evidence for other injectables is limited and as such there is a continued need for RCT as no standard approach is currently recognised.