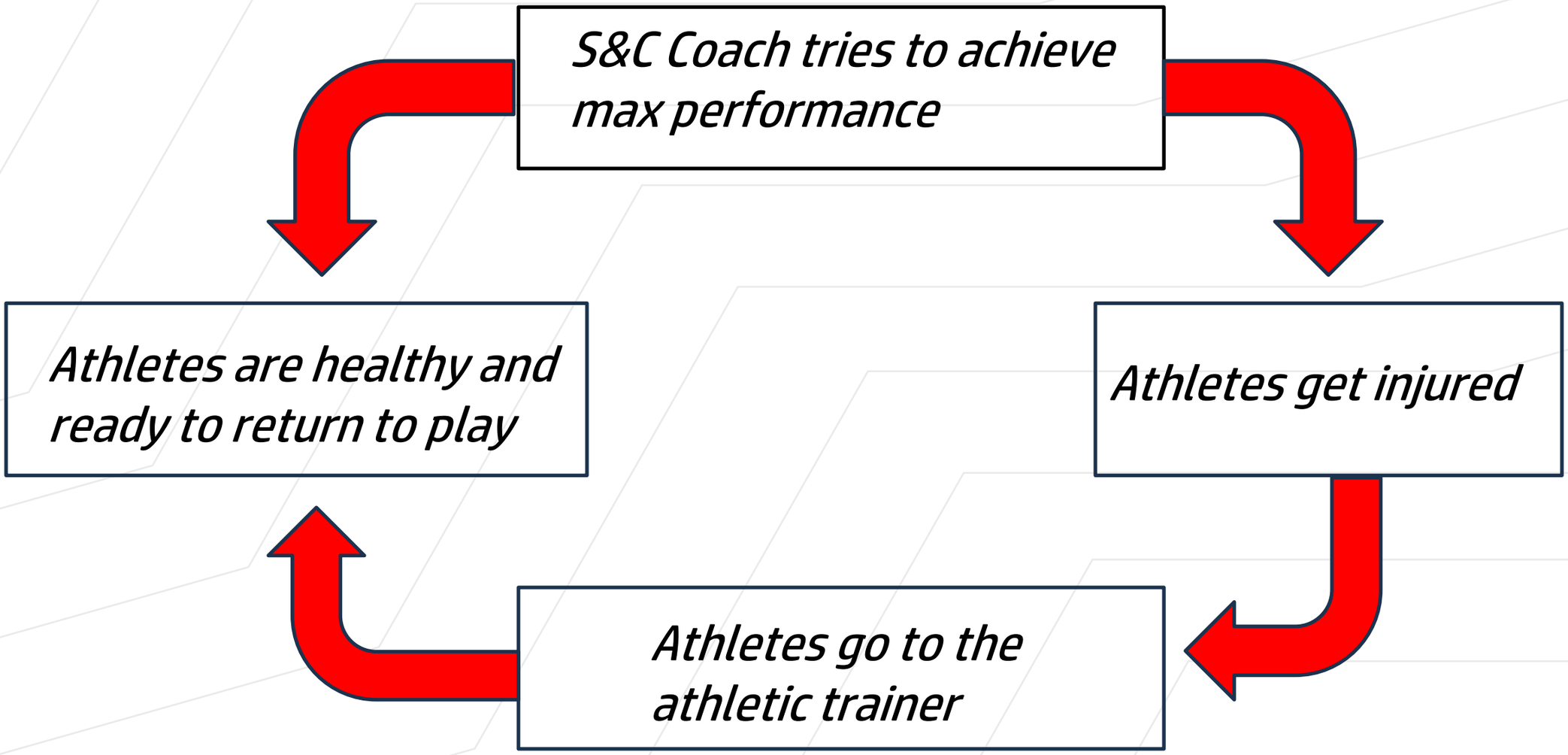
TRAINING TENDONS:

WHY ARE INJURY RATES ON THE RISE?

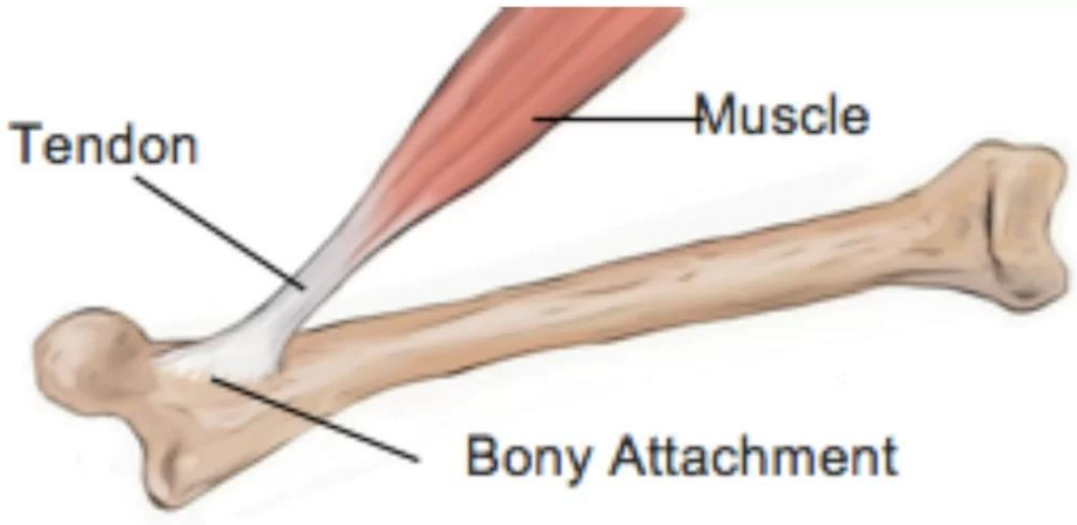
“ Pushing performance is the outcome of the optimization of the musculoskeletal system and that actually puts athletes at an increased injury risk; as S&C coaches we should learn how to balance performance and injury risk”

THE INJURY CYCLE



"We should separate the performance staff to the coaching staff. Performance staff should be part of the medical staff, their goal is to keep athletes strong and healthy; the job of the coach should be to take the strong and healthy athlete and get the best performance on the pitch" .

TENDONS AND LIGAMENTS



- They are structurally very similar: they are both at least made of 70% Type 1 collagen that is aligned along the line of force.

- The collagen protein is crosslinked together and the crosslinking is going to alter the stiffness of the structure.

STIFFNESS DEPENDS ON:

1. How much collagen we have
2. The direction of the collagen
3. The crosslinking of the collagen

REF: (1,6)

WHAT IS THE IDEAL LEVEL OF STIFFNESS?

LIGAMENTS

1. Attach bone to bone
2. The stiffer, the better
3. If we increase laxity of the knee joint we increase 4x the risk of ACL rupture

TENDONS

1. Attach muscle to bone
2. The stiffer, not always optimal
3. If the tendon is stiffer than the muscle is strong, we get muscle pulls

IF STIFFNESS IS::

REF: (3,4,5)

LOW

- ↑ ACL RUPTURES
- ↓ MUSCLE PULLS

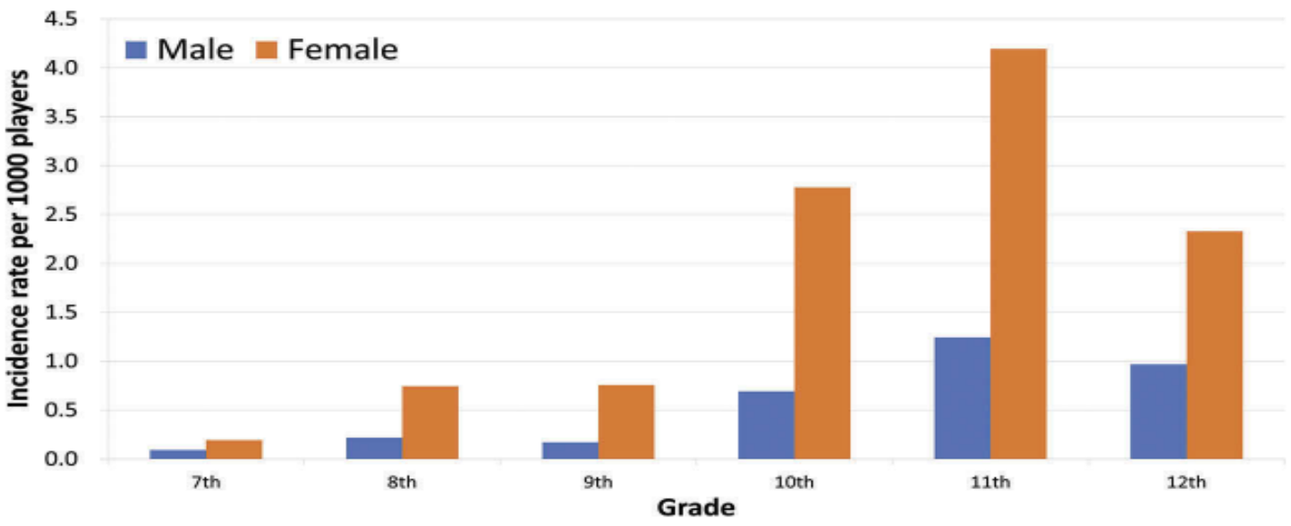
HIGH

- ↓ ACL RUPTURES
- ↑ MUSCLE PULLS

BNF

FEMALE VS MALES ACL INJURY RATES PLAYING THE SAME SPORT

- *Female athletes have less stiff ligaments than men.*
- *Females have less than 80% of non-contact muscle pulls compared to men.*
- *The ratio of injured females to injured males playing the same sport is around 2.8.*



ACL Incidence rate among Japanese Junior High School and High School athletes.

REF: (8)

LOADING TENDONS

" A tendon is a variable mechanical tissue: on the muscle end is stretchy, and on the bone end is stiff. If we only do fast movements we will increase the stiffness of the tendons and decrease the strength of the muscles (because they will not be heavy loads) , and that is when we are going to get muscle pulls."

ISOMETRIC LOADING

1. - Anytime we load the tendon (isometric, concentric, eccentric) the tendon gets **the same signal**.

When a part of the tendon gets injured, that section of the tendon does not get loaded when we do dynamic movements.

2. isometrics and overcoming isometrics induce **muscle relaxation** (30 seconds of isometric hold on the tendon, the tendon tension would go down about 45%).

3. Perform isometrics to be in **a long muscle length** because it seems to have a better outcome for both the muscle and the tendon

3. Once ROM is back and pain is minimal, **perform slow isotonic exercises** and progress from there

REF: (7)

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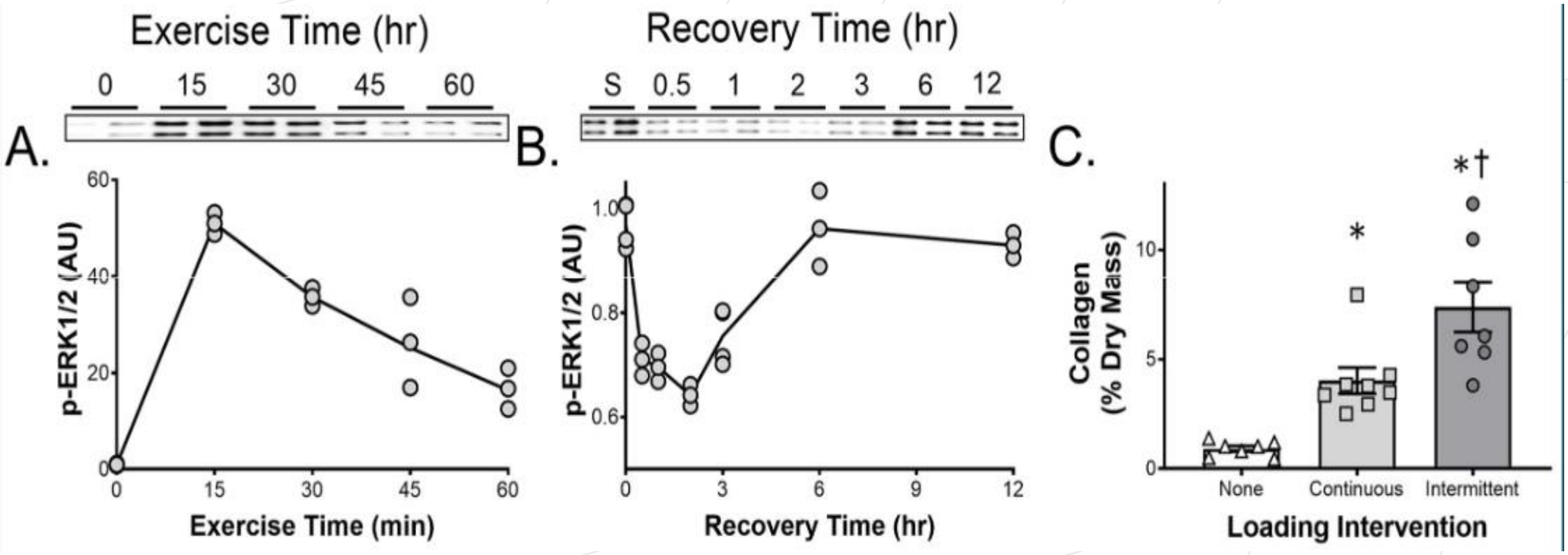
MED (MINIMUM EFFECTIVE DOSE)

Loading MED (Minimal Effective Dose):

- Tendons get all the signal in 10-15 minutes (3 sessions per day)
  - it takes 6-8 hours to recover the ability to signal again
- Supplement with 15g of collagen or gelatin (rich in proline and glycine)



REF: (1,2,6)

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