# HIGH YIELD MCQs - SPORTS MEDICINE


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# Question 1

**In which phase of throwing does maximum load/ torque pass around the elbow when it is under valgus extension overload??**

A) Early cocking

B) Late Cocking

C) Deceleration

D) Follow through

- Acceleration phase being the shortest  i.e 42-58 milliseconds ( 175 deg ER to 100 deg IR) and most explosive of all the phases.
- Movement involve valgus  force on elbow which tend to lag behind the inwardly rotating shoulder.
- ( i.e forcefull IR along with rapid release of elastic forces).
- As Acceleration phase basically inolve the release of ball that usually occur at ear level.
- One can see  Movements involve enormous force on elbow mostly the Elbow.. Valgus Force.
- Ball release takes place b?w 40-60 deg ER.
- At Ball Realease Elbow Extension Velocity peaks at 21-2700 deg/sec.

# ELBOW IN ARM COCKING

- Near the end of arm cocking (64% of time from foot contact until ball release), maximum valgus torque is experienced at the elbow.
- The flexor and pronator muscles of the forearm generate a counter varus torque (64 Nm)
- Maximum Elbow Flexion is limited by eccentric contraction of the triceps, followed by concentric contraction as the elbow extends at the termination of late cocking and throughout acceleration.

The highest tension in UCL will be seen in late cocking but elbow in this phase remains in flexion so injury chances are just a lil less (although significant).

But in acceleration the valgus is maintained and this gets coupled by forceful extension  to release ball (with hand also being maintained at ear level), that maximises chances of injury to UCL. The fact that this phase is shortest and most explosive, and helping IR of shoulder generally lags behind elbow extension, compounds the injury possibilities

# ELBOW IN ARM COCKING

- A low to moderate flexion torque of 0-32 Nm is produced at the elbow throughout the phase.
- A large Valgus Torque- is produced at the elbow by
  - Pelvis & Upper torso rotations & rapid shoulder External Rotations
- To resist the valgus force... A Max Varus torque of 52-76 Nm is generated (by Flexor and Pronators of forearm) at the elbow shortly before Maximum External Rotation.

Valgus torque placed on Arm

↓

Large tensile forces on medial aspect of elbow

↓

Repetitive VALGUS LOADING torque can cause compression between radial head & capitellum

↓

Injury to UCL/Medial Epicondylitis or Flexor Pronator Tendontis

# Reason for Elbow Injury

1. Maximum Medial Force 240-360N (++ Varus Torque) is applied by Upper arm, to the forearm to resist lateral translation.
2. A maximum Anterior Force 80-240 N is applied by upper arm onto the forearm to resist posterior translation of forearm at the elbow.
3. A maximum Compressive Force of 150-390 N is applied by the upper arm to the forearm to resist Elbow distraction.

# Role of TRICEPS

- The elbow achieves a maximum flexion of 85-105 approx 30 milliseconds before MER.

- If the triceps muscle is paralyzed by a radial nerve block , the elbow collapses & continues flexing near its limit(approx 145 deg elbow flexion).

- Collapse is caused by Centripetal flexion torque at the elbow created by the rapidly rotating upper torso and arm.

- TRICEPS muscle contracts eccentrically and then Isometrically in resisting the centripetal flexion torque that occurs during late arm cocking.

# ELBOW DURING ARM ACCELERATION

- Short time MER to ball release.
- Entire phase lasts for few 100th of seconds.

✓ Max Elbow Flexor Torque of 40-60 Nm is generated from low to moderate activity of Elbow Flexors.

✓ As Maximum Elbow Angular Velocity of 2100-2700 deg/sec occurs at approximately halfway through the phase.

- Acceleration the Valgus is maintained and this gets coupled by Forceful Extension (Elbow intially flexes from 90 to 120 degree then rapidly extends to near 25 degree just before ball release) to release ball in just 50 milliseconds (with hand also being maintained at ear level), that maximises chances of injury to UCL as well. M/C UCL injury phase is.....???
- This phase is shortest and most explosive, and helping IR of shoulder generally lags behind elbow extension MORE injury possibilities.

# Role of TRICEPS

- Elbow Extension in the phase brought by----- TRICEPS + CENTRIFUAGL FORCE(major)

- TRICEPS & ANCONEUS function more as stabilizers than accelerator...helps in inititiation angular velocity.

# "VALGUS HYPEREXTENSION OVERLOAD"

- During arm acceleration, the need to resist valgus stress at the elbow can result in wedging of the olecranon against medial aspect of the trochlear groove and the olecranon fossa.

- This impingement leads to the osteophyte production at the posterior and posteromedial aspect of the olecranon tip and can causes chondromalacia and loose body formation.

- Substantial varus torque is generated throughout the arm cocking and arm acclereation phases to resist valgus torque.

- During these phases, the elbow extends through a range of approximately 65 deg ( approximately 85 deg to approximately 20 deg)

# QUESTION 2

**Amount of blood to be collected from an athlete for dope testing ideally is**

a. 20 ml once divided into two samples

b. 10 ml twice sent in two samples

c. 15 ml twice and sent in two samples

d. 10 ml once and sent in two samples

# IDENTIFY THE NAME OF THE KIT?

## What it is Used For??

WHAT ALL IS REQUIRED??

1.KIT- BEREG/ LOCKCON

2.Small Single Bereg Kit-

I.1 disinfection pad

II.2 cotton swabs

III.1 strip/ Bandaid

IV.gloves

3. Acessory Bag - Tubes for blood collection( Yellow/ Purple & Butterfly needle)

1. Tests-

i.ABP (PURPLE TUBE)- 1 OR 2- ATHLETE BIOLOGICAL PASSPORT

ii.GH or its markers (Yellow tube)

iii.Rest of blood test

2.Be Sure Athlete is sitting with their feet on the floor ( X not laying down) for at least consecutive 10 min and not Exercise in past 2 hours.

3.Ask Questions ( ABP1/2)

4. Proceed with the Procedure

# QUESTION 3

**You are working as a Doping Control Officer for Men's Cricket World Cup. It was an In Competition Testing. One of the Athlete from Men's Cricket Indian Team selected for Sample collection. He was little amused to see the new kits lying on the table. What's the name of the kit shown in the picture and how many of these kits should be present per athlete for sample processing??**


1.BEREG, 4/ ATHLETE

2.BEREG 3/ATHLETE

3.LOCKON 4/ATHLETE

4.LOCKCON 3 /ATHLETE



# QUESTION 4

**According to WADA guidelines, how much of IV Fluids can be given in a Dehydrated state in a Hospital Setting?**

a. 100 ml/ 24 hour

b. 200 ml/24 hour

c. Life saving emergency so any amount

d. 200 ml/ 12 hours

***Note that regardless of volume administered, an IV infusion or injection given as part of a hospital treatment, surgical procedure or clinical diagnostic investigation is not prohibited.***

1. It is the responsibility of the treating physician as per WADA guidelines to emphasize that the health and well being of the athlete must always remain the priority during treatment.
2. After evaluation by physician for indication of IV infusion he should be aware of the prohibited dosage of IV fluids more than 100 ml/12 hour in non emergency conditions.
3. As per WADA TUE guidelines when an IV infusion is considered by Physician as a treatment option in Emergency situation ( keeping it as hemodynamically unstable athlete requiring IV fluids) or emergency situations, treatment with IV fluids should never be withheld on grounds that method is on the Prohibited List & Methods.

# TUE(Therapeutic use exemptions) Physician Guidelines

- INTRAVENOUS INFUSIONS AND/OR INJECTIONS
- Intravenous (IV) infusions have been included on the WADA List of Prohibited Substances and Methods under section M2.
- Prohibited Methods; Chemical and Physical Manipulation since 2005.

- Intravenous infusions and/or injections of more than a total of 100 ml per 12-hour period except for those legitimately received in the course of hospital treatments, surgical procedures or clinical diagnostic investigations.
- The wording in the Prohibited List for IV infusions is unique in that the method is not prohibited under the three exceptions stated above.
- TUE would be necessary for a Prohibited Substance delivered by intravenous infusion even if the infusion itself is delivered in the setting of one of the three exceptions.

Infusions or injections of more than 100 ml within a 12- hour period are prohibited unless the infused/injected substance is administered during a

1) *hospital treatment,*

*2) surgical procedure or*

*3) clinical diagnostic investigation.*

Therefore, athletes should always apply for a TUE, if they are administered an intravenous treatment (more than 100 ml/12hrs), in any of the following environments which under regular circumstances will not comply with the three exemptions listed above.

a) medical practitioner's office, a hotel room, in a home, tent or vehicle

b) event organizers' medical facility, tent, first aid station, or start-finish line facility

c) IV clinics or any clinic/treatment room or centre outside of a hospital facility unless a clinical diagnostic investigation or surgical procedure has been performed.

- If a NON-PROHIBITED SUBSTANCE is infused or injected without being part of a hospital treatment, surgical procedure or clinical diagnostic investigation, a TUE must be submitted for this Prohibited Method if more than 100 ml of fluid in a 12-hour period is infused or injected.
- If a PROHIBITED SUBSTANCE is administered via IV infusion or injection, a TUE application must be submitted for the Prohibited Substance regardless of whether the infusion is less than 100 ml or the setting/circumstances under which it is administered.

# WHAT YOU WILL FILE IN A TUE--Diagnosis

a. **Medical History**

A summary of the **athlete's history** and the findings of a **physical examination** should confirm the diagnosis and/or the clinical condition that resulted in the need for an IV infusion.

**A description of the clinical situation** that preceded the treatment and specific medical indication for the IV infusion must be given in the TUE application.

Only if a prohibited substance is administered would one need to apply for a TUE.

The athlete is advised to obtain and keep a copy of the medical records from the intervention or procedure.

b. Relevant medical information

A detailed description of the **substance infused, the rate of infusion and any other relevant clinical information** from the treating physician should be included.

It must be demonstrated **why an alternative permitted therapy**, for example oral rehydration in case of dehydration, is not a valid option.

Any existing co-morbidities that would influence the decision for granting a TUE should also be included.

# QUESTION 5

**You were posted as team doctor in ASIAN GAMES 2021. One of your athlete suffered Acute Gastroenteritis due to which he lost a large amount of body fluids. You decided to administer IV fluids (RINGER LACTATE) as he was unable to accept oral feeds. You later on remembered that giving IV fluids is also doping. You decided to check WADA website to check the guideline for IV Fluids. What concentration of IV fluids can be allowed so that athlete is not sanctioned?**

a.100 mL/12 hours

b.200 mL/12 hours

c.200 mL/24 hours

d.Since athlete was severely dehydrated he will be excused from sanctions & it was done to save life

Intravenous (IV) infusions have been included on the WADA List of Prohibited Substances

and Methods under section M2. (Prohibited Methods; Chemical and Physical Manipulation) since 2005.

Intravenous infusions are prohibited both in-competition and out-of competition if the volume delivered exceeds 100 ml within a 12-hour period.

Here athlete is not in a hospital settings but inside a training camp where Iv fluids if given would require a TUE.

When an IV Infusion is administered to the athlete follow criteria should be fulfilled

a)A well described diagnosis and/or condition

b)It was not medically reasonable to try a permitted alternative treatment

c)The Treatment was ordered by a physician and administered by qualified medically professional

d)Adequate medical records of the treatment are available

# QUESTION 6

**You are a team physician doing PPE for upcoming ASIAN GAMES. One of your female athlete is a 20 year old sprinter. You did routine ECG as a part of work up & found an arrhythmia that showed Long QT interval on ECG. Though she is currently asymptomatic but on enquiring further she gave a history that she used to have syncopal episodes and fainting when get excited , angry or scared few months back for which she was also given medication since then by a cardiologist which reduced her symptoms. Based on this history how much months she must remain asymptomatic with medical therapy to allow her clearance for games?**

a) 12 months

b) 5 months

c) 6 months

d) 3 months

# Eligibility and Disqualification Recommendations for Competitive Athletes With Cardiovascular Abnormalities

**Cardiac Channelopathies**

Genetically mediated heart rhythm disorders (also referred to as the primary electrical disorders) that are generally associated with a structurally normal heart and a propensity for syncope, seizures, or sudden cardiac arrest precipitated by a channelopathy-mediated episode of nonsustained or sustained polymorphic ventricular tachycardia (torsade de pointes) or ventricular fibrillation.

These cardiac channelopathies-

a) Long-QT syndrome (LQTS),
b) Catecholaminergic polymorphic ventricular tachycardia (CPVT),
c) Brugada syndrome (BrS),
d) Early repolarization syndrome,
e) Short-QT syndrome, and
f) Potentially idiopathic ventricular fibrillation.
g) Approximately 1 in 1000 people are affected by a cardiac channelopathy, with LQTS being most common, involving an estimated 1 in 2000 people.

# RTP DECISION

1. Any return-to-play decision for an athlete suspected of having a cardiac channelopathy ---athlete be evaluated, risk stratified, treated, and counseled... by a Cardiologist.
2. Restriction from virtually all competitive sports..... proarrhythmic trigger... **CPVT & LQTS**
3. CPVT-triggered breakthrough event despite β-blocker use is much higher than in LQTS

# PREACAUTIONARY MEASURES

1) Avoidance of QT-prolonging drugs for athletes with LQTS

(2) Avoidance of drugs that exacerbate the BrugadS in affected athletes

(3) Electrolyte/hydration replenishment and avoidance of dehydration for all

(4) Avoiding/treating hyperthermia from febrile illnesses or training-related heat exhaustion/heat stroke for athletes with either LQTS or BrS

(5) Acquisition of a personal automatic external defibrillator (AED) as part of the athlete's personal sports safety gear, and

(6) Establishing an emergency action plan (EAP)with the appropriate school/team officials.

# GENOTYPE ++/ PHENOTYPE --

1. **A previously symptomatic athlete describes one who has experienced at least 1 channelopathy-triggered/suspected syncope, seizure, or aborted/resuscitated cardiac arrest.**

2. **An athlete with a concealed channelopathy describes an asymptomatic athlete with a positive genetic test who lacks electrocardiographic evidence on a 12-lead ECG at rest (ie, corrected QT interval <460 ms for LQTS, no spontaneous type 1 Brugada electrocardiographic pattern in the right precordial leads for BrS, no horizontal or downsloping early repolarization pattern in the inferolateral leads for early repolarization syndrome, or corrected QT interval >380 ms for short-QT syndrome) or during exercise stress testing for CPVT (ie, no exercise-induced premature ventricular contractions in bigeminy, couplets, or worse).**
3. **An athlete with a concealed channelopathy is also referred to as genotype positive/phenotype negative.**

# RECOMMENDATIONS

- It is recommended that **Symptomatic** athletes with any suspected or diagnosed cardiac channelopathy be Restricted from all competitive sports until a comprehensive evaluation has been completed, the athlete and his or her family are well informed, a treatment program has been implemented, and the athlete has been asymptomatic on therapy for 3 months .

- It is reasonable for an **Asymptomatic** athlete with genotype-positive/phenotype-negative (ie, concealed channelopathy) LQTS, CPVT, BrS, early repolarization syndrome, idiopathic ventricular fibrillation, or short-QT syndrome to participate in all competitive sports with appropriate precautionary measures.

3.Competitive sports participation may be considered for an athlete with either previously Symptomatic or electrocardiographically evident BrugadaS, Early repolarization syndrome, or Short-QT syndrome

Either symptomatic LQTS or electrocardiographically manifest LQTS (ie, corrected QT interval >470 ms in males or >480 ms in females), competitive sports participation (except competitive swimming in a previously symptomatic LQT1 host)

*Assuming appropriate precautionary measures and disease-specific treatments are in place and that the athlete has been asymptomatic on treatment for at least 3 months.*

For an athlete with previously **Symptomatic** CPVT or an **Asymptomatic CPVT** athlete with exercise-induced premature ventricular contractions in bigeminy, couplets, or nonsustained ventricular tachycardia, participation in competitive sports is not recommended except for class IA sports.

Exceptions to this limitation should be made only after consultation with a CPVT specialist.

**What is the most common complications with symptoms of Sore throat & Posterior triangle lymphadenitis** ??

A) Fatigue

B) Lymphadenitis

C) Spleen rupture

D) Morbilloform rash

- Athlete having Sore Throat and Cervical Lymphadenopathy??

1. Fatigue
2. Splenic Rupture
3. Hepatitis
4. Myocarditis

Diagnosis :

Infectious mononucleosis

Caused by:

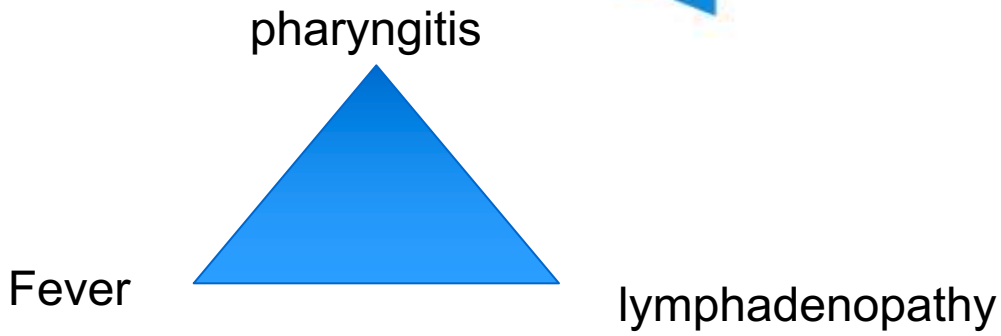
Epstein-Barr virus

Double-stranded DNA gamma herpesvirus that was first isolated in 1964 from Burkitt lymphoma tissue.

Benign lymphoproliferative IM ....also been linked to

Burkitt lymphoma, Hodgkin lymphoma, and nasopharyngeal carcinoma

## “Triad” of IM”




- Fatigue and pharyngitis are the most debilitating symptoms and often present as the chief complaint.
- Posterior cervical lymph nodes>>axillary and inguinal lymphadenopathy.
- **Athlete presenting with nothing more than fatigue, lack of energy, or diminished performance.**
- Other features------ posterior palatine petechiae(one third of cases), jaundice, exudative pharyngitis, rash, and splenomegaly

- A rash is seen in about 10% to 40% of patients. The rash is transient and generalized with *maculopapular, petechial, or urticarial features*
- Jaundice is rare, ( less than 10% to 15% of patients).

Approximately 90% of patients have mildly elevated liver enzymes facilitating in the diagnosis of IM.

Exudative pharyngitis----concomitant tonsillar enlargement(lymphoid hyperplasia and pharyngeal inflammation)

# Splenomegaly

*lymphocytic infiltration enlarging the spleen beyond protection from the rib cage and creating an organ that is susceptible to rupture either spontaneously or traumatically resolved in 4 to 6 weeks*

The acute phase of IM can resolve as quickly as 7 days, but usually takes between 2 and 3 weeks from the onset of symptoms.

This is followed by a recovery period that may take up to 2 to 3 months.

IM is typically self-limiting, but an acute EBV infection is a risk factor for chronic fatigue, with symptoms lasting in excess of 6 months.

Diagnostic criteria for IM

## Hoagland criteria

include greater than 50% lymphocytes and at least 10% atypical lymphocytes with

fever, pharyngitis, adenoapthy, and a positive serologic test.

# List of Complications

Sore throat (95%),

Cervical lymphadenopathy (80%),

Fatigue (70%),

Upper respiratory symptoms (65%),

Headache (50%),

Decreased appetite (50%),

Fever (47%) and

Myalgia (45%).

Most findings last 10 days or less but fatigue and cervical lymphadenopathy often persist for at least 3 weeks.

# Complications

- Complications that occur in at least 1% of patients are:

✓ Airway obstruction because of oropharyngeal inflammation,

✓ Streptococcal pharyngitis,

✓ Meningoencephalitis,

✓ Hemolytic anemia and

✓ Thrombocytopenia.

Splenic rupture occurs in <1% in patients but is the most feared complication, which sometimes keeps athletes out of competition for weeks.

***A reasonable recommendation is that athletes may resume contact sports after 3 weeks of illness as long as they have no ongoing signs or symptoms of acute EBV infection.***

# Question 8

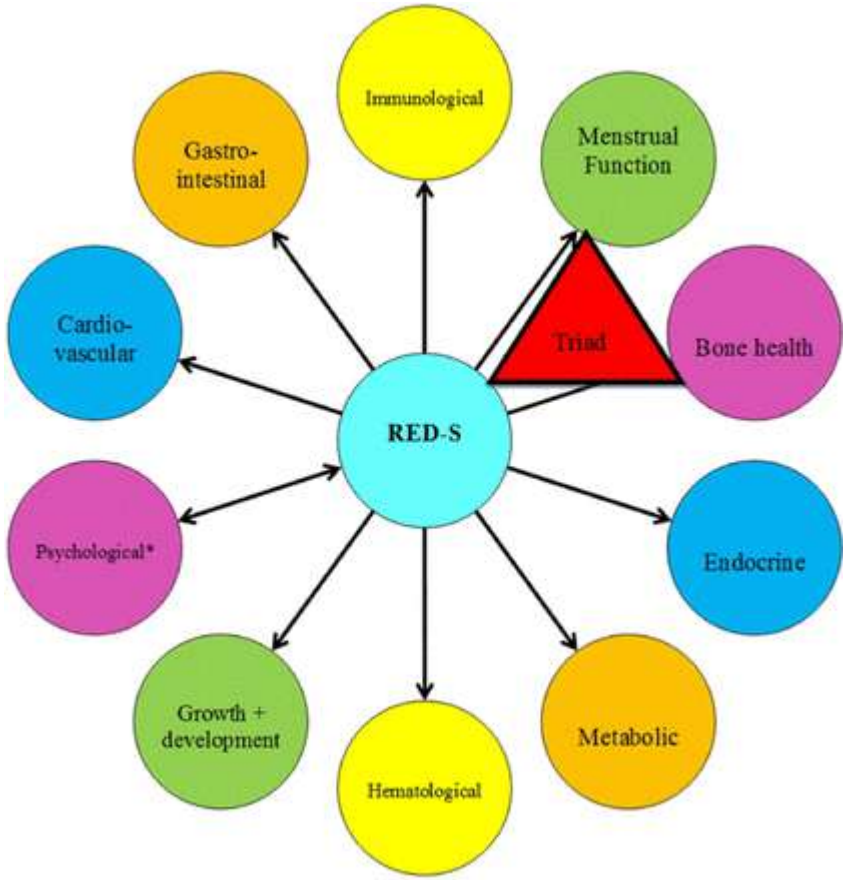
**A young female of 22 years was preparing for upcoming national wrestling championship. She weighed 52 kg & wanted to prepare for 48 kg category. She started losing weight rapidly, started training excessively & took inadequate nutrition. She also complained of irregular menses. Based on the given history you suspected a diagnosis ??**

**Which amongst the following is most common cause of this condition?**

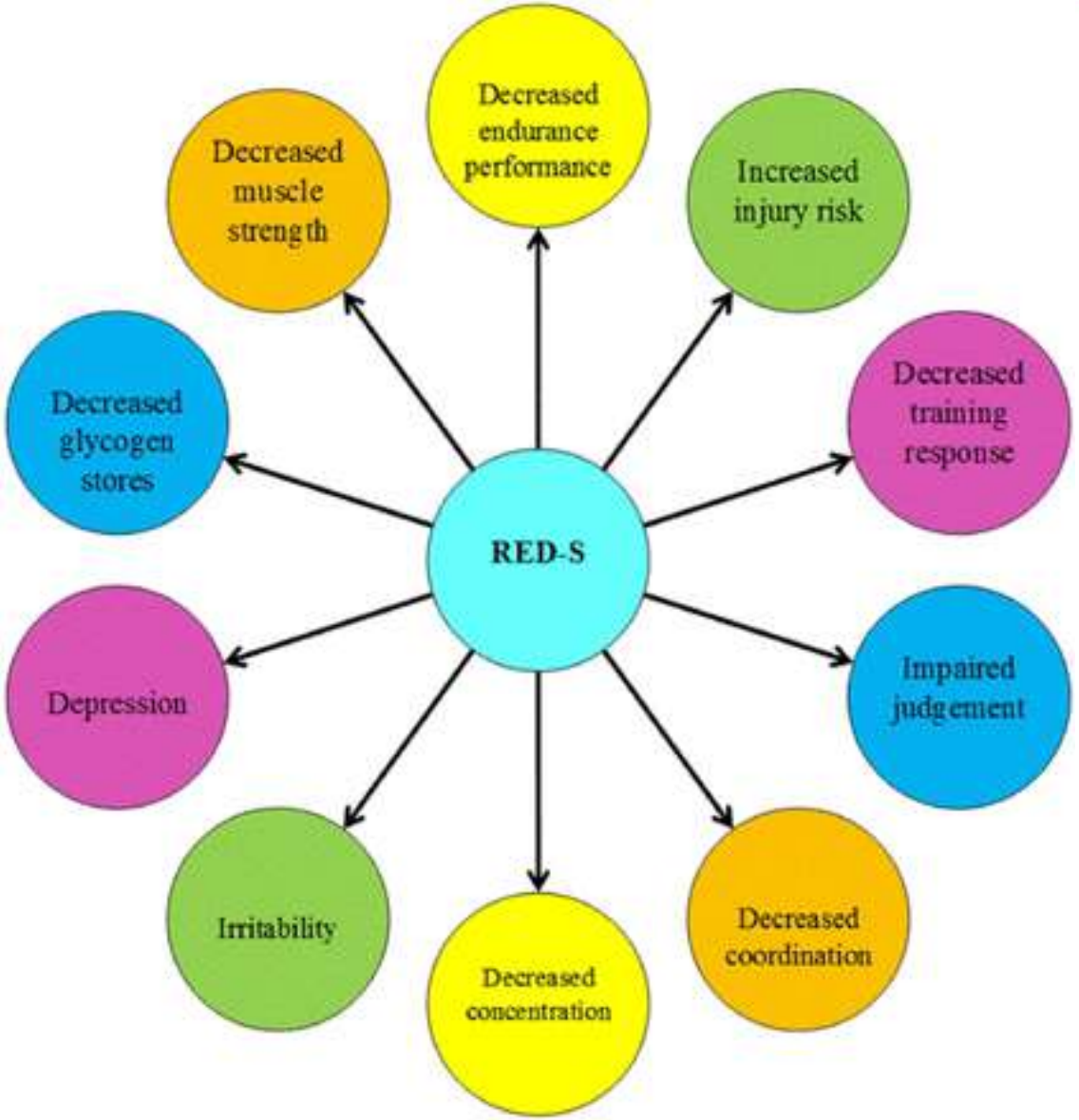
- a) Excess pressure from parents & coach
- b) Disordered eating pattern
- c) Pre occupation with body image
- d) Endocrine disorder like Hypothyroidism/DM

# Beyond the Female Athlete Triad: Relative Energy Deficiency in Sport (RED-S)

- **LEA (Lower Energy Availability)**- mismatch between an athlete's energy intake (diet) and the energy expended in exercise, leaving inadequate energy to support the functions required by the body to maintain optimal health and performance.




$$\begin{aligned}\mathrm{Energy\,Availability\,(EA)} &= \mathrm{Energy\,Intake\,(EI)\,(kcal)} \\ &\quad - \mathrm{Exercise\,Energy\,Expenditure\,(EEE)\,(kcal)}/ \\ &\quad \mathrm{Fat\,Free\,Mass\,(FFM)\,(kg)}\end{aligned}$$



# Disordered eating and eating disorders

- More prevalent among female and male athletes in **weight-sensitive sports** in comparison to athletes representing sports in which leanness is a less important performance variable.
- The pathogenesis of eating disorders is **multifactorial** with cultural, familial, individual and genetic/biochemical factors playing roles.
- Weight pressure and unique eating disorder risk and trigger factors have been reported and include performance pressure, sudden increase in training volume, injury, teammate modelling of eating disorder behaviours and team weigh-ins.
- A desire to be leaner to enhance performance seems to predict later disordered eating.
- Coach–athlete relationship is high conflict and low support.
- Advantage of weight loss--perfectionism, competitiveness, pain tolerance and the perceived performance .

- **Most Common Site of Stress Fracture in an Athlete is**

1. Distal Third of Tibia
2. 2nd Metatarsal
3. Fibula
4. Femoral Neck

- The most common sites for stress fractures are as follows in decreasing order
- Metatarsals>>Tibia, Tarsals, Femur, and Fibula, followed by the pelvis.

- In female athletes, stress fractures of the

Pelvis and Metatarsals are most common.

- Upper extremity stress fractures are rare but have been reported in gymnasts, weightlifting, and throwing sports.

- The clavicle, scapula, first rib and proximal humerus/shaft (thrower's shoulder),
- Medial epicondyle (thrower's elbow), olecranon, and Radial physis (gymnast's wrist) are the most common sites.

- Female athletes across all sports higher incidences were observed (baseball/softball, basketball, cross-country, ice hockey, lacrosse, soccer, swim and dive , tennis, indoor and outdoor track)

- Now most common fracture if being asked without giving a specific sports it's — Tibia
- In runners most common cause of Leg pain is MTSS : Stress Injury to Lower 1/3rd Tibia
- But if specific sports is mentioned it's
- Metatarsal Stress #= Common in Ballet Dancers
- In Athlete Most Common Bone affected by Stress # is Tibia
- In Female Athlete it's Metatarsal - which is more common

# TO BE CONTINUED...

FOR ANY QUERIES-

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