PRE-PARTICIPATION SPORTS PHYSICAL:

A Review and Update on the Standard of Care

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SPARCC

Sports Medicine • Rehabilitation • Concussion Care

SPARCC TEAM: DR. MINOR

Dr. Mo (Mortazavi)
and
Dr. Jon (Minor)

Trained in Pediatrics and non-operative sports medicine
(the entire spectrum of ages)

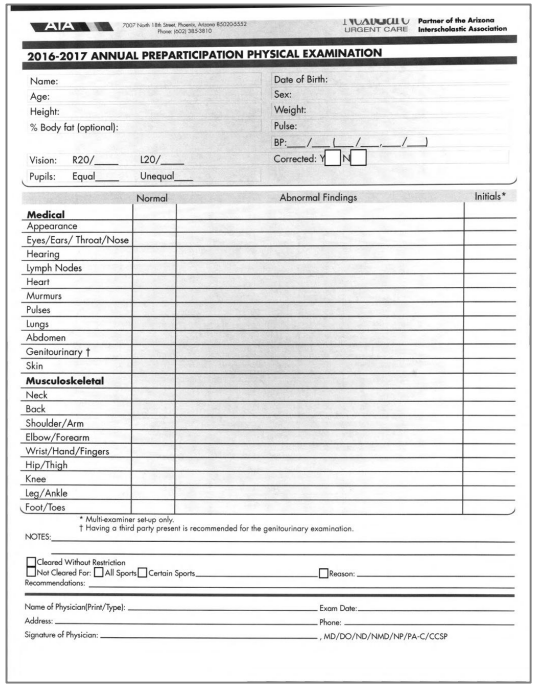
OBJECTIVES

1. To review the pre-participation sports history and physical, and feel comfortable identifying abnormalities
2. Understand those athletes warranting further specialty evaluation (cardiac, MSK, concussion)
3. Feel comfortable screening and identifying athletes at risk of musculoskeletal injury
4. Be able to identify other high-risk injury and cardiac activity groups in need of pre-participation examinations

GOAL AND TARGET OF THE PPE

The GOAL of PPE:

- Identifying athletes at increased risk of morbidity & mortality
  - Sudden cardiac death (SCD)
  - Splenic rupture (recent mononucleosis infection)
  - Chronic MSK injury (sprains, dislocations, etc)
  - Acute MSK injury (major ligament tears)
  - Concussion, post-concussion syndrome



AIA URGENT CARE — Partner of the Arizona Interscholastic Association

2016-2017 ANNUAL PREPARTICIPATION PHYSICAL EXAMINATION

Name: Date of Birth:
Age: Sex:
Height: Weight:
% Body fat (optional): Pulse:
BP: ___/___ ___/___ ___/___
Vision: R20/____ L20/____ Corrected: Y ☐ N ☐
Pupils: Equal____ Unequal____

	Normal	Abnormal Findings	Initials*
Medical			
Appearance			
Eyes/Ears/ Throat/Nose			
Hearing			
Lymph Nodes			
Heart			
Murmurs			
Pulses			
Lungs			
Abdomen			
Genitourinary †			
Skin			
Musculoskeletal			
Neck			
Back			
Shoulder/Arm			
Elbow/Forearm			
Wrist/Hand/Fingers			
Hip/Thigh			
Knee			
Leg/Ankle			
Foot/Toes			

* Multi-examiner set-up only.
† Having a third party present is recommended for the genitourinary examination.

NOTES:

☐ Cleared Without Restriction
☐ Not Cleared For: ☐ All Sports ☐ Certain Sports ☐ Reason:
Recommendations:

Name of Physician(Print/Type): Exam Date:
Address: Phone:
Signature of Physician: , MD/DO/ND/NMD/NP/PA-C/CCSP

GOAL AND TARGET OF THE PPE

Target Subjects and frequency of PPE:

- All high school & college athletes, often Jr high athletes, and recreational collision sports (Pop Warner football)
- Required annually (AHA recommends every 2 years)
  - With PCP, opportunity to combine with annual exam
- Athletes who commonly get overlooked:
  - Gymnasts
  - Dancers
  - Running Clubs
  - Martial Arts
  - City Leagues
  - AAU basketball

GOAL AND TARGET OF THE PPE

Ultimate TARGET or Purpose:

- Risk stratification to determine the highest classification for safe athletic participation

		Noncontact		
Contact/Collision	Limited Contact/Impact	Strenuous	Moderately Strenuous	Nonstrenuous
Boxing	Baseball	Aerobic dancing	Badminton	Archery
Field hockey	Basketball	Crew	Curling	Golf
Football	Bicycling	Fencing	Table tennis	Riflery
Ice hockey	Diving	Field		
Lacrosse	Field	Discus		
Martial arts	High jump	Javelin		
Rodeo	Pole vault	Shot put		
Soccer	Gymnastics	Running		
Wrestling	Horseback riding	Swimming		
	Skating	Tennis		
	Ice	Track		
	Roller	Weight lifting		
	Skiing			
	Cross-country			
	Downhill			
	Water			
	Softball			
	Squash, handball			
	Volleyball			


UNIVERSITY

IN-OFFICE VS "LOCKER ROOM PPE"

Advantages:

1. Rapport with own patient
2. Know patient's prior history
3. Coordinate yearly
4. Allotted time for thoroughness

Disadvantages:

1. Can be rushed if inadequate time blocked
2. Clinicians: need to keep up with standard of care practices

IN-OFFICE VS ***"LOCKER ROOM PPE"***

Advantages:

1. Can perform hundreds over the course of hours
2. Coordinated to prevent athletes from missing play
3. Stations: specialists to perform different sections
4. Involve cardiology: on-site evaluation

Disadvantages:

1. Can overlook important details (volume)
2. Lack of individualized care
3. Clinicians: need to keep up with standard of care practices

BREAKING DOWN THE "STATIONS" PPE

Whether in-office or mass screenings, here's how to assign or break down each section/station: **7 "stations", ideally 7 on team**

BREAKING DOWN THE "STATIONS" PPE

"Vital Sign" Stations:

1. Blood pressure
   - Referral if 99th %'ile or greater for age & height
2. Visual acuity
   - Referral: uncorrected worse than 20/40

Blood Pressure Levels for Boys by Age and Height Percentile (Continued)

Age (Year)	BP Percentile ↓	Systolic BP (mmHg) ← Percentile of Height →							Diastolic BP (mmHg) ← Percentile of Height →						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
11	50th	99	100	102	104	105	107	107	59	59	60	61	62	63	63
	90th	113	114	115	117	119	120	121	74	74	75	76	77	78	78
	95th	117	118	119	121	123	124	125	78	78	79	80	81	82	82
	99th	124	125	127	129	130	132	132	86	86	87	88	89	90	90
12	50th	101	102	104	106	108	109	110	59	60	61	62	63	63	64
	90th	115	116	118	120	121	123	123	74	75	75	76	77	78	79
	95th	119	120	122	123	125	127	127	78	79	80	81	82	82	83
	99th	126	127	129	131	133	134	135	86	87	88	89	90	90	91
13	50th	104	105	106	108	110	111	112	60	60	61	62	63	64	64
	90th	117	118	120	122	124	125	126	75	75	76	77	78	79	79
	95th	121	122	124	126	128	129	130	79	79	80	81	82	83	83
	99th	128	130	131	133	135	136	137	87	87	88	89	90	91	91
14	50th	106	107	109	111	113	114	115	60	61	62	63	64	65	65
	90th	120	121	123	125	126	128	128	75	76	77	78	79	79	80
	95th	124	125	127	128	130	132	132	80	80	81	82	83	84	84
	99th	131	132	134	136	138	139	140	87	88	89	90	91	92	92
15	50th	109	110	112	113	115	117	117	61	62	63	64	65	66	66
	90th	122	124	125	127	129	130	131	76	77	78	79	80	80	81
	95th	126	127	129	131	133	134	135	81	81	82	83	84	85	85
	99th	134	135	136	138	140	142	142	88	89	90	91	92	93	93
16	50th	111	112	114	116	118	119	120	63	63	64	65	66	67	67
	90th	125	126	128	130	131	133	134	78	78	79	80	81	82	82
	95th	129	130	132	134	135	137	137	82	83	83	84	85	86	87
	99th	136	137	139	141	143	144	145	90	90	91	92	93	94	94
17	50th	114	115	116	118	120	121	122	65	66	66	67	68	69	70
	90th	127	128	130	132	134	135	136	80	80	81	82	83	84	84
	95th	131	132	134	136	138	139	140	84	85	86	87	87	88	89
	99th	139	140	141	143	145	146	147	92	93	93	94	95	96	97

BREAKING DOWN THE "STATIONS" PPE

Start of Physical Exam:

3. Skin-mouth-eyes
   - Rashes: HSV, ringworm, molluscum, impetigo
   - Oral: exudative pharyngitis, dentition
   - Eyes: EOM, pupillary contraction, near point converg
4. Chest: cardiac history reviewed, and cardiac exam
   - Referral for red flags (fam hx, fainting/CP with exerc, etc.)
5. Lymphatics, abdomen and ***when indicated*** genitalia
   - Cervical (post chain → mono)
   - Hernia/genitalia if abd pain w/ exerc or athlete concern

BREAKING DOWN THE "STATIONS" PPE

6. Musculoskeletal exam (2-minute Ortho exam)
   - Neck, back ROM (with scoli)
   - Shoulder ROM
   - Upper/Lower Ext strength
   - Duck walk
   - Focused joint exam if history of injury or pain
7. Final review, with repeat of pertinent exam where indicated

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

What is the role of cardiac screening in PPE?

Much debate

General consensus:

- Many false positives on screenings
  - Not cost-effective
  - Unnecessary days away from sport/participation

In the right setting, may be a role for targeted screenings

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

The pre-participation cardiac screening in young athletes: which protocol do we need exactly?

380 athletes referred before sports participation

Screening protocol:

- ***personal and family history***
- ***physical exam***
- 12-lead ECG
- transthoracic echo
- 24-hour Holter monitor
- treadmill exercise test

Çetin İl, et al. *Cardiology of the Young.* 2018 April.

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

The pre-participation cardiac screening in young athletes: which protocol do we need exactly?

History form:

- chest pain in 19 (5%)
- dyspnea in 13 (3.4%)
- dizziness and fainting with exercise in five patients (1.3%)
- Family history of sudden death and arrhythmia in 41 patients (10.7%)

Physical exam:

- hypertension in 10 patients (2.6%)
- heart murmur was present in 20 (5.2%)

Çetin İl, et al. *Cardiology of the Young.* 2018 April.

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

The pre-participation cardiac screening in young athletes: which protocol do we need exactly?

Screening test results:

- 12-lead ECG was abnormal in 9 patients (2.4%)
- Insignificant TTE findings in 47 patients (12.3%)
- Hemodynamically important TTE findings in five patients (1.3%)
- 24-hour Holter monitor was abnormal in six patients (1.5%)
- Significant ST changes in two patients (0.5%) on treadmill exercise test, with normal findings on myocardial perfusion scans

Çetin İl, et al. *Cardiology of the Young.* 2018 April.

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

The pre-participation cardiac screening in young athletes: which protocol do we need exactly?

Conclusions:

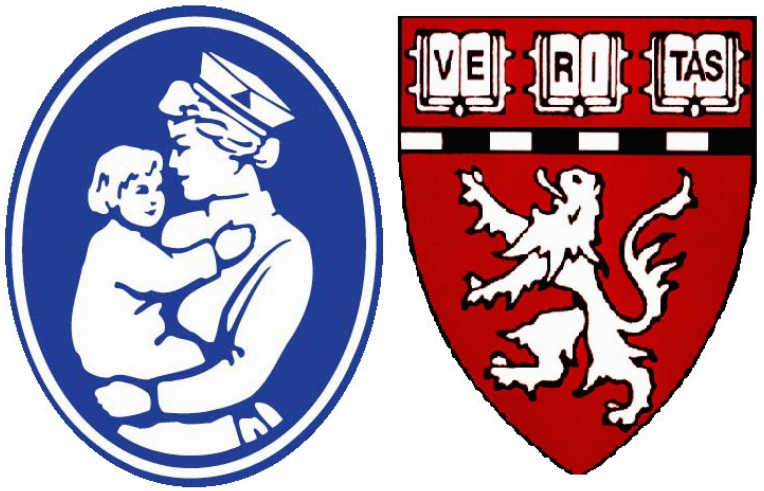
- No significant relation between screening protocol and TTE, 24-hour Holter monitor, or treadmill exercise testing
- Pre-participation screening in young athletes should consist of targeted personal history, family history, physical exam, and 12-lead electrocardiography
- Other testing only if screening indication for cardiovascular disease

Çetin İl, et al. *Cardiology of the Young.* 2018 April.

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

Early **S**creening for **C**ardiovascular **A**bnormalities with **P**re-participation **E**chocardiography protocol (**ESCAPE**)

Boston Children's Hospital



Corrado, et al. J Ultrasound Med. 2014 Feb

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

ESCAPE protocol:

- Sixty-five male collegiate athletes (18 to 25 years)
- Each screened with H&P, ECG, and focused echocardiography
  - performed by non-cardiologist sports medicine physician
  - 2010 European Society of Cardiology criteria were used to screen ECGs
  - physician-operated echo performed to assess for hypertrophic cardiomyopathy and aortic root dilatation
  - athletes screening positive were referred to cardiologist

Corrado, et al. J Ultrasound Med. 2014 Feb

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

ESCAPE protocol:

- Most of the athletes (n = 59/65) did not screen positive by any screening modality
- Three athletes screened positive on ECG but had normal focused echocardiographic findings
- Three athletes screened positive by H&P but had normal ECG and focused echocardiographic findings
- All athletes screening positive were referred to a cardiologist and eventually cleared for sports participation
- No athlete screened positive by focused echocardiography alone
- Focused echocardiography reduce the HCM referral rate by 33%
- Measurements statistically similar to those of formal echo

Corrado, et al. J Ultrasound Med. 2014 Feb

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

ESCAPE Conclusions:

Focused physician-operated echocardiography:

1. improves false-positive rates
2. broadens the spectrum of disease that is detectable through pre-participation screening of athletes

Corrado, et al. J Ultrasound Med. 2014 Feb

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

Ultrasound Instruction:

Question: Can we teach medical students to perform screening ultrasound, or focused echo for HCM?

Methods:

- 1st and 2nd year med students instructed in focused echocardiography, screening for HCM
- Compared students' measured findings with formal TTE

Fox JC, et al. J Ultrasound Med. 2017 June.

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

Ultrasound Instruction:

Question: Can we teach medical students to perform screening ultrasound, or focused echo for HCM?

Methods:

- 12 high schools, 3 colleges; athletes enrolled
- 2332 athletes: screened with focused echo
  - Med student findings reviewed by cardiologist

Fox JC, et al. J Ultrasound Med. 2017 June.

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

Ultrasound Instruction:

Question: Can we teach medical students to perform screening ultrasound, or focused echo for HCM?

Results:

- 2332 echos: 137 with positive findings (5.8%)
- Formal cardiology work-up: 7 with confirmed HCM (5.1%)
- 100% sensitivity, reliably ruling out HCM

Fox JC, et al. J Ultrasound Med. 2017 June.

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

ECG Screening:

Rate of false positives:

- European Society of Cardiology (2010): 26%
- Stanford Criteria (2011): 8%
- Seattle Criteria (2013): 6%

The use of ECG for SCD screening: "Seattle Criteria"

Schmehil C, et al. *Translational Pediatrics*. 2017.

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

ECG for SCD screening: "Seattle Criteria"

Lowest *rate of false positives:*

Goal:

1. **Identify abnormal ECG findings**
   - ❖ **Warrant removal from sport participation**

2. Identify normal ECG findings
   - ❖ Prevent unnecessary removal from sports

T-wave inversion
ST segment depression
Pathologic Q waves
Complete left bundle branch block
Intraventricular conduction delay
Left axis deviation
Left atrial enlargement
Right ventricular hypertrophy pattern
Ventricular pre-excitation
Long QT interval
Short QT interval
Brugada-like ECG pattern
Profound sinus bradycardia
Atrial tachyarrhythmias
Premature ventricular contractions
Ventricular arrhythmias

Drezner JA, et al. Br J Sports Med. 2013.

RECENT LITERATURE: COMPREHENSIVE CARDIAC SCREENING

ECG for SCD screening: "Seattle Criteria"

Lowest *rate of false positives:*

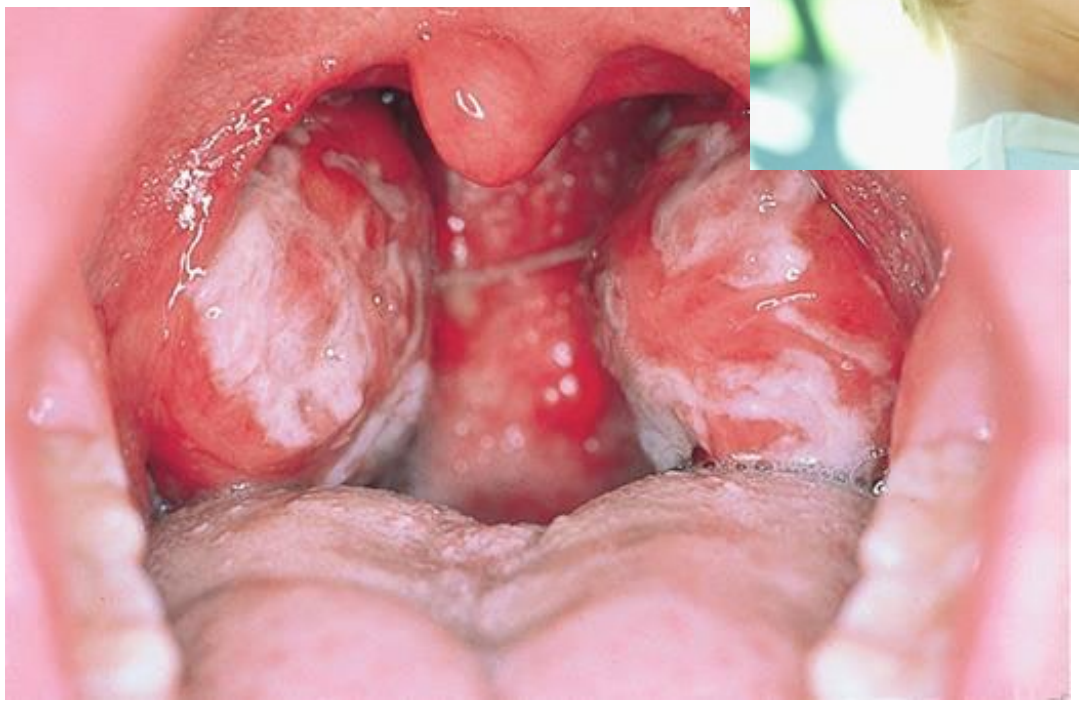
Goal:

1. Identify abnormal ECG findings
   - ❖ Warrant removal from sport participation

2. **Identify normal ECG findings**
   - ❖ **Prevent unnecessary removal from sports**

- ✓ **Sinus bradycardia**
- ✓ **Sinus arrhythmia**
- ✓ **Ectopic atrial rhythm**
- ✓ **Junctional escape rhythm**
- ✓ **1° AV block (PR interval >200 ms)**
- ✓ **Mobitz Type I (Wenckebach) 2° AV block**
- ✓ **Incomplete right bundle branch block**
- ✓ **Isolated QRS voltage criteria for LVH**
- ✓ **Early repolarization**
- ✓ **Convex ST segment elevation combined with T-wave inversion in V1-V4**

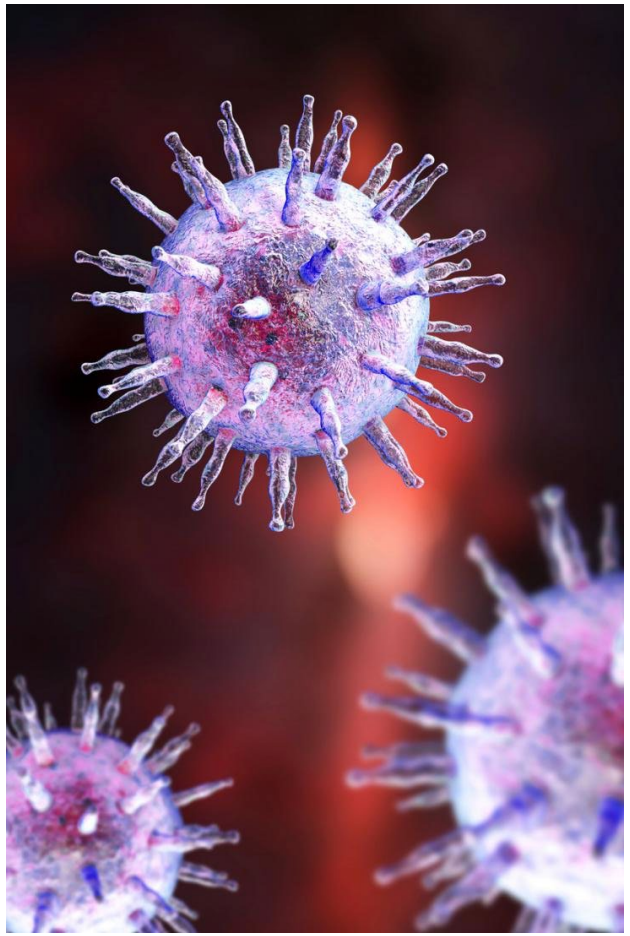
Drezner JA, et al. Br J Sports Med. 2013.



INFECTIOUS MONONUCLEOSIS

"Mono"

- Epstein-Barr Virus (EBV) infection
- Associated with splenic enlargement
  - Increased risk of splenic rupture
    - Spontaneous and Traumatic
- Incidence of infection:
  - Highest from 15 – 24 years of age
  - Rare in childhood
  - Negligible over age 35



INFECTIOUS MONONUCLEOSIS

Application to Pre-participation Physical Exam:

- History: recent fever, sore throat, fatigue, rash
- Exam: Splenic enlargement, lymphadenopathy

Risk Stratification:

- Identification of athletes at risk of rupture: ALL ATHLETES
  - Contact/collision (football, soccer, basketball, wrestling, etc.)
  - Anaerobic and vigorous sport (weight lifting, sprinting, throwing, etc)

More likely to see this during the season than at PPE

INFECTIOUS MONONUCLEOSIS

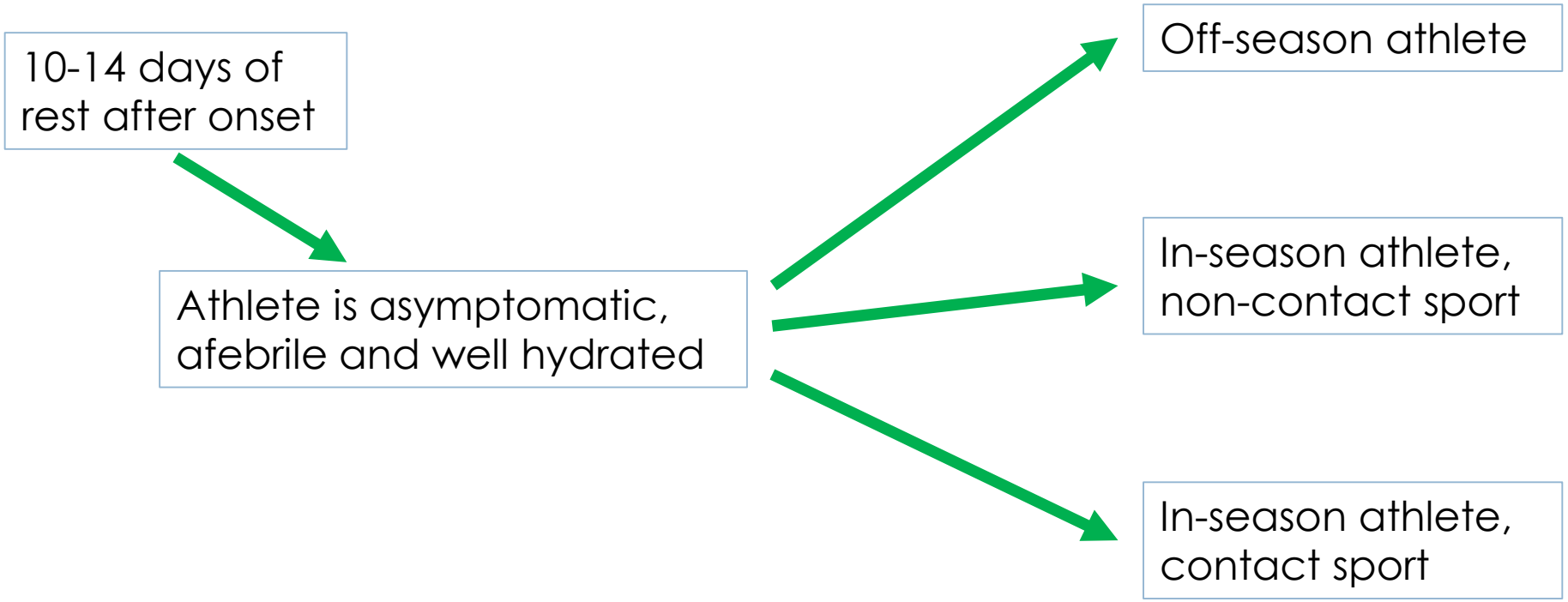
Management of Mono:

1. Supportive care
   - No role for medications or corticosteroids
2. Exam is unreliable for evaluating splenic enlargement
3. Ultrasound: best for imaging spleen; limited at guiding RTP
   1. Serial ultrasound: evaluating for regression → illness resolution
4. Exercise does not increase risk for chronic fatigue

Becker JA. Sports Health. 2014 May June

INFECTIOUS MONONUCLEOSIS

Management of Mono: Algorithm



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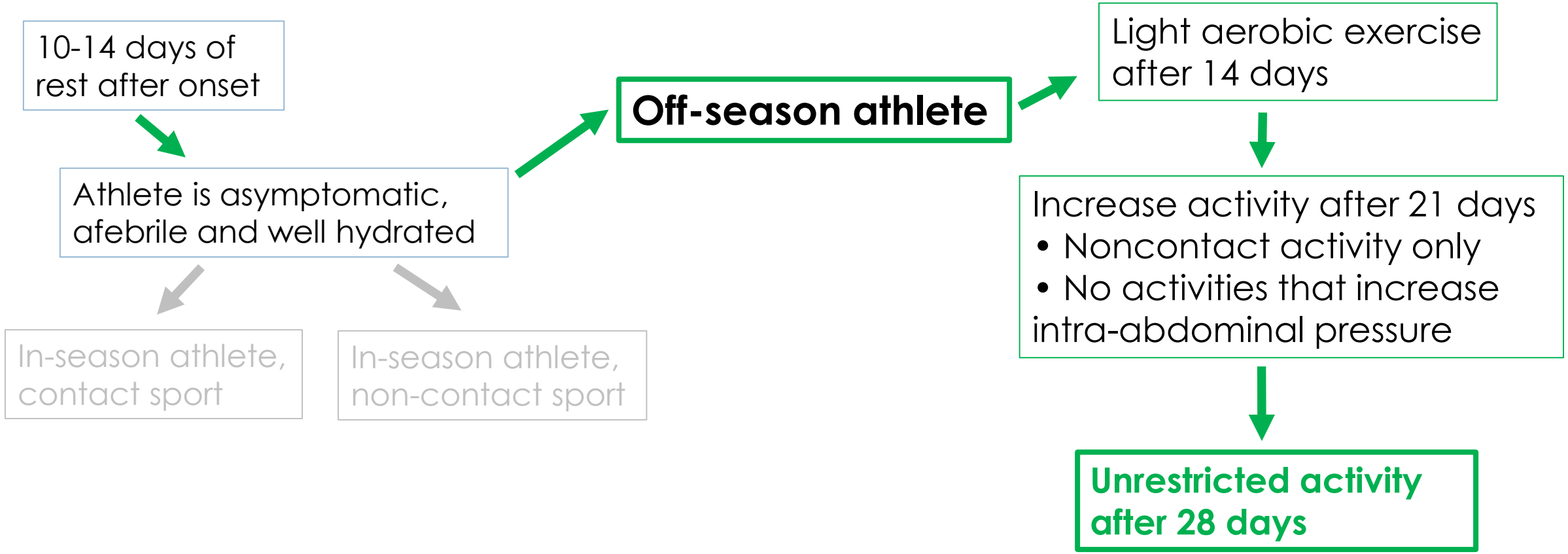

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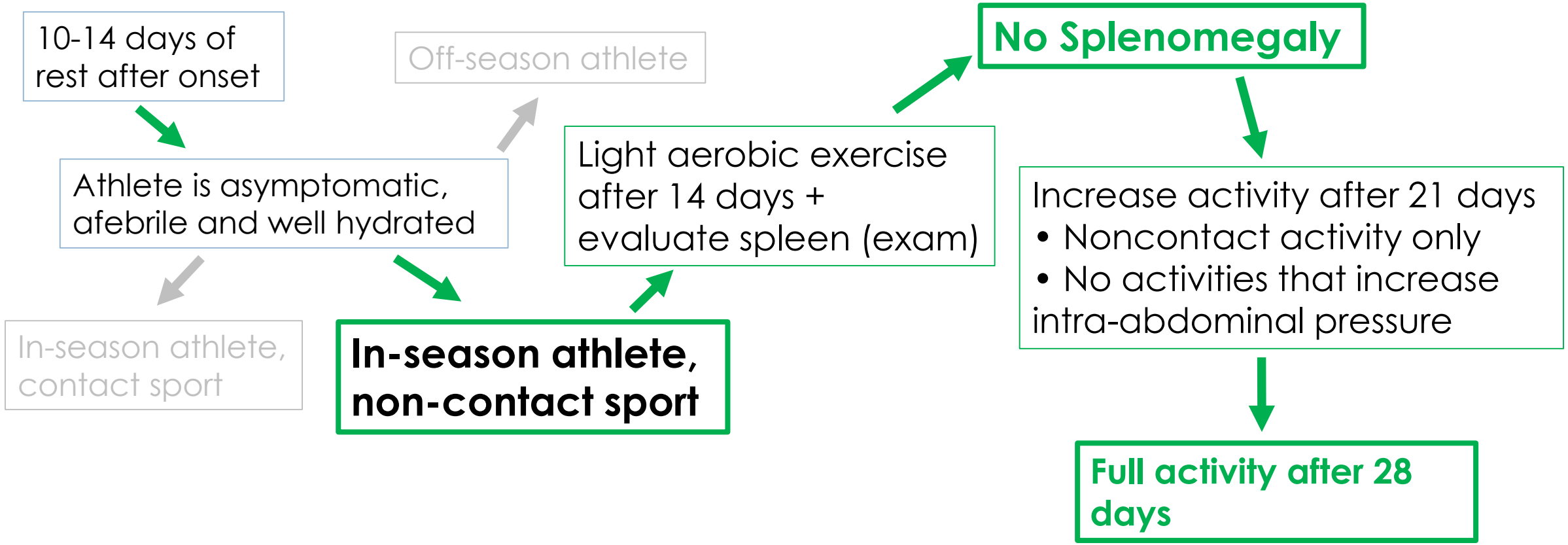

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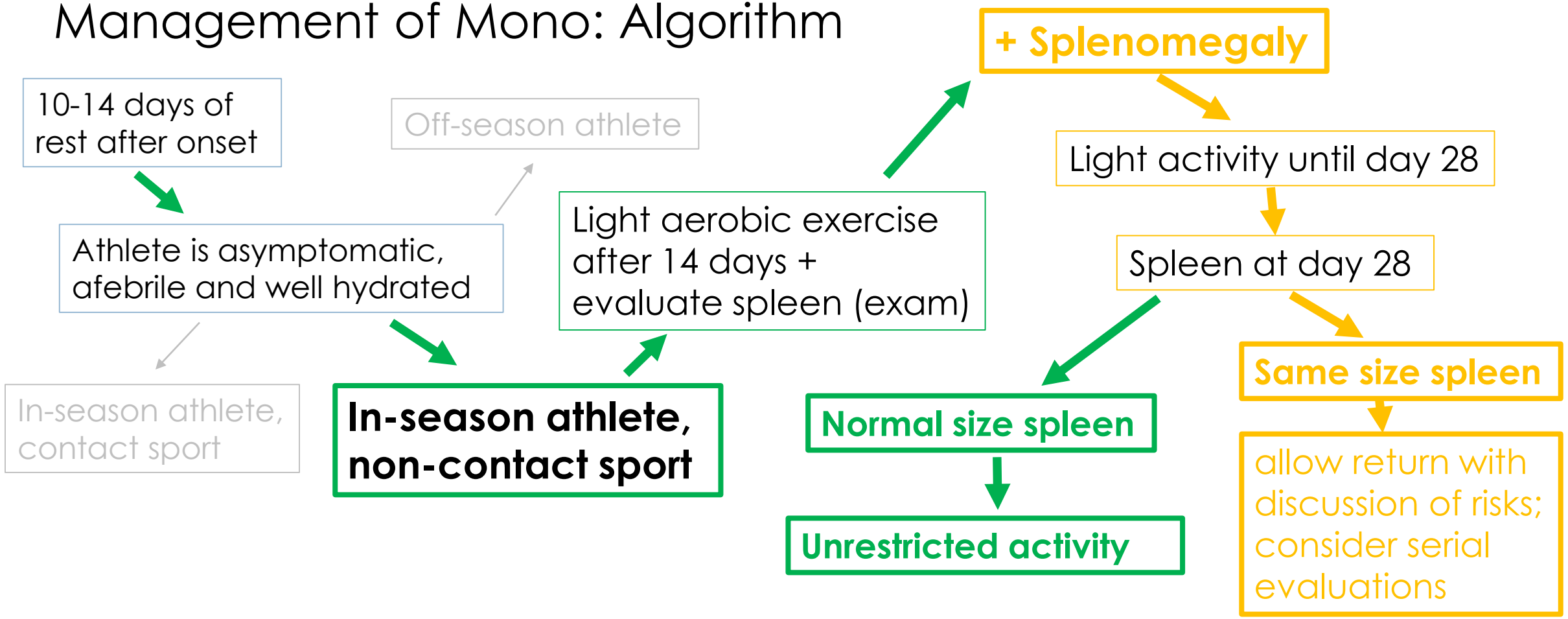

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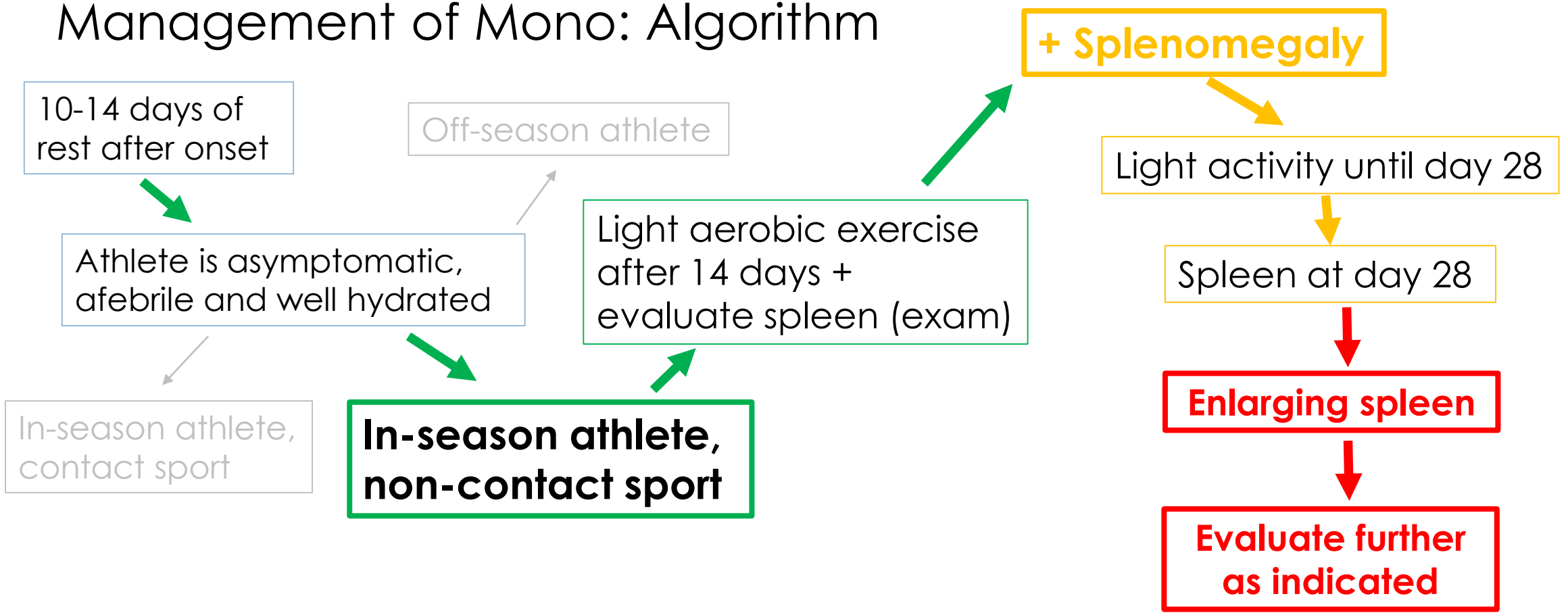

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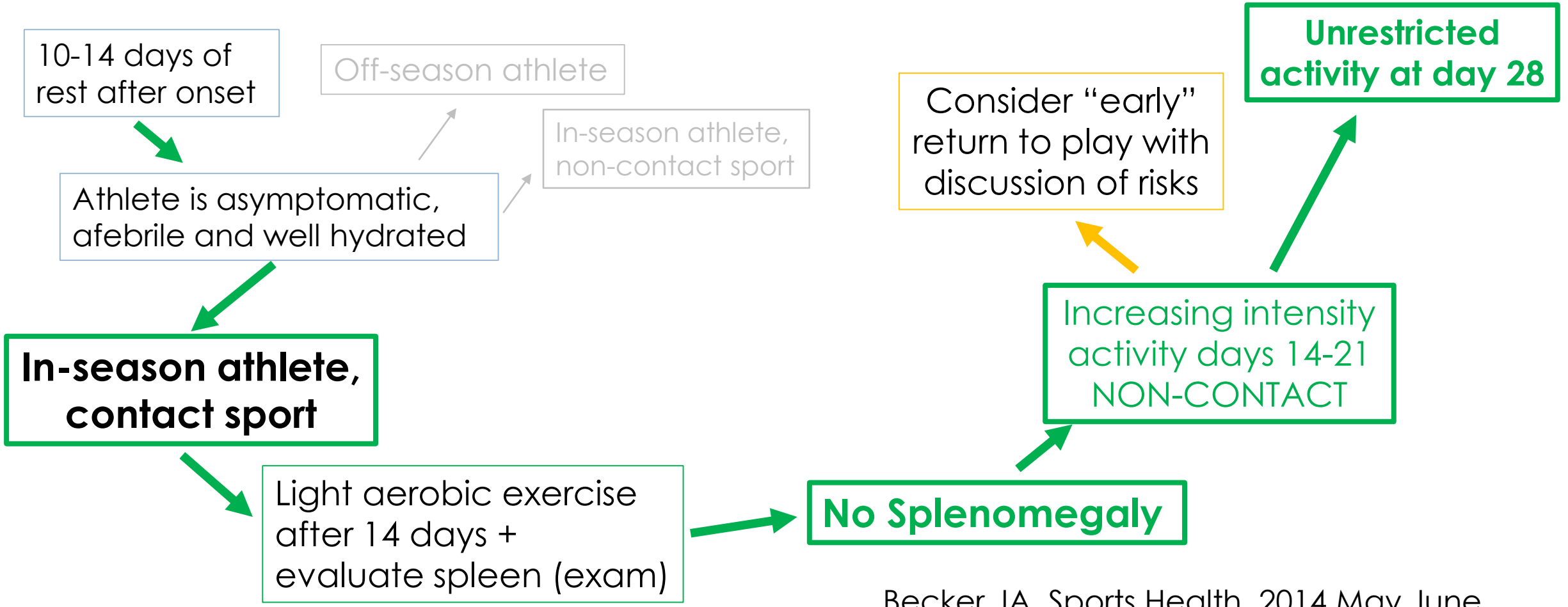

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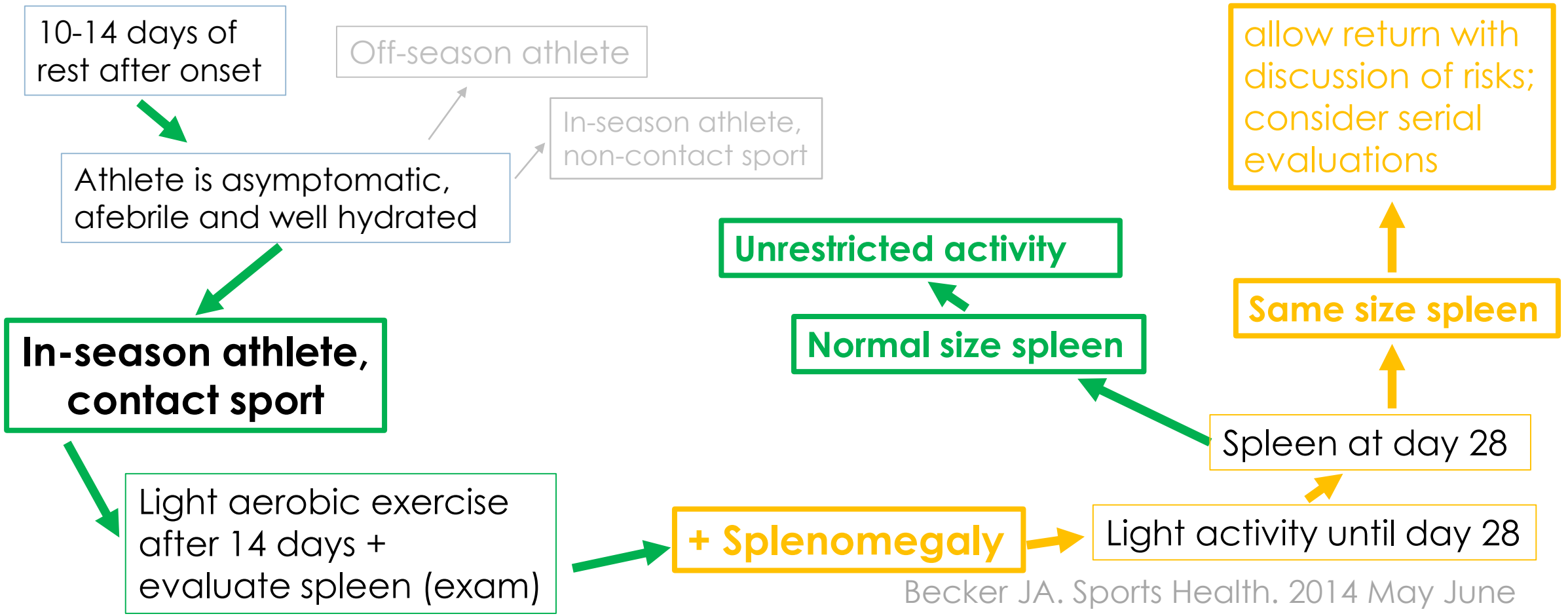

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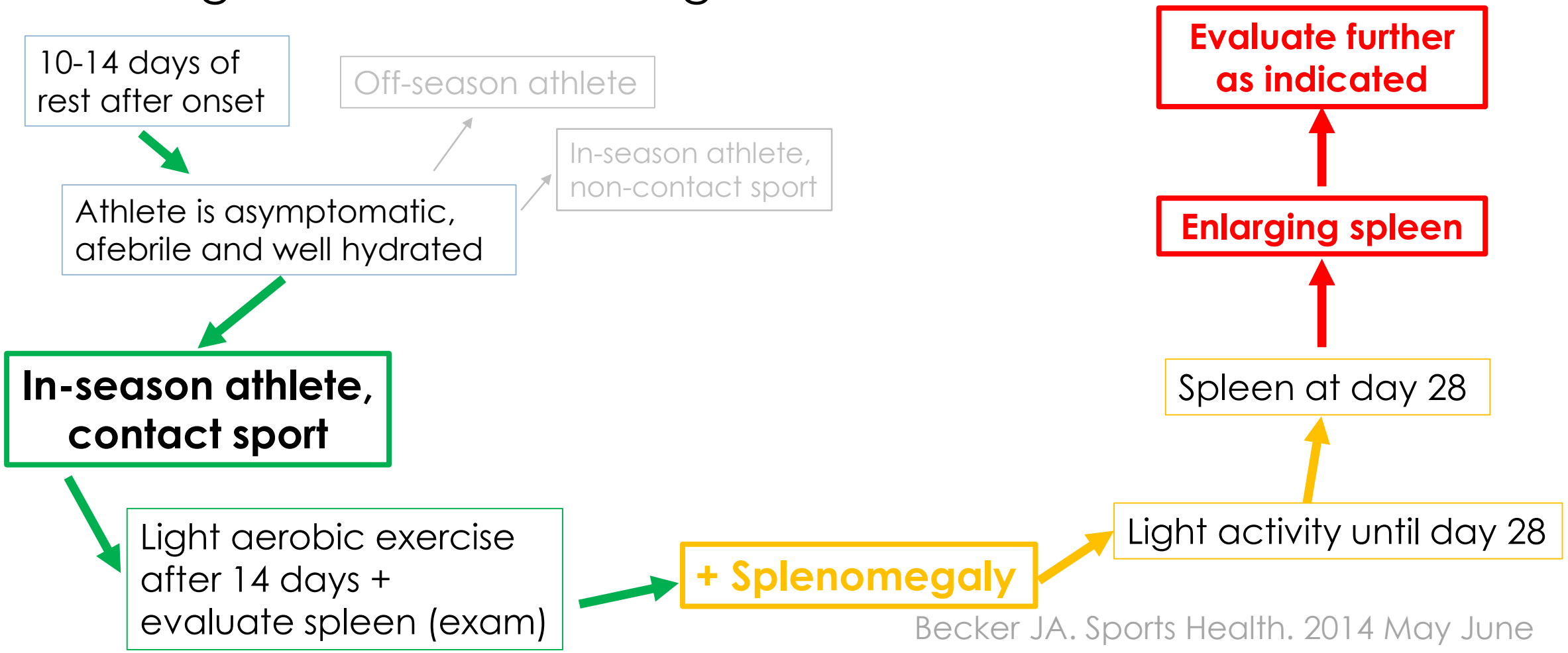

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INFECTIOUS MONONUCLEOSIS

Splenic Rupture in the setting of Mono:

- MEDLINE and EMBASE search: 1984-2014
  - 52 articles, 85 cases
- RESULTS:
  - average patient age 22 years, 70%male
  - average time between onset of IM symptoms and splenic rupture was 14 days (range up to 8 weeks)
    - preceding history of trauma reported in 14%
    - abdominal pain was most common presenting complaint of splenic rupture(88%)
    - 32% were successfully managed non-operatively, whereas 67% underwent splenectomy

Bartlett A, et al. *Injury*. 2016 March

INFECTIOUS MONONUCLEOSIS

Splenic Rupture in the setting of Mono

Conclusions and Recommendations:

- men under 30 within 4 weeks of symptom onset are at highest risk of splenic rupture
  - Rupture up to 8 weeks after illness onset
    - avoid sports, heavy lifting and vigorous activity for 8 weeks
  - Patient wishing to return to high risk activities earlier (4 weeks), ultrasound to ensure resolution of splenomegaly
  - Majority of ruptures without trauma, may be so minor as to go unnoticed by the patient
    - Counsel about symptoms of splenic rupture: minimizing delayed treatment

Bartlett A, et al. *Injury*. 2016 March

RECURRENT MSK INJURIES

Prefacing pattern:

All Common Recurrence following a single injury:

- **Shoulder dislocations**
- **AC separation**
- **Ankle sprains**
- **Patellar dislocation**
- **Stress injury/fracture**
- ***Concussions***

RECURRENT MSK INJURIES

Preventing Recurrent and chronic MSK Injuries

Purpose of the PPE:

1. Identify prior and recent injury (history/forms)
2. Confirm full recovery (exam):
   - No swelling, pain with activities
   - Full range of motion and strength
   - Negative special tests
3. Screen for inherent weakness and underlying injury factors

CONSIDER SPORTS MED OR ORTHO → HIGHER LEVEL OF EVAL

CONSIDER REFERRAL TO PHYSICAL THERAPY IF SAFE TO PLAY

RECURRENT MSK INJURIES

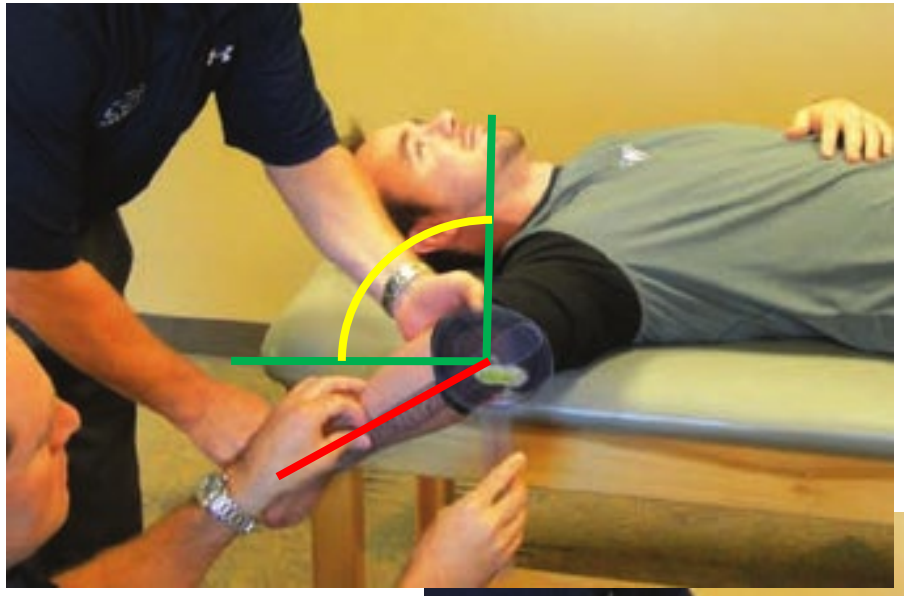
If you identify prior and recent injury (from history & forms):

1. Dig deeper into history:
   - Returned to sport since injury?
   - Any pain or swelling with daily activity or sporting activities?
2. Perform a focused exam:
   - Shoulder: ROM, strength
   - Back: ROM, flexibility
   - Lower Extremity (hip/knee/ankle/foot): joint(s) ROM, foot positioning, flexibility, single leg squat
3. Screen for inherent weakness, mechanical malalignment and underlying injury factors

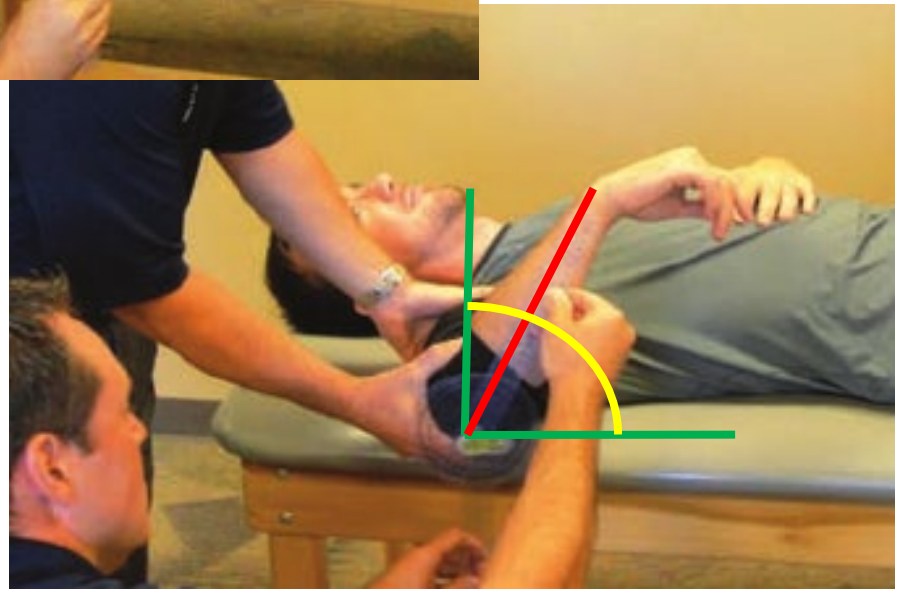
RECURRENT SHOULDER INJURIES

Prior shoulder (or elbow) injury or pain: SCREENING/EXAM

1. ROM (both-comparison):
   - Flexion
   - Abduction
   - IR and ER
2. Eval for GIRD: (glenohumeral internal rotation deficit)



Normal range: 85-95 degrees



Normal range: 70-90 degrees

Normal arc of motion: 170-180 degrees

RECURRENT SHOULDER INJURIES

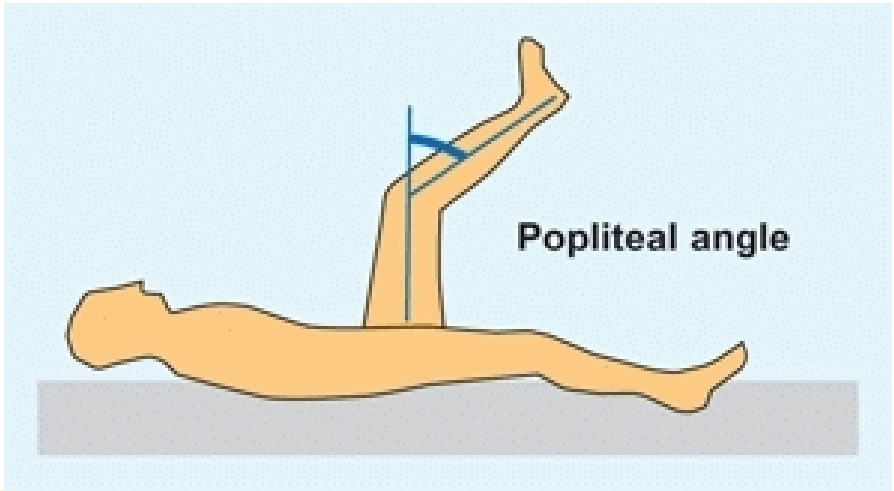
Preventing shoulder (or elbow) injury or pain:

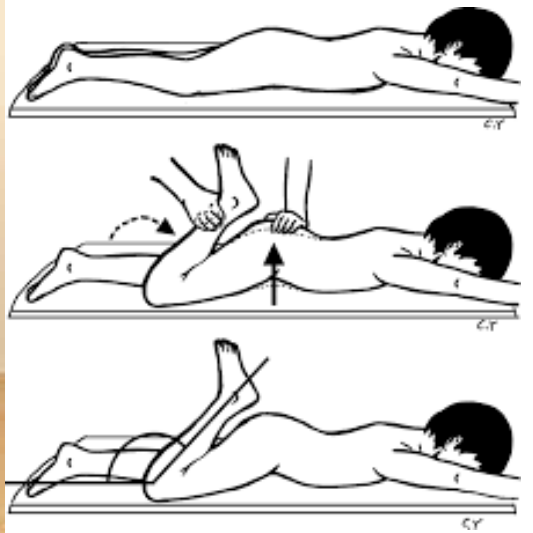
- Proper warm-up: strengthening and stretching
  - RTC, peri-scapular, upper back
  - Proper warm-up
  - Sleeper stretches
- Pitch Counts

RECURRENT BACK INJURIES

Prior back injury or pain:
SCREENING/EXAM

1. ROM:
   - Flexion
   - Extension
   - Abduction
   - Rotation
2. Evaluate LE flexibility:
   - Hamstrings (popliteal angle)
   - Hip flexors (Thomas test)
   - Quads (Ely test)

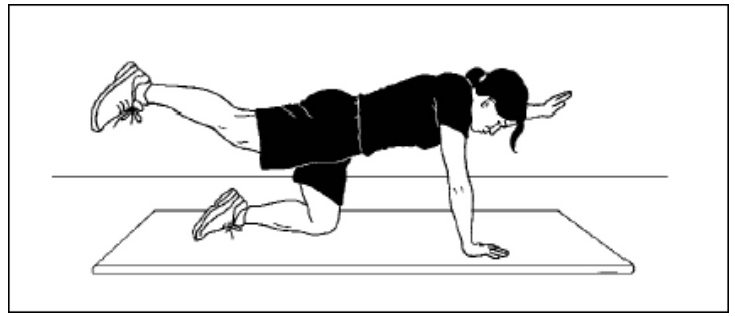


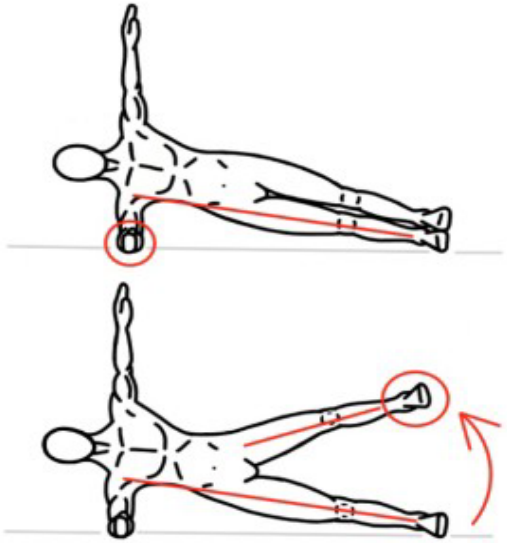


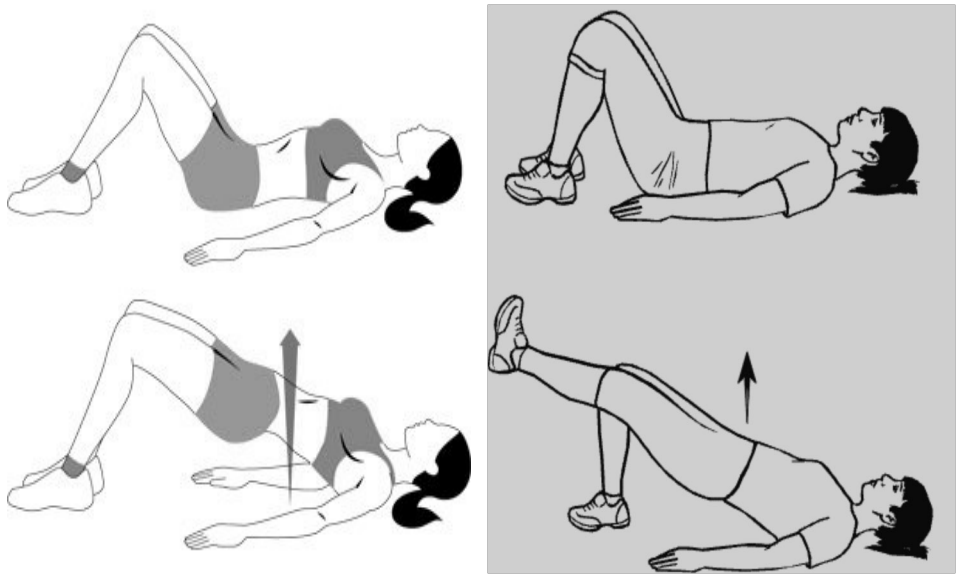
RECURRENT BACK INJURIES

Preventing back injury or pain:

- Strengthening:
  - Neutral Core (planks & more)
  - Gluteal/hip abduction
- Stretching
  - Hamstrings
  - Hip flexors
  - Quads



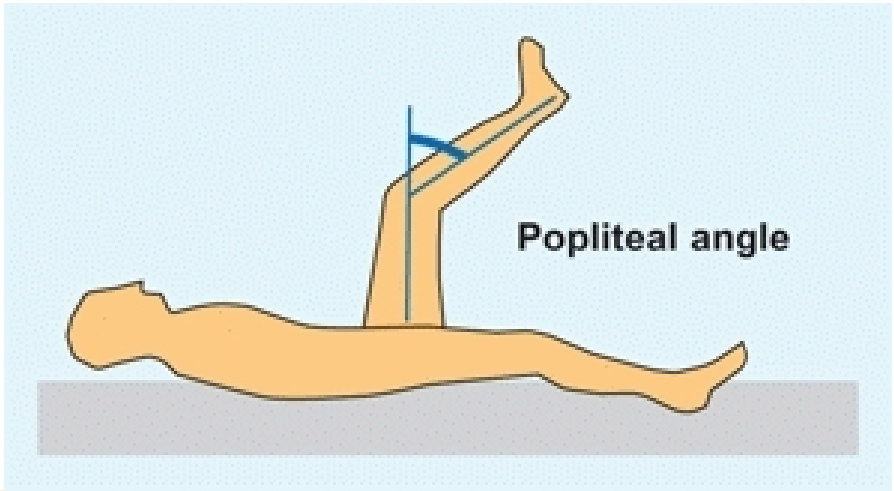


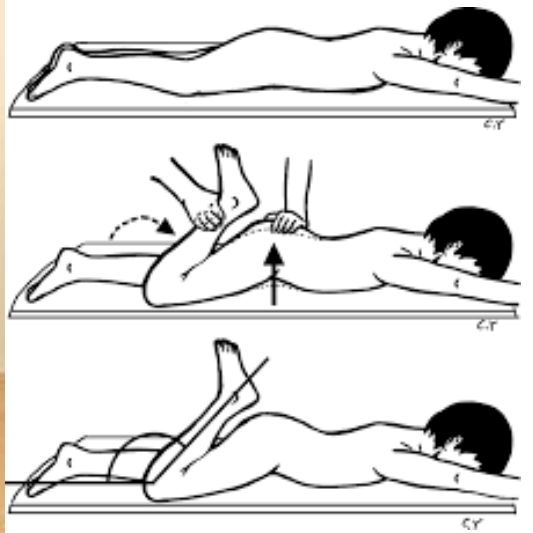


RECURRENT LOWER EXTREMITIES INJURIES

Prior LE injury or pain:
SCREENING/EXAM

1. ROM (both-comparison):
   - Hip (flex, IR, ER)
   - Knee (Flex/Ext)
   - Ankle (Fl/Ext/Inv/Ever)
2. Eval LE flexibility:
   - Hamstrings (popliteal angle)
   - Hip flexors (Thomas test)
   - Quads (Ely test)

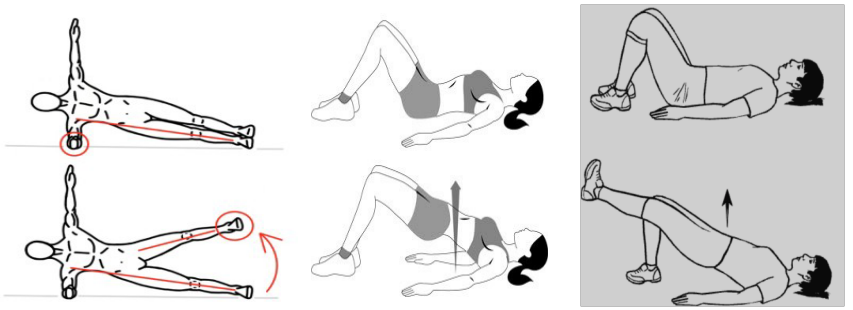


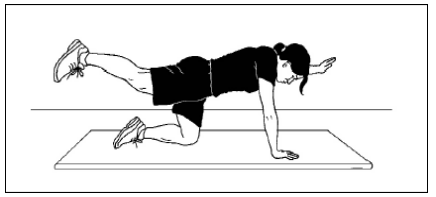


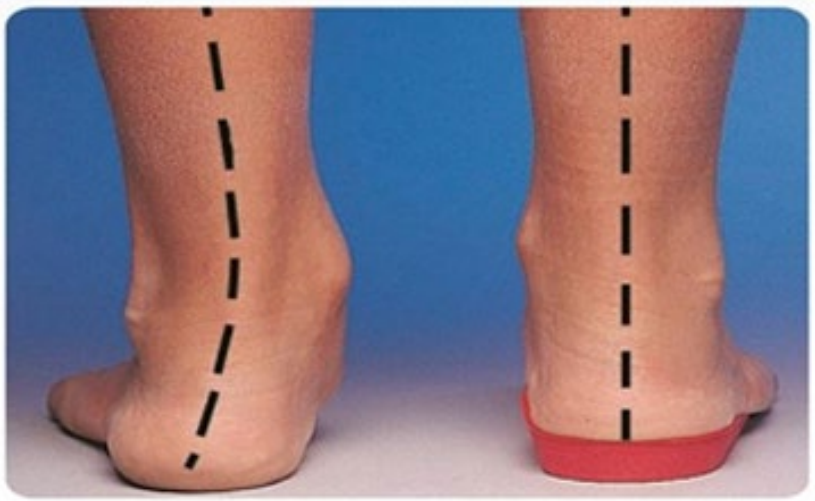
RECURRENT LOWER EXTREMITIES INJURIES

Preventing LE injury or pain:

- Strengthening:
  - Core
  - Gluteal/hip abduction
  - Foot & ankle
- Stretching
  - Hamstrings
  - Hip flexors
  - Quads
- Shoe inserts





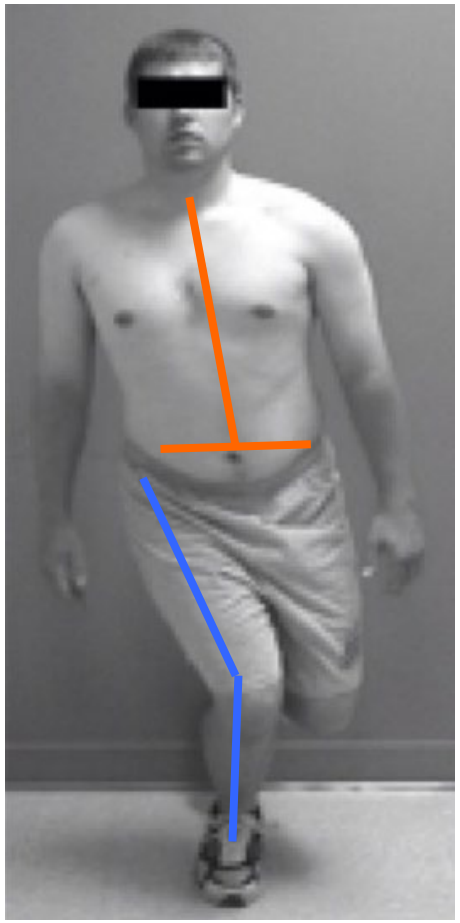


RECURRENT MSK INJURIES

Screen for inherent weakness, mechanical malalignment and underlying injury factors

1. Weakness:

- Lower extremity
    1. **Single leg squat**
    2. **Step down**
    3. Trendelenburg
    4. Box hop down
- Upper extremity
    1. Scapular dyskinesia



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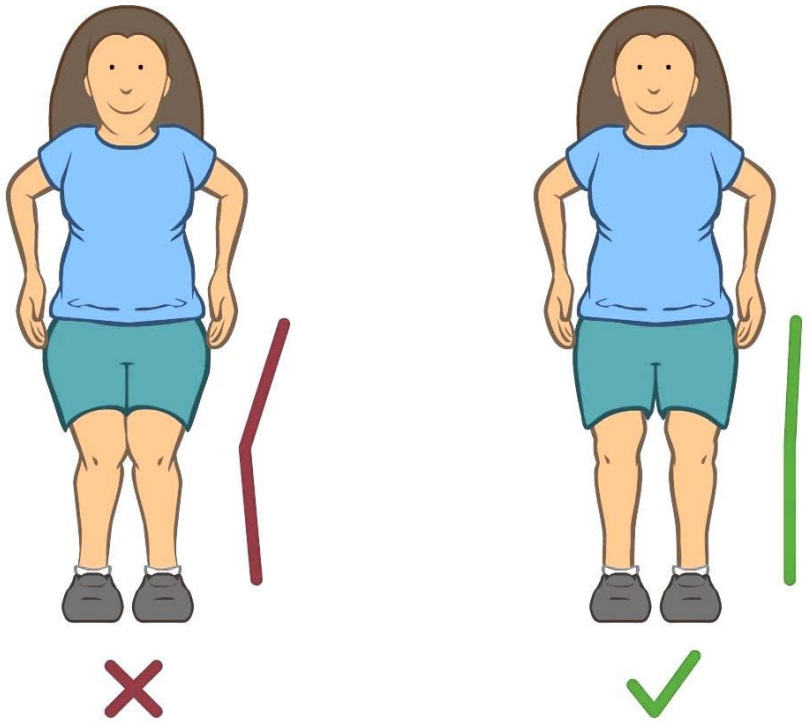

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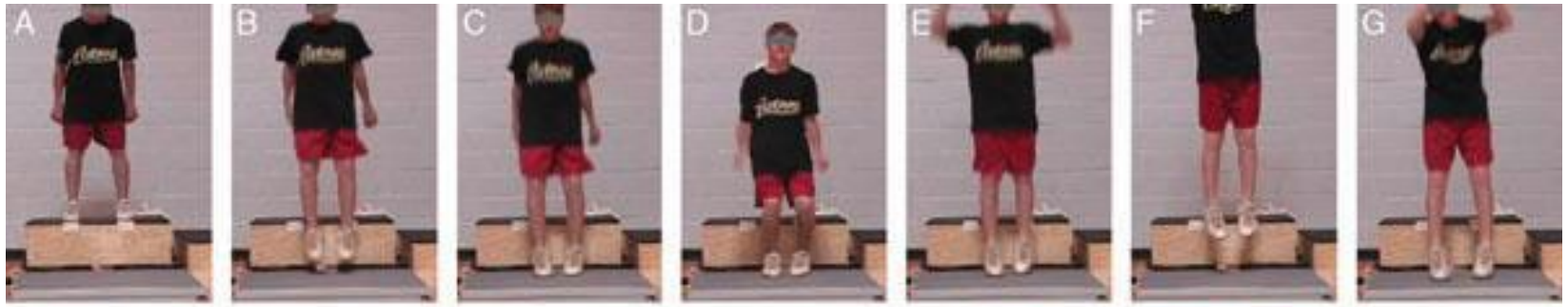

RECURRENT MSK INJURIES

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- Upper extremity
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ASSESSING FLEXIBILITY: HYPERMOBILITY

Beighton Scoring:

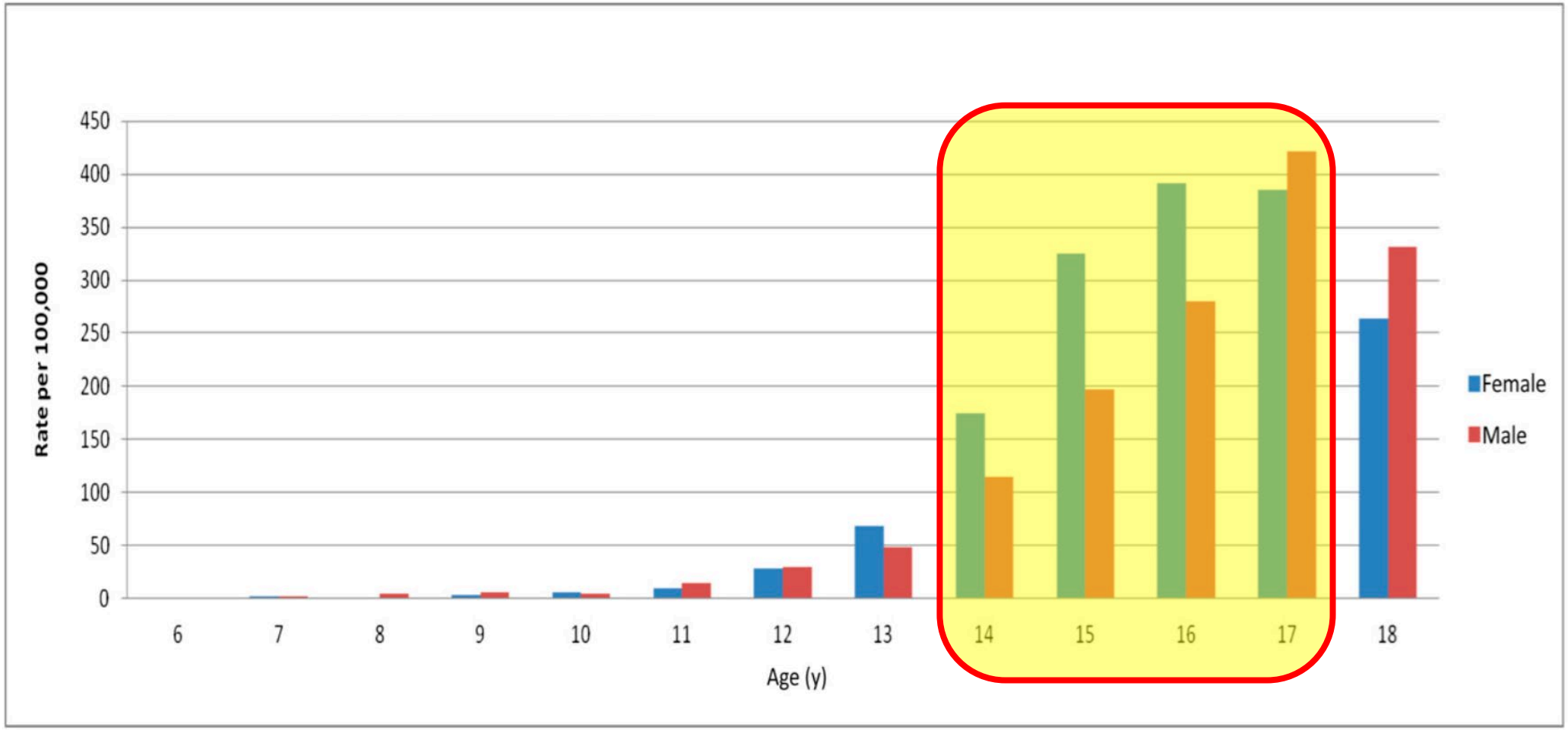
Beighton Scale

Up to 9 points:
Thumb flexion (2)
Pinky extension (2)
Elbow extension (2)
Knee extension (2)
Trunk Flexion (1)

PREVENTING CATASTROPHIC INJURIES

ALC INJURIES BY AGE

Rates of ACL tears per 100 000 person-years for male and female patients over the study period broken down by age.



Beck NA, et al. *Pediatrics* 2017

IMPACT OF ACL INJURY: CAREER

Return to play:

- High School: 63%
- College: 69%

(McCullough et al, AJSM 2012)

- Early adults: 73%

(Brophy et al, AJSM 2012)

ACL TEAR COMPLICATION RISK:
PREMATURE ARTHRITIS

ACL TEAR COMPLICATION RISK: *PREMATURE ARTHRITIS*

Radiographic osteoarthritis signs:

- 74% within 10 – 15 years

  (Øiestad et al, AJSM 2011)

- Negative impact on quality of life: 75%

  (Lohmander et al, Arth Rheum 2004)

RISK FACTOR FOR ACL TEAR: FEMALE

Female athletes:

- 2-6 times higher in soccer

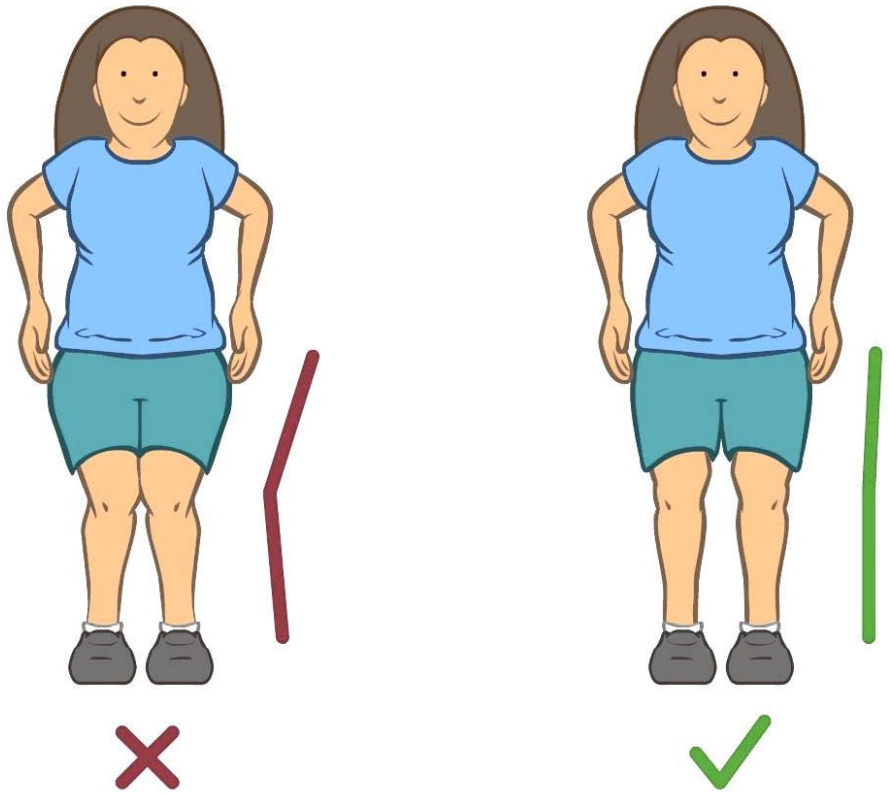
  (Arendt et al, JAT 1999; Lindenfeld et al, AJSM 1994)

- 4-8 times higher in basketball

  (Arendt et al, JAT 1999; Malone et al, South Ortho Assc 1993)

SCREENING TO ASSESS FOR RISK AND MECHANISM OF ACL INJURY

Jump Test



SCREENING TO ASSESS FOR RISK AND MECHANISM OF ACL INJURY

MECHANISM OF ***FEMALE*** ACL INJURY

- Direct or Indirect contact: 30%
- Non-contact: 70%

(Arendt et al, AJSM, 1995; Boden et al, Orthopedics, 2000; Agel et al, AJSM, 2005; Walden et al, KSSTA, 2007)

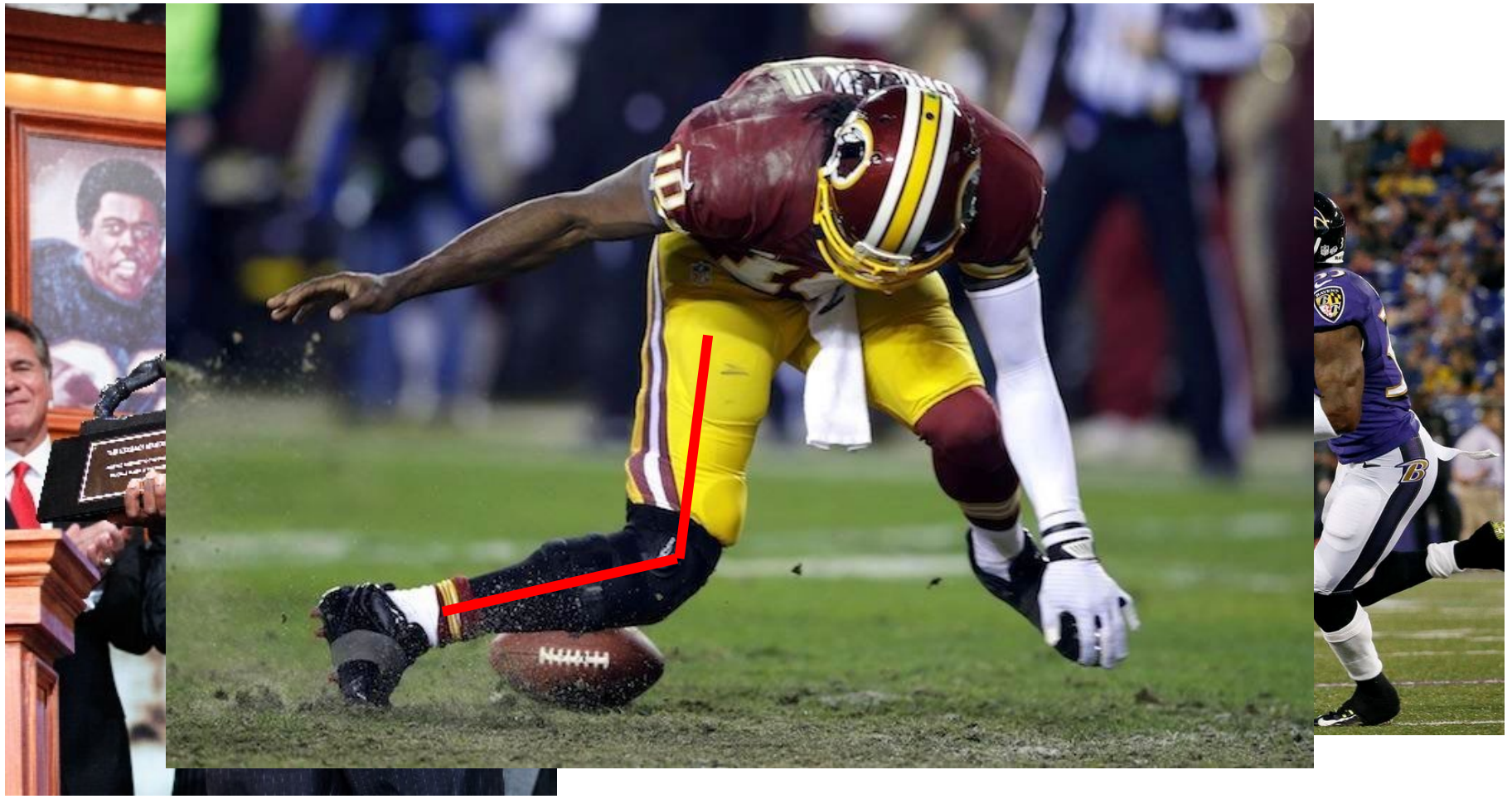
SCREENING FOR ACL RISK FACTORS

WHAT ABOUT MALE ATHLETES?

The $43 Million Question:

$13.8 million signing bonus + $7.3 million for four years

SCREENING FOR ACL RISK FACTORS
WHAT ABOUT MALE ATHLETES?



SCREENING FOR ACL RISK FACTORS
THE $43 MILLION QUESTION

COULD HAVE PREDICTED… ?

NFL ACL TEARS

Johnston JT, et al. *AJSM* 2018.

- Retrospective Review of ACL tears (2013-2016)
  - 156 ACL tears (77 during game)
  - Review of 69 injuries (YouTube videos)
    - Nature of injury:
      - Direct/Indirect contact vs. Non-contact
- Findings:
  - 50 of 69, 72.5% by non-contact mechanism
    - Exception: Lineman only 20% by non-contact

CONCUSSION: CHECKLIST

In order to diagnose concussion:

1. Direct or indirect blow to the head (INJURY)
   - Loss of consciousness not required
   - ImPACT (neurocognitive testing) helpful
2. Accumulation of symptoms
   - Typically within 48 hours
3. Concussion gets worse, then better
4. Once resolved, does not come back without a new injury

CONCUSSION: EXAM

Pertinent/Focused exam findings:

1. Increased near point convergence (NPC)
   - Normal 5-8 cm (or less)
2. VOMS exam:
   - Vertical and horizontal saccades
   - Symptoms with dolls eye/visual motor sens
3. BESS testing (ideally compare to baseline)
   - Double leg pose
   - Tandem pose
   - Single leg pose

CONCUSSION: RISK FACTORS

Risk factors for concussion:

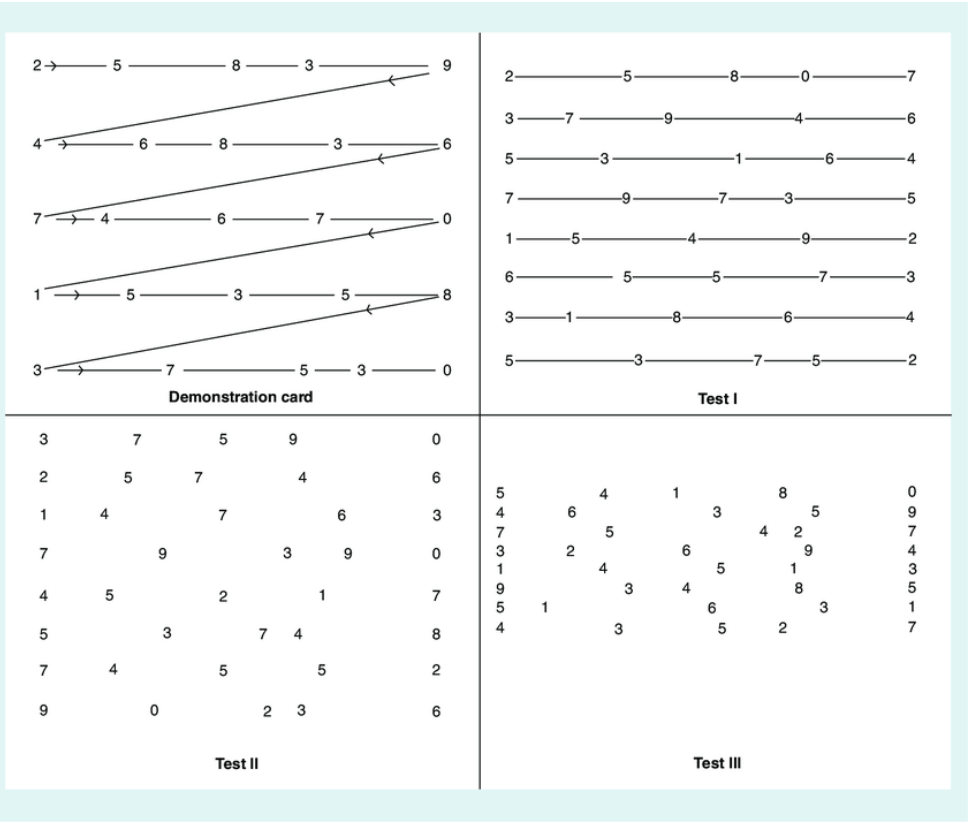
1. Prior concussion
   - 2-6x more likely than naïve athlete
   - Recent concussion
2. Females
   - Varies by sport
3. Neck, core, hip/shoulder weakness
4. Perhaps, hypermobility

CONCUSSION: RISK FACTORS FOR PCS

Risk factors for ***PROLONGED*** concussion:

1. Prior history of prolonged recovery
2. Neuro-psychiatric history:
   - Depression, anxiety, bipolar, PTSD
   - ADD/ADHD, learning disability

CONCUSSION: BASELINE AND PPE



Baseline evaluation:

1. ImPACT or neurocognitive testing
   - Does not prevent concussion
   - Generally repeated every 2 years
2. BESS:
   - Double, tandem, single leg poses
3. King-Devick cards
4. Near point convergence

CONCUSSION: GOALS OF PPE

1. To provide information to the ATC and treating physician with baseline performance
2. Can then compare post-injury exam, tests, etc with baseline to help confirm injury
   - Promoting prompt removal from play
   - "When in doubt, sit it out!"
3. Can confirm resolution of symptoms and have objective testing results, promoting safe return to play
4. Note: can never retrospectively obtain baseline info, unless gathered appropriately

??QUESTIONS??