

# Type 1 Diabetes in Young Athletes

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The logo for SMART SERIES. The word "SMART" is in large, bold, blue capital letters. To the left of the "S" is a stylized graphic of a hand with fingers spread, composed of horizontal lines. To the right of "SMART" is the word "SERIES" in smaller, blue capital letters, oriented vertically.



# Disclosures

- No relevant financial disclosures



# Objectives

- Provide education about young athletes with type 1 diabetes and the effects exercise and sport participation has on its management
- Provide an update on current treatment modalities and systems for type 1 diabetes (pump therapy, CGM, etc.) for improved provider awareness and recognition
- Increase knowledge and confidence for clinicians in sideline management of athletes with type 1 diabetes, specifically hyper- and hypoglycemia during sport participation



# Types of Diabetes

TYPE 1	TYPE 2	GESTATIONAL	PREDIABETES
Autoimmune reaction, the body stops making insulin	Body does not utilize insulin well, causing high blood sugar levels	Diabetes during pregnancy	Blood sugar levels higher than normal, but not high enough for diagnosis

# Type 1 vs Type 2

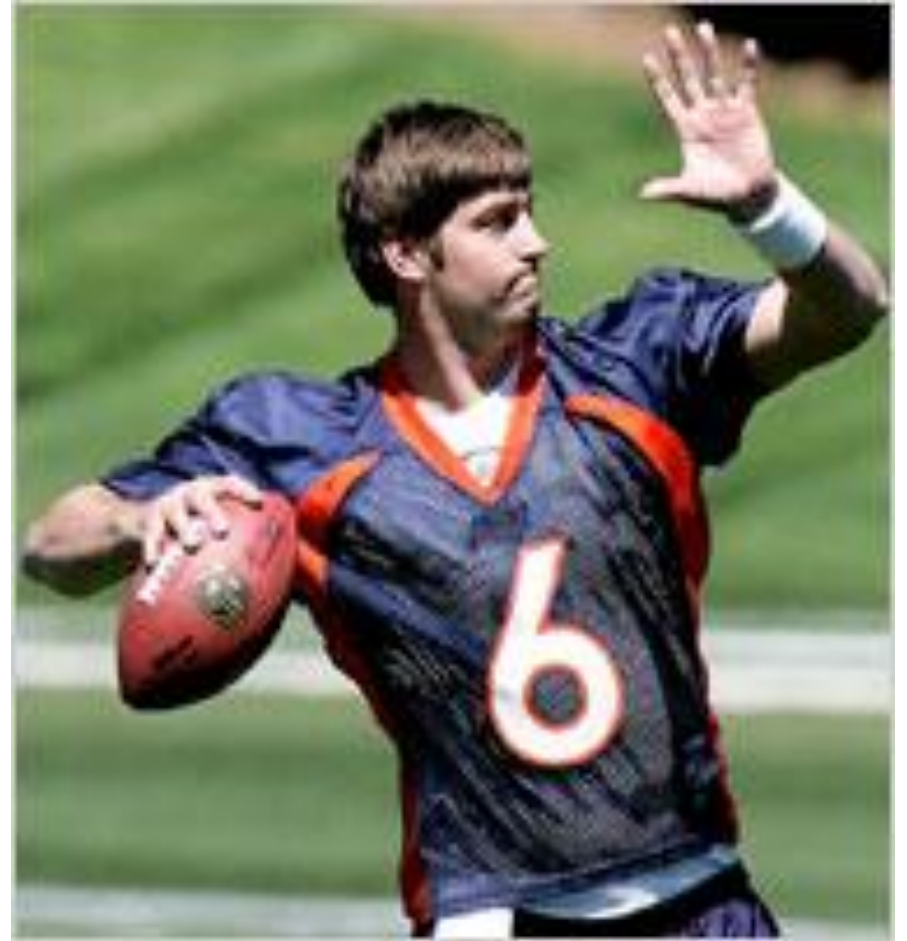
	TYPE 1	TYPE 2
<b>Cause</b>	Autoimmune Destruction of insulin producing beta cells in the pancreas	Body can still create insulin in the pancreas Either the body does not produce enough or does not use insulin well
<b>Prevention</b>	Cannot be prevented or cured with diet or exercise.	Can be prevented, delayed and treated with healthy lifestyle changes
<b>Risk factors</b>	Genetics Age Exposure to viruses and other environmental factors	Genetics 45 years or older Overweight Inactivity Have prediabetes African America, Hispanic, American Indian or Alaskan Native
<b>%</b>	5-10 % of all diabetes diagnoses	90-95% of all diabetes diagnoses
<b>Treatment</b>	Individual is insulin dependent. Must use insulin given subcutaneously via injections or insulin pump.	First line of treatment is lifestyle changes with diet and exercise. Second line is oral medication. Last line is insulin therapy.

# Prevalence of Type 1

- Type 1 diabetes is one of the most commonly diagnosed chronic illnesses of childhood
- Currently affects approximately 187,000 kids and teens under the age of 18 in the United States
- Per CDC (2020), the number continues to rise
- Approximately 18,000 new diagnosis made annually



# Why talk about Type 1 diabetes?



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# Type 1

- Awareness of all types is important to effectively manage young athletes with diabetes
  - Young athletes can be EITHER type 1 or Type 2
  - Knowing which one essential to proper management
- Since exercise is a core component of sport participation - and exercise has a significant impact blood glucose levels – understanding the disease and knowing what to do is key
- Working in any setting with youth athletes, we will likely interact with a patient with a type 1 diabetes diagnosis





# Blood Glucose

Hyperglycemia and Hypoglycemia

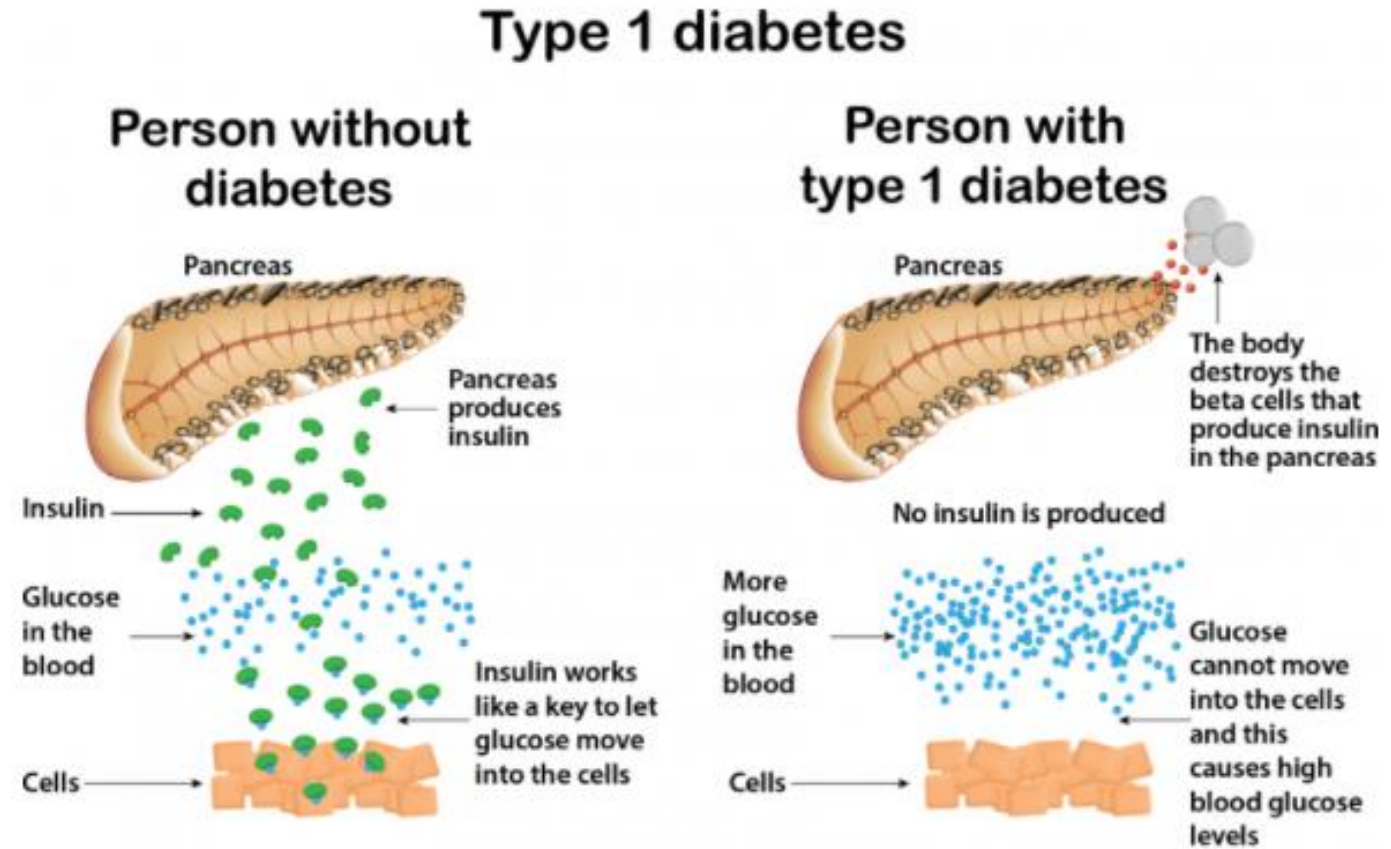


# Blood Glucose

- Blood glucose (BG) = blood sugar
- The amount of glucose (sugar that comes from food) in the body
- BG is the main source of energy for the cells in the body and distributed to cells in the body via the bloodstream

# Blood Glucose & Insulin

- Insulin
  - Anabolic hormone
  - Primary role in the body is to interact with glucose to convert the glucose to energy
- Type 1 diabetics  $\neq$  insulin  $\neq$  glucose cannot move into cells  
= high blood glucose (hyperglycemia)



**In type 1 diabetes, the pancreas stops making insulin.**

# Blood Glucose Levels

BG measured using a glucometer or CGM

Blood Glucose Levels			
Mg/DL	Fasting	After Eating	2-3 hours After Eating
Normal	80-100	170-200	120-140
Pre-diabetic	101-125	190-230	140-160
Diabetic	>126	220-300	>200

# Blood Glucose Levels

Hemoglobin A1C – blood test that measures average BG over the previous 3 months

As of 2020 ADA Standards of Medical Care recommends pediatric populations with T1D should aim for A1C below 7%

Currently less than 20% of children living with T1 have A1C below 7%

Hb <sub>A1c</sub> (%)	Avg. Blood Sugar	
	(mmol/L)	(mg/dL)
4	3.3	60
5	5.0	90
6	6.7	120
7	8.3	150
8	10.0	180
9	11.7	210
10	13.3	240
11	15.0	270
12	16.7	300
13	18.3	330
14	20.0	360

# Blood Glucose

Blood glucose levels are effected by:

- **Food** — Carb quantity, carb type, fat, protein, caffeine, alcohol, meal timing, dehydration, microbiome
- **Medication** — medication dosage, timing, interactions, steroid, B3
- **Activity** — light exercise, high intensity exercise, time of day, duration, level of fitness, food & insulin timing
- **Biological** — sleep, stress, smoking, recent hypoglycemia, puberty, celiac, allergies, menstruation, scar tissue, dawn phenomenon
- **Environment** — expired insulin, inaccurate BG readings, outside temperatures, sunburn, altitude
- **Behavioral & Decision Making** — frequency of checking BG, family relationships, social pressure, cultural pressure, default options and choices, mental health conditions

# Blood Glucose

If blood glucose levels are:

- High = Hyperglycemia ( $>180$  mg/DL)
  - Low = Hypoglycemia ( $< 70$  mg/DL)
- 
- Hyperglycemia is the default state for a T1D due to no insulin production
  - Hypoglycemia typically occurs secondary to overinsulinization from intensive insulin therapy (and impacted of exercise)

# Hyperglycemia (High)

- Hyperglycemia is classified as  $>180$  mg/dL<sup>3</sup>
- High blood glucose level
- If BG level is  $> 250$  mg/dL<sup>3</sup>, there is increased risk of ketones in the blood which can rise more with activity
  - Can check ketones via urine stick
  - Concern for diabetic ketoacidosis (DKA)
- Significant concern of high BG = DKA





# Treatment: Hyperglycemia (High)

- Administer insulin
- Insulin should be given per care team management plan
- Avoid injecting insulin into the exercising muscles
- Drink lots water
- Check for ketones in urine
- Avoid consuming sugary food or carbohydrates

# Hypoglycemia (Low)

- Hypoglycemia is classified as  $<70 \text{ mg/dL}^3$
- Most severe acute complication of insulin therapy
- Hypoglycemic risk is highest in T1D males, adolescents and those with previous severe episodes
- Can be during or after exercise
  - Exercise induced nocturnal hypoglycemia (15-48 hours)
- Significant concern of low BG = seizure, coma, brain damage

# Hypoglycemia (Low)

Hypoglycemia with exercise best prevented with combination of:

1. BG monitoring
2. Carbohydrate supplementation
3. Insulin adjustments

Treatment

1. Food intake
2. Injection of glucagon
  - a. Glucagon
  - b. Gvoke (auto injector)

# Treatment : Hypoglycemia (Low)

- 15-30 g of rapid acting sugar
- + protein if able
- Use “simple carbohydrates” like reg. soda, OJ, glucose tabs, juice, fruit snacks, candy, honey, cake frosting, etc.
- Complex carbohydrates, chocolates & sugar packets are not ideal because have a slower uptake
  
- Do not put anything into the mouth of a diabetic who is unresponsive
- Glucagon (or Gvoke) injection if unresponsive



# Common Symptoms

Hyperglycemia (HIGH)	Hypoglycemia (LOW)
Excessive thirst	Sweating
Frequent urination	Dizziness
Weakness	Confusion
Feeling tired	Feeling weak
Weight loss	Being pale
Decreased healing	Shaking
Stomach ache	Increase heart rate
Vomiting	Anxious
Dry skin	Inattentive
Drowsiness	Irritable, crying
Fruity odor to breath	Strange or odd behavior

# Severe Symptoms

Hyperglycemia (HIGH)	Hypoglycemia (LOW)
Rapid breathing (Kussmaul)	Neurogenic symptoms
Severe dehydration	Seizures
	LOC
	Brain damage

# Conflicting Symptoms

<i>Shared symptoms</i>	
Hypoglycemia (LOW)	Hyperglycemia (HIGH)
Headache	Headache
Nausea	Nausea
Fatigue	Fatigue
Blurred vision	Blurred vision
Increased appetite	Increased appetite

- Symptoms of low and high blood sugar can be the same
- These differ from person to person as well as by situation (ex. in heat, illness, etc.)

- Both hypoglycemia and hyperglycemia can impair athletic performance, either directly, or through changes in hydration and electrolyte balance
- Symptoms of hypo- or hyperglycemia can change over time or shift based on current tightness of control
- Moodiness, change in affect, irritability, combativeness and/or defiance can be symptoms of either
  - Can make acute management challenging in pediatric populations especially



- Importance of being able to accurately check blood glucose for acute management and in situations involving physical activity
- Need for preseason or initial visit plans for each young patient once aware of their type 1 diabetes diagnosis



# Treatments & Technology



# Treatment & Technology

- **Blood glucose levels**

- Glucometer
- CGM

- **Insulin types**

- Short acting
- Intermediate acting
- Long acting

- **Insulin delivery methods**

- Injections
- Pump therapy (CSII – Continuous Subcutaneous Insulin Infusion)



# Treatment & Technology: Blood Glucose

## Blood glucose

- Glucometer
  - \$
  - \$15-35 dollars each
  - Can purchase OTC or with Rx
  - Need to also purchase testing strips
  - Should always have one on hand if type 1 (even if using CGM)
- CGM
  - \$\$\$
  - \$4,000+ and insurance dependent
  - Rx required
  - Also requires purchase of additional or recurring supplies (inserters, sensors, etc.)
  - Can use as primary source of checking, may still require glucometer calibrations



# Commonly used – Glucometer & CGM

## Glucometer

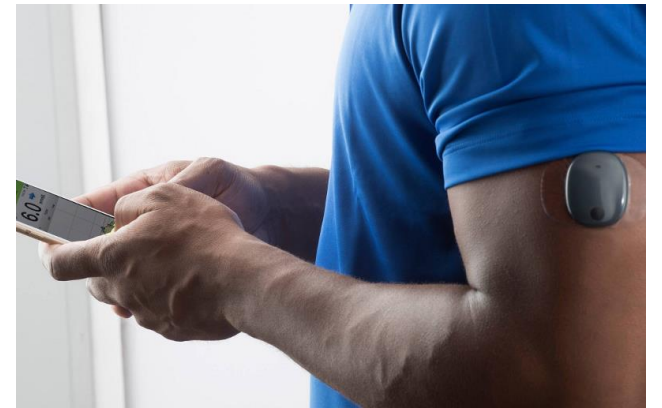
- Many, many different brands
- Best is whatever one coordinates with the patients management plan



## • CGM

1. Freestyle Libre and Libre2 (Abbot)
2. Dexcom G6
3. Guardian Connect and Guardian Sensor 3 (Medtronic)
4. Senseonics Eversense

# CGM



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# Treatment & Technology: Insulin

## Insulin types

- **Short acting** - Lowers within 10-30 min, peak at 1-4 hours
  - Regular (Humulin R)
  - Aspart (Novalog)
  - Lispro (Humalog)
- **Intermediate acting** - Lowers within 1-2 hours, peak at 6-10 hours
  - NPH (neutral protamine hagedorn)
- **Long acting** - Lowers approx 4 hours post, lasts up to 24 hours
  - Detemir (Levemir)
  - Glargine (Lantus or Basaglar)



# Treatment & Technology: Delivery Methods

## Insulin delivery methods

### 1) Injections

#### a) Traditional

- NPH + short acting in AM
- Short acting at dinner
- NPH at bedtime

#### b) Basal–bolus

- Long acting (Lantus) once daily + Short acting at meals

### 2) Pump therapy (CSII – Continuous Subcutaneous Insulin Infusion)

- Use of portable electromechanical pump to infuse short acting insulin subcutaneously at preselected rates
  - Hourly basal rates
  - Bolus ratios for food and corrections





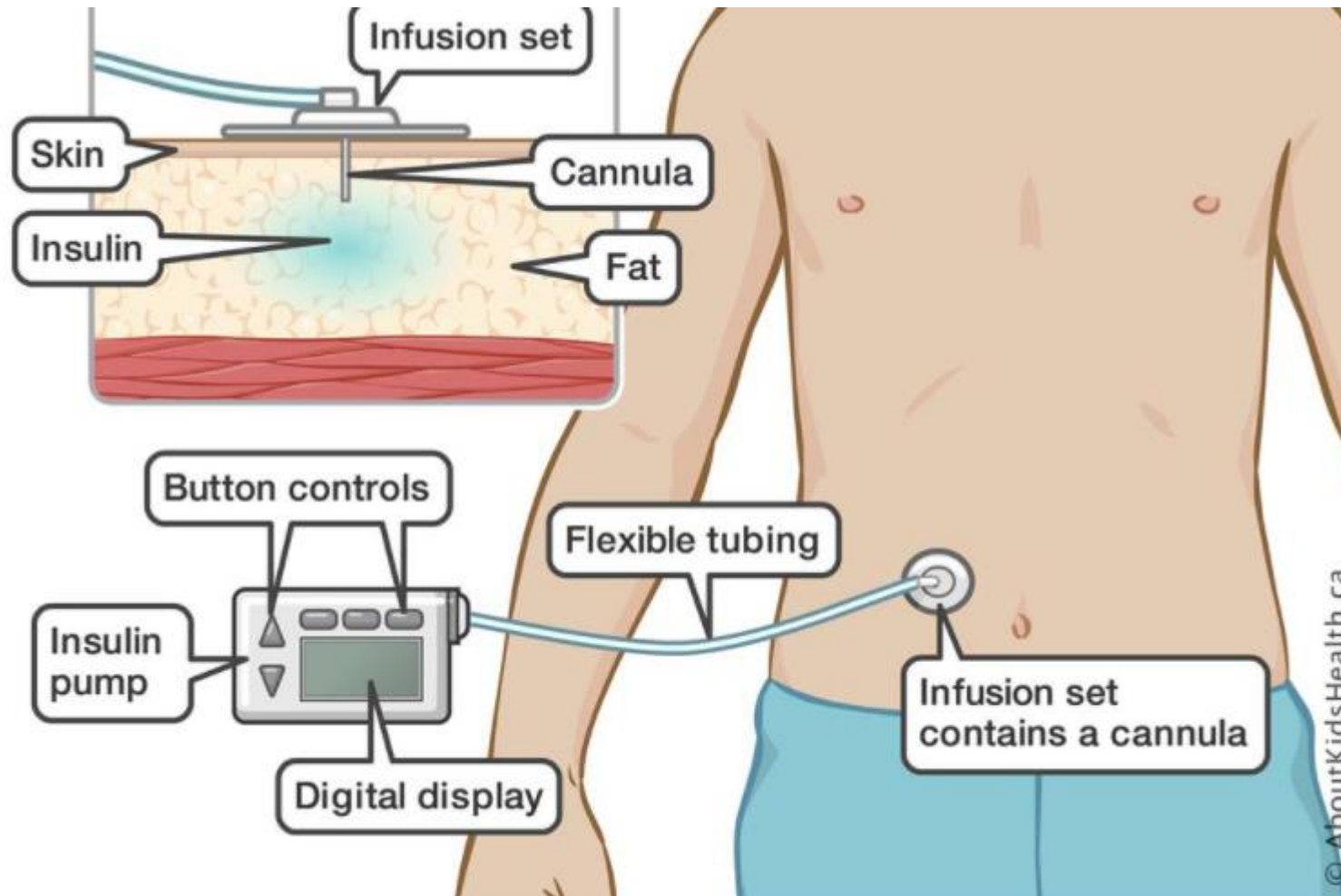
# Treatment & Technology

## Commonly used insulin delivery methods

- Injections
  - Syringe
  - Insulin pen
- Pump therapy (CSII)
  - Tandem
  - Medtronic Minimed
  - Omnipod



# Pump Therapy (CSII)

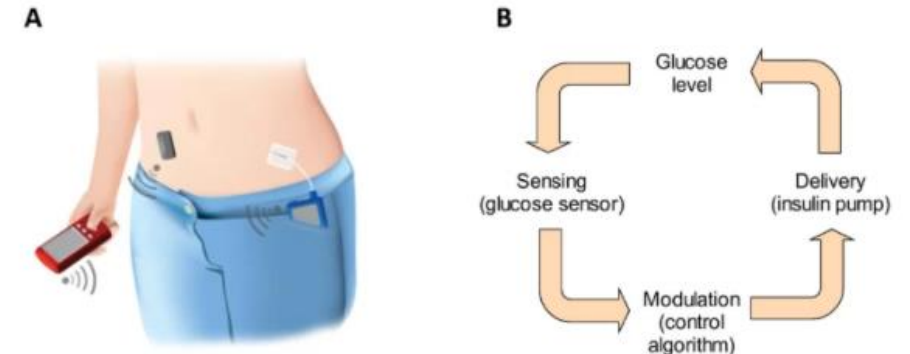


# Treatment technology: Closed Loop

- Closed loop systems
  - “Artificial pancreas”
  - Insulin pump + CGM
  - Pump and CGM sync to deliver automated basal insulin using an algorithm and real time glucose trends data from the CGM sensor
  - Goal is to improve glycemic control and improve degree of BG fluctuations

- Two options currently exist:
  - Medtronic MiniMed 670G
  - Tandem Control IQ + Dexcom G6 (“hybrid”)

Figure 1



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# Type 1 Diabetes & Exercise



# Exercise & Type 1 Diabetes

- Children with T1D are encouraged to engage in at least 60 min/day of moderate to vigorous physical activity and at least 3 days/week of muscle and bone strengthening exercise
- Should be started in collaboration with care management team
- Education and training of coaches, teachers, other parents, etc.



# Benefits & Risks

## Benefits

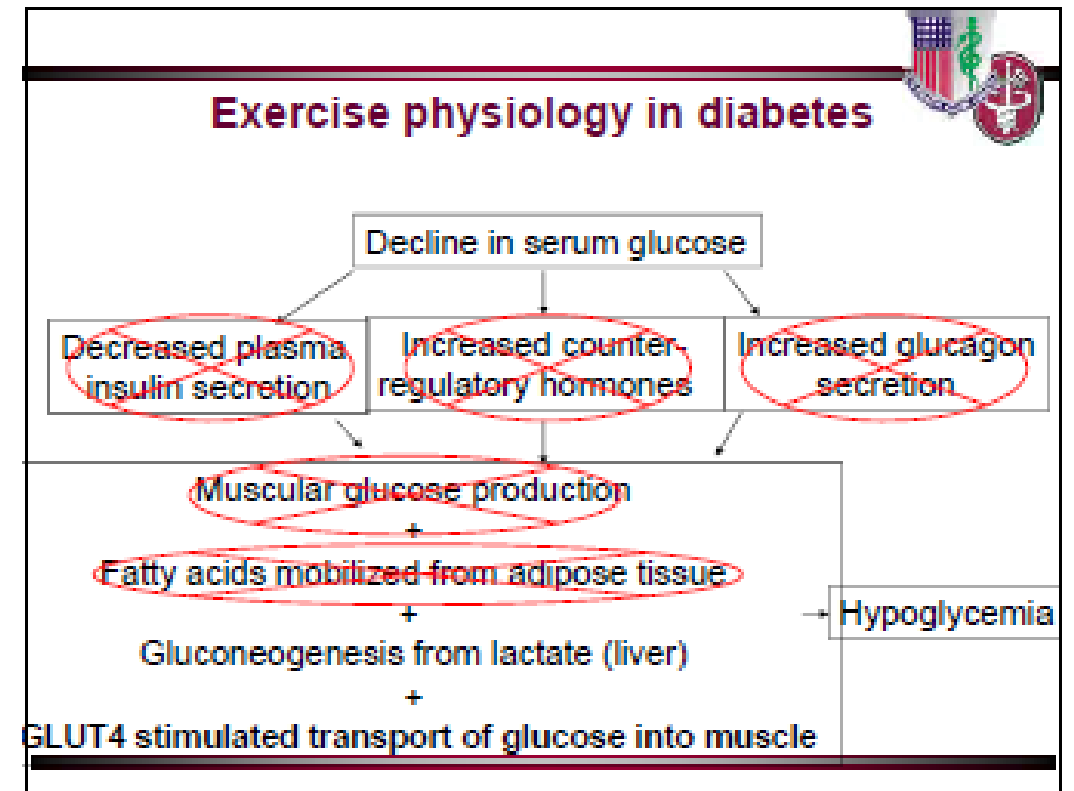
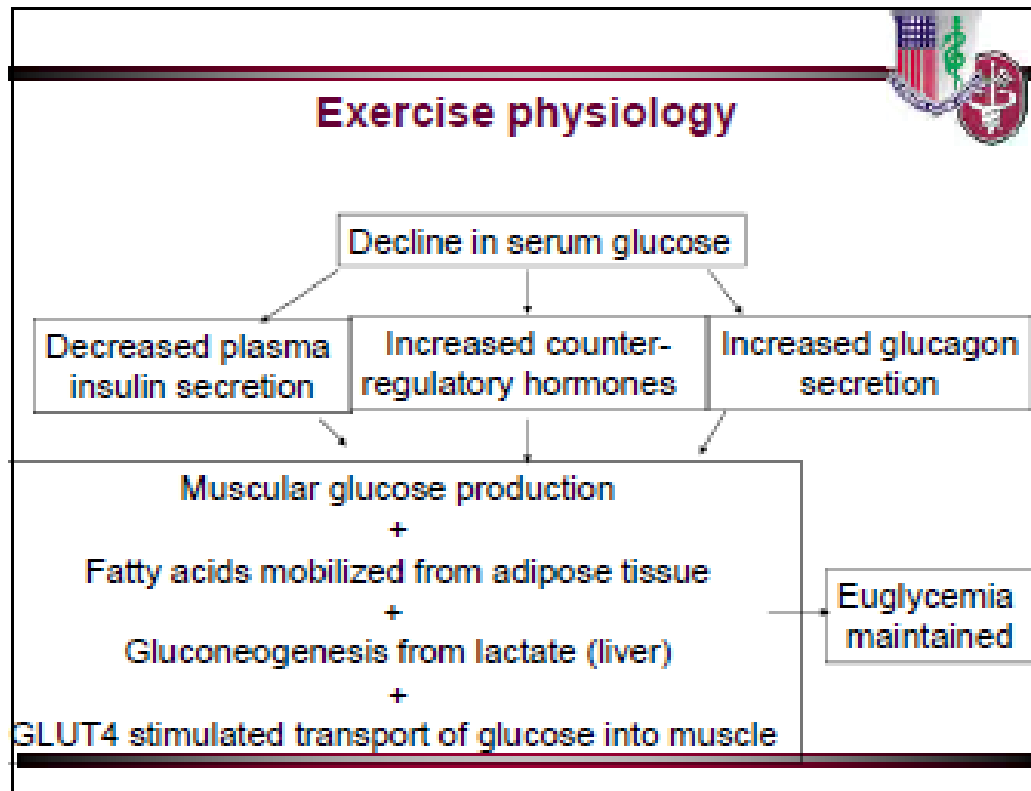
1. Improve overall and disease specific quality of life
2. Improve mental health
3. Enhances and improves insulin sensitivity
4. Increased metabolism for body weight regulation
5. Lowers BP and HR at rest and during submaximal exercise
6. Improves self efficacy for maintaining normal BG levels by learning effects and management before, during and after activity

## Risks

1. Dehydration
2. Hypoglycemia
3. Increase risk of DKA
4. Expose underlying cardiovascular disease



# Exercise physiology in type 1 diabetes



# Normal vs Type 1 Diabetic

Diabetic have different exercise responses due to:

1. Exogenous insulin supply reservoir
2. Suboptimal release of counter-regulatory hormones (ex. sleep)
3. Insulin absorption variability
4. Insulin sensitivity increase post exercise
5. Skeletal muscle glucose uptake after exercise



# Hypoglycemia (Low) & Exercise

Hypoglycemia causes related to exercise:

1. Rate of insulin absorption increases with exercise along with temp and blood flow increase
2. Exogenously administered insulin does not decrease during exercise (as it would in non-diabetic)
3. During exercise, can result from impaired counter regulatory hormones (glucagon, catecholamine) by previous exercise session or hypoglycemic event
4. Exercise improves insulin sensitivity in skeletal muscle

# Hyperglycemia (High) & Exercise

Hyperglycemia causes related to exercise:

1. High intensity exercise (70% VO<sub>2</sub> or >85% max HR) can cause increase in BG concentrations and potential ketoacidosis in those with poor control
2. High intensity exercise can lead to hyperglycemia due to catecholamine, free fatty acids, ketones = impair muscle glucose utilization and increase BS levels
3. Psychological stress of competition cause increase BS levels
4. Hot and humid environments can elevate BG levels due to exaggerated increase in counterregulatory hormones

# Training Factors

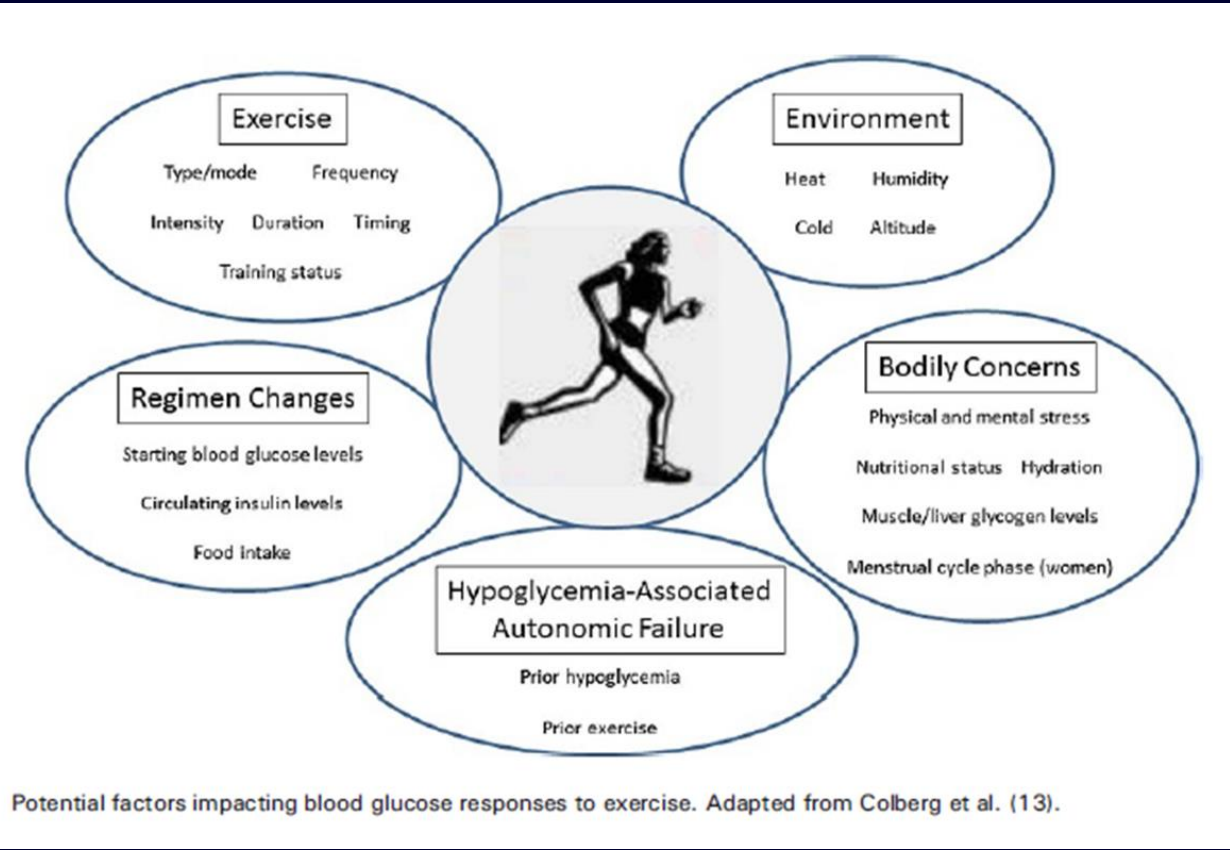
Training Consideration	Description	Findings
<b>Type</b>	Aerobic	<i>Hypoglycemic trends</i>
	Mixed	<i>Both hypoglycemic and hyperglycemic trends</i>
	Anaerobic	<i>Possible protective effect on hypoglycemia if resistance training performed before aerobic exercise</i> <i>Hyperglycemia</i>
<b>Intensity</b>	Low	
	High/Competition	<i>Causes increase in glucose output from the liver, resulting in possible hyperglycemia during activity</i>
<b>Timing</b>	Morning	<i>Fasted exercise, first thing in the morning prior to breakfast resulted in less hypoglycemia and more glucose values in range throughout the day compared to afternoon exercise</i>
	Afternoon	<i>Short term athletic performance in anaerobic activities is better in the afternoon compared to morning for glucose control</i>

# Sprints to combat low?

- Adding high intensity bouts of intermittently during moderate exercise decreased risk of hypoglycemia during exercise
- Including a brief (10 second) max intensity sprint either before or after a moderate intensity exercise session may protect against hypoglycemia onset in the short term

*(Can.J Diab 2013)*





Potential factors impacting blood glucose responses to exercise. Adapted from Colberg et al. (13).

### Exercise and Type 1 Diabetes

	AEROBIC	MIXED	ANAEROBIC
WORK RATE			
EXAMPLES OF ACTIVITY	Swimming Cycling Distance run/Jogging Rowing Cardio Aerobics Dancing Spinning  <b>Prolonged, low intensity exercise</b>	Football Basketball Rugby Netball Ice-hockey Skating Gymnastics Cricket  <b>A mixture of both</b>	Sprints Circuits Weights Sprint swimming Interval training Martial Arts  <b>Short sharp bursts of activity</b>
GLUCOSE TRENDS			
MAIN VARIABLES	Intensity and duration of exercise, insulin to glucagon ratio, fitness, nutrition, initial glucose concentration	Intensity and duration of exercise, insulin to glucagon ratio, counter-regulatory hormones, lactate concentration, fitness, nutrition, initial glucose concentration	Intensity and number of intervals, insulin concentration, counter-regulatory hormones, lactate concentration, fitness, nutrition, initial glucose concentration
MANAGEMENT SUGGESTIONS	<ul style="list-style-type: none"> <li>• Monitor blood sugar pre and post exercise</li> <li>• Reduction in insulin pre and post exercise</li> <li>• Pump -Temporary basal rate</li> <li>• CHO snack pre exercise and post exercise</li> <li>• Exercise diary</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor blood sugar pre and post exercise</li> <li>• Reduction in insulin pre exercise</li> <li>• Pump - Temporary basal rate</li> <li>• Exercise diary</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor blood sugar pre and post exercise</li> <li>• Pump -Temporary basal rate</li> <li>• Exercise diary</li> </ul>

# Hydration

Hydration is particularly important for T1D athletes to maintain BS levels, thermoregulation, CV functioning, etc.

Dehydration = decrease food absorption = increase BG

Recommended drinking:

- 20 oz. approx. 1-2 hours pre activity
- 28-40 oz. for every 1 hour of exercise or sport



# Insulin Adjustments – Preventing Hypoglycemia

## Injected

- Recommend 20% reduction in basal rate before and after exercise

## CSII

- Reducing or suspending CSII 30-60 min prior to exercise by 25-75%
- ~20% reduction of basal rate at bedtime for 6 hours post afternoon exercise to decrease nocturnal hypoglycemia for pediatrics
  - + addition of snack and or CGM advised



# Insulin Administration

If insulin dosing is needed for athlete with hyperglycemia:

- Follow the pre-set management plan
- Administration will vary based on insulin delivery method
  - If injections: Follow existing correction factor or bolus ratios from primary diabetes provider
  - If CSII: Use the technology settings that were created by diabetes provider and team to accurately determine correction dose
  - If multiple insulin types: Double check/confirm type before athlete injects
- When in doubt, do not dose insulin for acute management concerns!





# Insulin Adjustments

Insulin delivery, adjustments to basal or bolus settings, or decision making about dosages = **JUST DON'T DO IT**

- Contact the primary medical provider responsible for the management athlete with T1D with concerns or advice on changes
- Secondly, parent or guardian will usually have the next best level of insight onto making these if needed in real time
- If young athlete is old enough (or has managed for long period of time on their own already) = likely will know what is needed

**Content expert on insulin dosing = Patient + Parent + Diabetes  
Doc >>> All of us**



# Recap

- The bodies of athletes with type 1 diabetes respond differently to exercise and sport compared to their non-diabetic peers
- Type, duration, timing and intensity of physical activity must be considered when engaging in exercise or sport for T1D athlete
- Timing of hydration, carbohydrate replacement and insulin dosing is also important for best BG control
  - Different methods to measure BG as well as administer insulin to assist in maintaining BG control with activity

# BG Management with exercise

- Avoid exercise if BG < 100 or > 300
- Check ketones if BG > 250 and exercising
  - Exercise while hyperglycemic, postpone until BG <250 and NO ketones present
  - Never let athlete participate if ketones present
- Check BG before, every 30-60 minutes during, and following exercise
- After intense exercise day, check BG before bed and again approx. 2am
  - Exercise induced nocturnal hypoglycemia

# BG Management with exercise

- Consume 15 g of carbohydrates for every 30 minutes of exercise
- Include a bedtime snack with protein and carbohydrates after days with intense exercise
- Disconnect, suspend or enter exercise mode settings on pump with moderate to intense exercise
- Disconnect pump for most contact sports and swimming
  - Prevents device damage
  - Avoid injury risk to opponent
  - Benefit of decreasing insulin delivery during exercise to avoid potential low



# Acute Management



	ACUTE EMERGENCY GAUGE	
MOST RISK FOR <u>ACUTE</u> COMPLICATIONS	<b>Acute Hypoglycemia (&lt;70 mg/DL)</b>	Fast acting sugar/food Glucagon injection
	<b>Chronic Hyperglycemia (&gt;180 mg/DL)</b>	Insulin + ongoing adjustment of management plan with care team
	<b>Acute Hyperglycemia (&gt;180 mg/DL)</b>	Insulin
LEAST RISK FOR ACUTE COMPLICATIONS	<b>Normal BG (80-180)</b>	None

- When in doubt, administer sugar!
- The acute effects of low blood glucose are far worse than those from high blood glucose

# Planning for young athletes with type 1 diabetes



# Pre Participation Exam

As part of the yearly PPE, these athletes should be clearly identified and the school licensed athletic trainer, nurse and team physician should be made aware

Pre-season management meeting should be scheduled to include:

- *Athlete*
- *Parent (for athletes < 18 yo)*
- *Coach*
- *LAT*
- *Team physician*
- *Endocrinologist or PCP as available or needed*





# Pre Participation Exam

Pre-season medical meeting should confirm management plan including:

1. Blood glucose monitoring guidelines – how often to check and acceptable values
2. Insulin therapy guidelines (including type, dosages, and adjustment strategies, and correction dosages.)
3. Device training
4. List of other medications
5. Individualized guidelines for hypoglycemia recognition and treatment
6. Individualized guidelines for hyperglycemia recognition and treatment
7. Stocking of sideline kit (+/- glucagon & sugar sources)
8. Emergency contacts and physician information



# Pre Participation Exam

- In addition to standard PPE, additional screenings should be performed on a yearly bases for type 1 athletes.
- These include:
  - Vital signs
  - Complete physical exam including monofilament evaluation (*neuropathy*)
  - A1C (*avg. glucose control*)
  - Yearly eye exam (*retinopathy*)
  - Labs including: micro albumin, fasting lipid panel, thyroid function tests (*kidney, cardiovascular or metabolic complications*)
  - Possible need for formal cardiac stress test
  - Mental & behavioral health (*depression, anxiety*)



# For the athletic trainer...

- Know your athletes - learn the individuals signs and symptoms of low and high BG
- Don't be afraid to pull the athlete out if BG out of control based on pre-season plan – young athletes may not be willing to do it themselves
- Be aware of the environmental factors and stressors that may affect an athlete with T1 (i.e. playoff stress, raining weather, etc.)
- Athletic training kit should always be stocked with necessary supplies + extras
- Carry your own glucose monitor in your kit at all times
- Keep diabetes top of mind when responding on field or sideline injuries



# For the PT/OT...

- Know your patients medical history
- Confirm management plan with patient at initial evaluation
  - Including how to check and respond if hypo- or hyperglycemic during session
- Encourage them to check their BG before their rehab session
- Let them know it is okay to take a break during their session to check BG or eat if needed
- Be aware of modality use over insulin injection area, pump or CGM sites
- Educate the patient or refer them to someone who can if additional health concerns or delayed healing is noticed during course of treatment
- Have a diabetic emergency kit on site at your clinic (include glucometer & sugar sources)



# For the MD, DO or APP...

- Provide detailed PPE in coordination with endocrinologist or managing provider
- Encourage patient compliance with additional yearly screenings
- Continued patient and family education on T1 management and treatment options
- Further attention to mental health screenings (depression, anxiety) and referrals in the T1D population
- Encouragement of physical activity and sport participation
- Communicate any concerns or limitations with team physician, nurse, PT/OT or licensed athletic trainer providing concurrent care
- Have a diabetic emergency kit on site at your clinic (include glucometer & sugar sources)



# Considerations for young athletes with Type 1



# Supply

## Travel

- Assure enough supplies packed for duration of trip + additional week
- Always pack some meals and snacks in case of lows or delays
- Review TSA guidelines
- For pumps and CGMs, cannot pass through XR or metal detector. Athletes recommended to “opt out” for pat down to avoid device interference. Account for extra time.
- Adjust any device settings fro time changes



# Supply

## Pump & insulin storage

- A protected, designated space should be determined to contain any disconnected pump or supply's during activity
- If extreme temperatures, plan accordingly to create mild environment. Insulin typically requires storage within a specific temperature range.



# Environmental

## Sport environment

- Certain sports may require disconnection from insulin pump to preserve device or athlete safety (i.e.. Swim, dive, wrestling, etc.)
- Athletic equipment may interfere with normal access to medical devices (i.e.. Football). Adjust device placement or access as able and assure awareness of medical team.
- Some athletes with T1 may choose insulin administration options based around their sport (specifically aesthetic sports). May result in change in delivery method in vs out of season.
- Insulin pump tubing can get tangled in equipment or from contact. Assure devices are properly protected pre participation and back up supplies are available if needed.



# Environmental

## Temperature

- Any extreme weather – heat or cold – can impact adhesive for insulin pump sites or CGM's. Additional reinforcement may need needed based on temperature conditions.
- Skin adhesive (Mastisol) or transparent film dressing (Tegaderm) can help stabilize infusion sites
- Hot and cold modalities should not be used before or after insulin injections because they affect rate of absorption



# Medical

At risk for additional auto-immune conditions (ex. Celiac, thyroid, etc.)

Complications may affect participation or sport (ex. Peripheral neuropathy, autonomic dysfunction, etc.)

Poor glucose control (Higher A1C) can result in lower bone mineral density

- In athletic population, may take longer to heal from injuries, specifically fractures

# Medical

Young athletes with T1 diabetes are at increase risk for depression, anxiety, and mental health problems

- Integrate mental health professionals into their treatment team
- Refer when appropriate

## Medical identification

Use abdomen for injection sites as able. Increased insulin absorption with leg or arm site based on LE/UE sport.



# Medical

Red flag to clinician if rapid weight loss in known T1 diabetic athlete – raises suspicion for insulin omission for weight loss vs worsening BG control

Some T1D athletes will intentional sport participation in hyperglycemic state– risk dehydration, decreased performance and ketosis.

Include T1D in differentials with acute evaluations of new or unknown athletes

**Each athlete with T1D will have unique management goals, dosages, device settings, symptom presentation and treatments.**



# Scenario 1: Known Athlete with T1D

If concern for hyperglycemia, hypoglycemia, or becomes **unresponsive**

❖ Follow pre-established treatment plan

1) D/c activity or sport

2) Check blood glucose

- If BG normal range, consider other possible medical or sport related emergency in addition to T1D

2) Facilitate treatment

- If hypo & alert = provide fast acting carbohydrate food per care plan
  - Recheck & adjust every 15 – 30 min
- **If hypo & unconscious = administer glucagon**
  - **Maintain ABC**
  - **Call 9-1-1**
- If hyper = assist in administering insulin correction bolus per care plan
  - Recheck & monitor until reaches range



# Scenario 2: Unknown Athlete with T1D

If concern for hyperglycemia, hypoglycemia, or becomes **unresponsive**

- ❖ D/c activity or sport
- ❖ Obtain history
  - Include direct question about diagnosis of diabetes or any other chronic condition
- ❖ Follow pre-established treatment plan if available
- ❖ If no plan available,
  - 1) Check blood glucose
    - If BG normal range, consider other possible medical or sport related emergency in addition to T1D
  - 2) Facilitate treatment
    - If hypo & alert = provide fast acting carbohydrate food of at least 15 -30 g
      - Recheck & adjust every 15 – 30 min
    - If hypo & unconscious = administer glucagon
      - Maintain ABC
      - Call 9-1-1
    - If hyper = discuss with guardian before insulin admin
      - If patient able, assist them in correction bolus per their reported care plan
      - If unable, connect with guardian to find out treatment recommendation
      - Recheck & monitor until reaches range



# Scenario 3: Unknown Medical Emergency

Treat as you would all medical emergencies however, with increased **awareness** to:

- Specifically ask about diabetes
- Observe for insulin pump or CGM equipment in addition to medical alerts
- Have prepared kit on hand to check BG or provide fast acting sugar if needed





Thank you!

Questions?

The logo for SMART SERIES. The word "SMART" is in a large, bold, blue font. To the left of the "S" is a stylized graphic of a hand with fingers pointing upwards. To the right of "SMART" is the word "SERIES" in a smaller, blue font, oriented vertically.



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