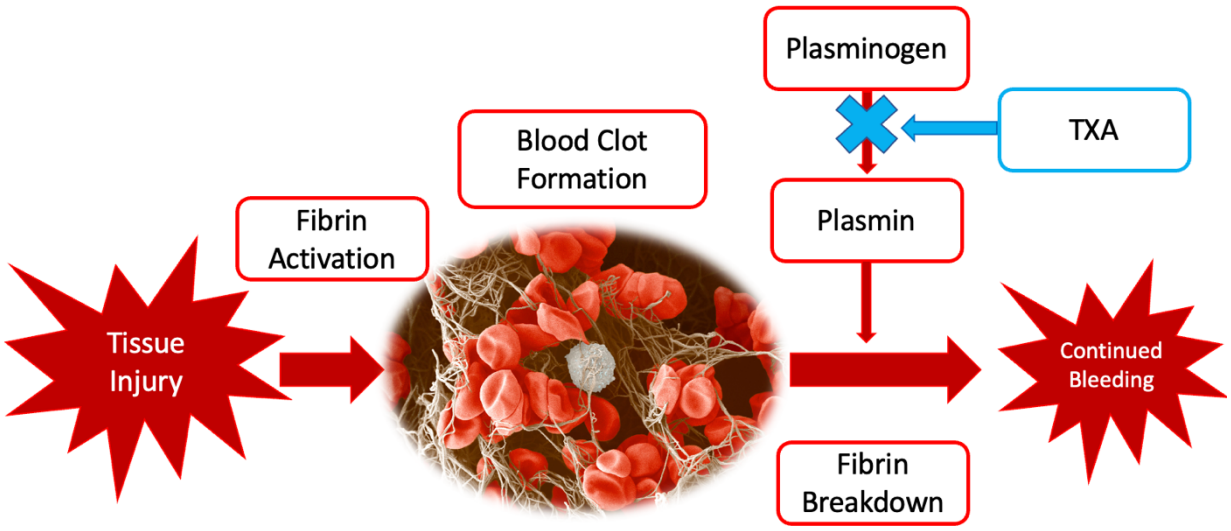
OMD Podcast: Prehospital Tranexamic Acid

Summary Points:

-What is TXA and How Does It Work
-Clinical Applications and Limitations of TXA
-TXA in Protocol
-TXA Pro-Tips

- **What is TXA and How Does It Work**

-TXA stands for tranexamic acid
-The one-liner is TXA works by stabilizing blood clots
-When bleeding occurs, special proteins are activated in the blood stream that activate a cascade of reactions
    -This cascade results in the formation of strands of protein (fibrin) that act as a net to trap platelets and RBCs to form a clot to stop the bleeding
    -This cascade increases in intensity then reaches an equilibrium point where the clot reaches maximum size and stabilizes
        -At this equilibrium point, there is a balance between elements causing the clot to form (thrombin) and elements breaking down the clot (plasmin)
        -Some degree of clot breakdown is critical otherwise runaway clotting could occur leading to thrombosis and potential emboli
-TXA binds to the blood protein plasminogen
    -Plasminogen is the inactive form of the enzyme plasmin
    -Plasmin degrades fibrin strands to break-down and destabilize the clot
    -By blocking plasminogen from waking up, TXA prevents the breakdown of the fibrin strands and thus the blood clots
        -Tissue Plasminogen Activator (aka TPA) does the opposite of TXA and activates plasmin and is used as a clot buster for stroke
-TXA does NOT increase coagulation, or act as a substrate for coagulation as some procoagulants do
-It does NOT stop sources of rapid or massive hemorrhage on its own
    -Clots need the opportunity to form BEFORE TXA can be effective
-A great animation for how TXA works:
    https://www.youtube.com/watch?v=emAHFC-Aidg&t=3s



- **Clinical Applications and Limitations of TXA**

-TXA has been shown to decrease mortality in trauma patients requiring massive transfusion in several gold standard trials (CRASH-2 and MATTERS trials)

-These trails included patients with significant hemorrhage defined as HR> 110 and/or SBP < 90mmHg

-TXA given within 3 hours of injury

-TXA has been studies for numerous other applications in ADULTS

-Nosebleeds: Topical TXA no better than Placebo (NoPac trial)

***NOTE: this was not looking at systemic TXA, and systemic TXA is NOT indicated in severe nosebleed

-GI Bleeding: Systemic TXA no better than placebo in GI Bleed with shock (HALT-IT Trial)

-This is likely due to the difficulty of pinpointing the start time of a GIB, thus targeting the narrow time window for TXA to work may not be possible (Recognition of GIB often delayed by days from onset)

-TBI: Small benefit in traumatic brain injury trial (CRASH-3 trial) under very specific conditions particularly mild to moderate TBI

-This trial also demonstrated TXA is safe in polytrauma patients with a TBI

-Post-Partum Hemorrhage: showed benefit of 1g TXA (WOMAN trial)

-Hemoptysis: Not fully studied, limited data with inconclusive findings

-TXA has not been studied extensively in pediatric patients

-Some data in traumatic hemorrhage with benefits

-We are actively monitoring this and will update protocols if any high-quality research comes out.

-For now, DO NOT use in peds patients without calling OLPG!

-Keep in mind, TXA is not a cure-all nor is it a risk-free medication!

-It is still a targeted treatment and has very narrow evidence-based indications that we just covered

-Our protocols reflect the latest research, if the indication isn't in protocol, it probably isn't supported right now.
-Some trials have demonstrated increased risk of thrombosis with TXA
-This risk is even higher in patients with current or history of thrombosis (DVT/PE)

- **TXA in Protocol**

-TXA is indicated ONLY in adult patients that meet the following criteria:
-Traumatic injury with severe hemorrhage AND HR>110 or SBP<90 AND signs of poor perfusion
-Injury within 3 hours (NOT effective and may be harmful if outside this)
-TBI with motor component of GCS<5 (difficulty following commands)
-This was done to exclude some of the very mild TBIs that won't benefit from TXA
-Severe post-partum hemorrhage
-Dose is 2g slow IV/IO push, this is to reflect CRASH-3
-NOT indicated in pediatrics
-If concerned and think TXA might be beneficial, call OLPG
-NOT for medical hemorrhage (GI bleed, epistaxis)

Protocol, Dosage, and Administration

Adult - Shock/Hypotension
Advanced
If trauma with significant hemorrhage and SBP≤90 or HR≥110 with poor perfusion or TBI with inability to follow verbal instructions (Motor GCS < 5)
2 g IV/IO, slow push over 1 min
Do not give if injury occurred ≥3 hours before

Adult—Traumatic Cardiac Arrest
Advanced
2 g IV/IO, slow push over 1 min

Adult - General Trauma
Advanced
If trauma with significant hemorrhage and SBP≤90 or HR≥110 with poor perfusion or TBI with inability to follow verbal instructions (Motor GCS < 5)
2 g IV/IO, slow push over 1 min
Do not give if injury occurred ≥3 hours before

OB/GYN – Emergency Childbirth
Advanced
If postpartum hemorrhage
1 g IV/IO, slow push over 1 min

- **TXA Pro-Tips**

-TXA is really something you should reach for when you think the patient will require massive transfusion (3-4 units of blood or more)
-Look for signs of hemorrhagic shock or massive hemorrhage
-Keep in mind that traumatic injuries will cause an adrenaline dump and tachycardia from stress and pain
-Do your best to differentiate stress response from shock

-TXA won't help isolated tachycardia

-There are NO mechanisms of injury that are an automatic indication for TXA

-Even GSW doesn't mean that TXA is required

-Patients still must have signs of shock or be predicted to require multiple units of blood products to benefit from TXA

-Hemodynamically stable patients DO NOT need TXA regardless of mechanism of injury

-TXA is time dependent, but there are 3-hours to administer the first bolus

-In trauma patients suffering from shock, TXA is NOT the number one priority

-ABC management, IV access, hemorrhage control, initial fluids and initiating transport are ALL more important than giving TXA

-TXA is not definitive care for bleeding and will NOT save your patient in the pre-hospital setting

***Takeaway: TXA is beneficial, but is a much lower priority when compared to critical trauma care basics

-Keep in mind, post-partum hemorrhage is NOT the same as bleeding after a miscarriage

-TXA has not been studied in miscarriages

-If you have a patient in the first or second trimester with severe bleeding and shock after a miscarriage, call OLPG for guidance prior to giving TXA

SUMMARY IN BRIEF

-TXA is not a substitute for the basics of hemorrhage control

-NOT an IV tourniquet!

-TXA has been researched in many applications but has only been proven to be effective in the following subsets of patients:

-Trauma patients with massive hemorrhage and shock

-Post-partum hemorrhage

-Moderate TBI

-Keep in mind, there are very specific requirements for TXA administration in your protocols, make sure to check that your patient is a candidate!