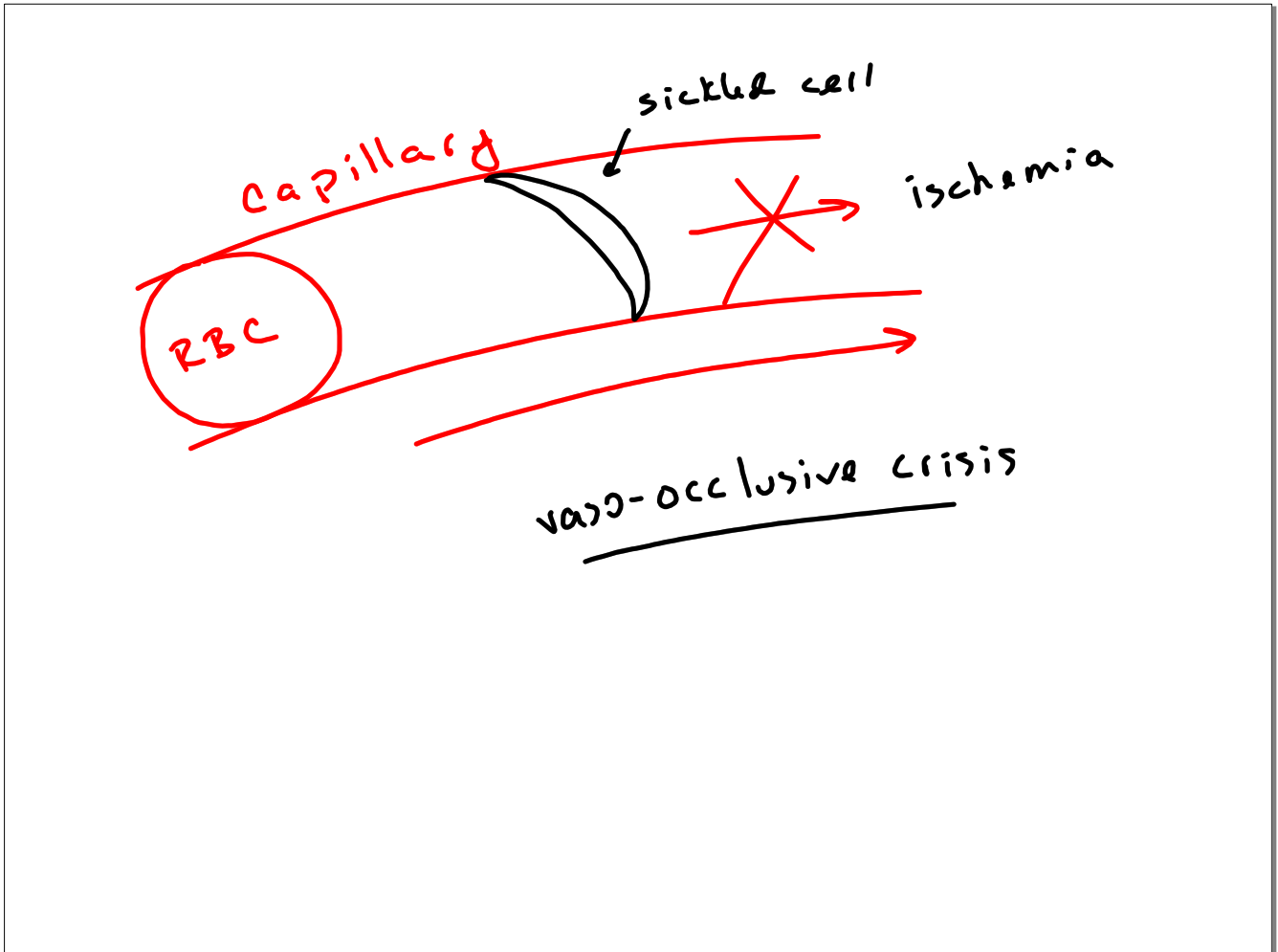


Pre-hepatic	Hepatic	Obstructive
<p>* Cause: destruction of too many RBC's</p> <ul style="list-style-type: none"> <li>- hemolytic disease</li> <li>- new born</li> </ul>	<p>* Cause: liver has difficulty conjugating bilirubin</p> <ul style="list-style-type: none"> <li>- hepatitis</li> <li>- cirrhosis</li> <li>- pre-term baby</li> </ul>	<p>* Cause: difficulty getting direct bilirubin to digestive tract</p> <ul style="list-style-type: none"> <li>- gallstones</li> <li>- tumor</li> <li>- pancreatitis</li> </ul>
<p>* Jaundice:</p> <ul style="list-style-type: none"> <li>↑↑ indirect bilirubin</li> <li>↑ direct bilirubin</li> </ul>	<p>* Jaundice:</p> <ul style="list-style-type: none"> <li>↑↑ indirect bilirubin</li> </ul>	<p>* Jaundice</p> <ul style="list-style-type: none"> <li>↑↑ direct bilirubin</li> </ul>
<ul style="list-style-type: none"> <li>* Darker feces</li> <li>* Darker urine</li> </ul>	<ul style="list-style-type: none"> <li>* Pale Feces</li> <li>* Light colored urine</li> </ul>	<ul style="list-style-type: none"> <li>* Pale Feces</li> <li>* Dark urine</li> </ul>

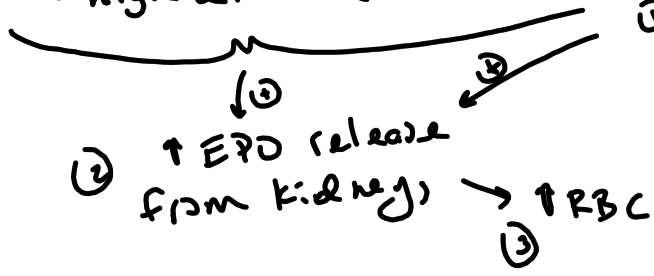
Nutrient Deficiency	Bone Marrow Damage (aplasia)	Genetic
Iron	Aplastic anemia	Thalassemia - $\alpha$ - $\beta$ - hemolytic
B <sub>12</sub>		Sickle Cell Anemia - $\beta$ - hemolytic
B <sub>9</sub>		



# Polycythemia ↑RBC

- ① \* Hypoxia (↓O<sub>2</sub> level)
  - cardiovascular disease
  - pulmonary disease
  - smoking
  - high altitude

} bad

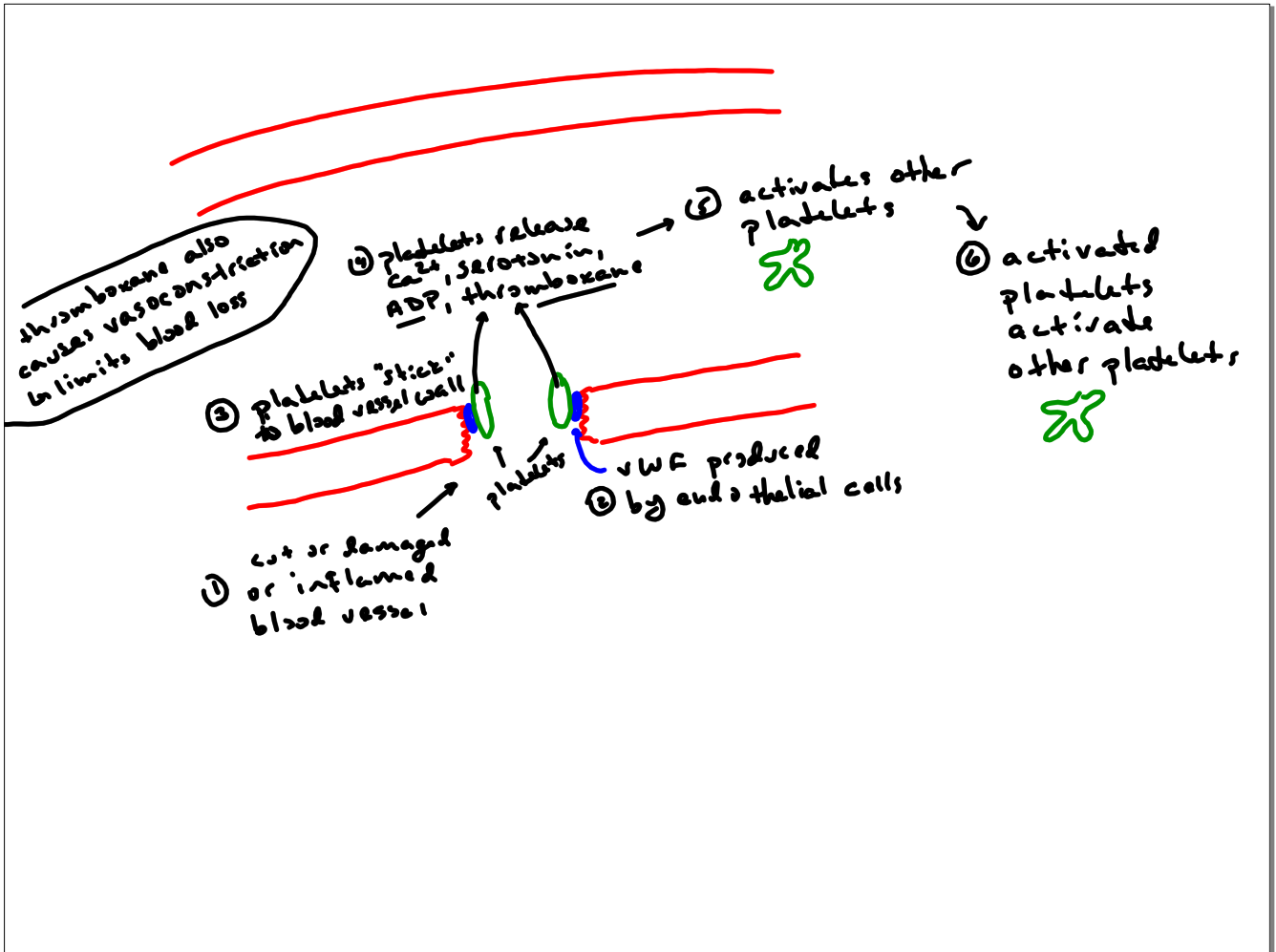


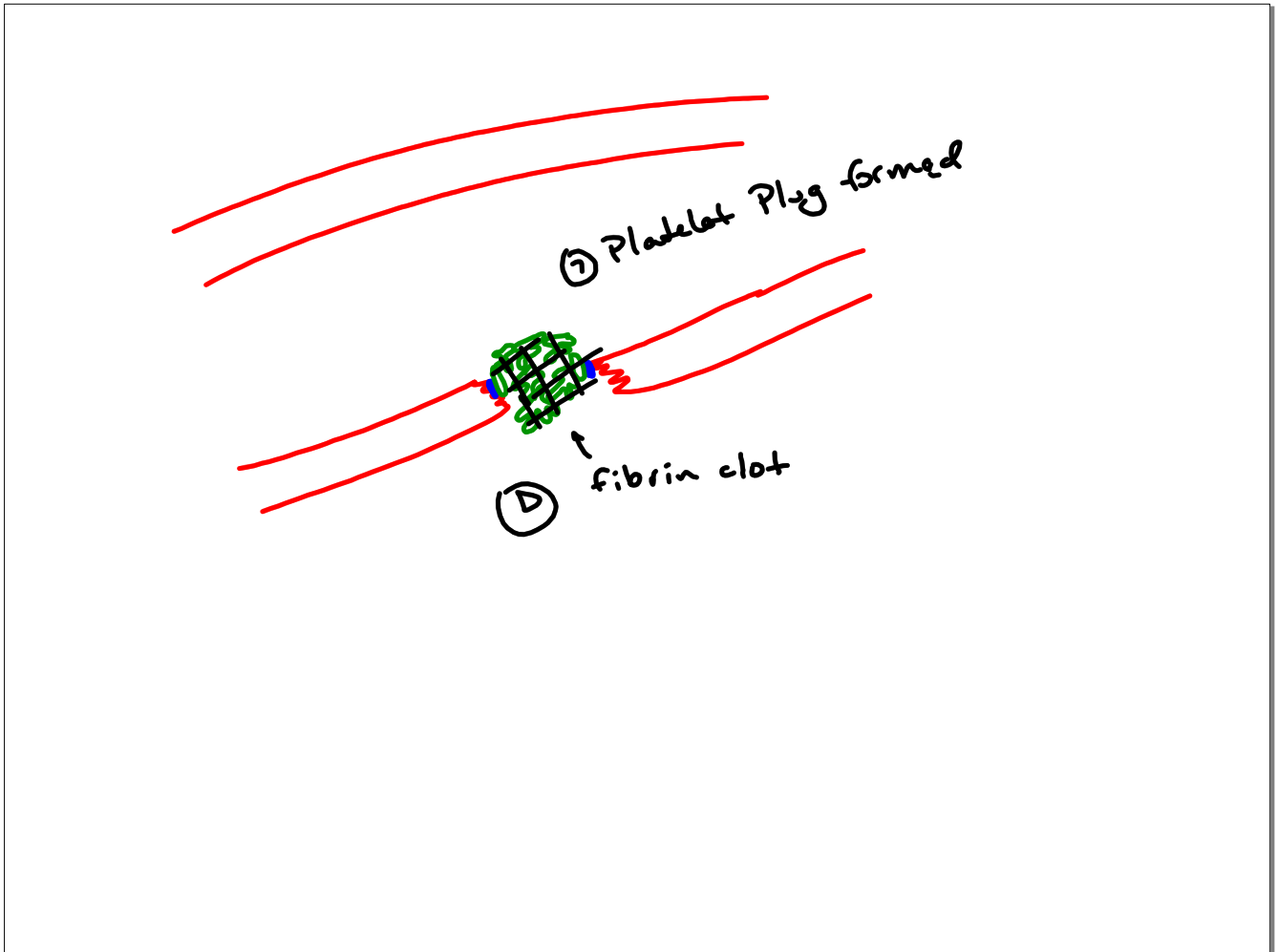
\* Cancer  
- Polycythemia  
- JAK2

① Defective Hb  
(anemic)

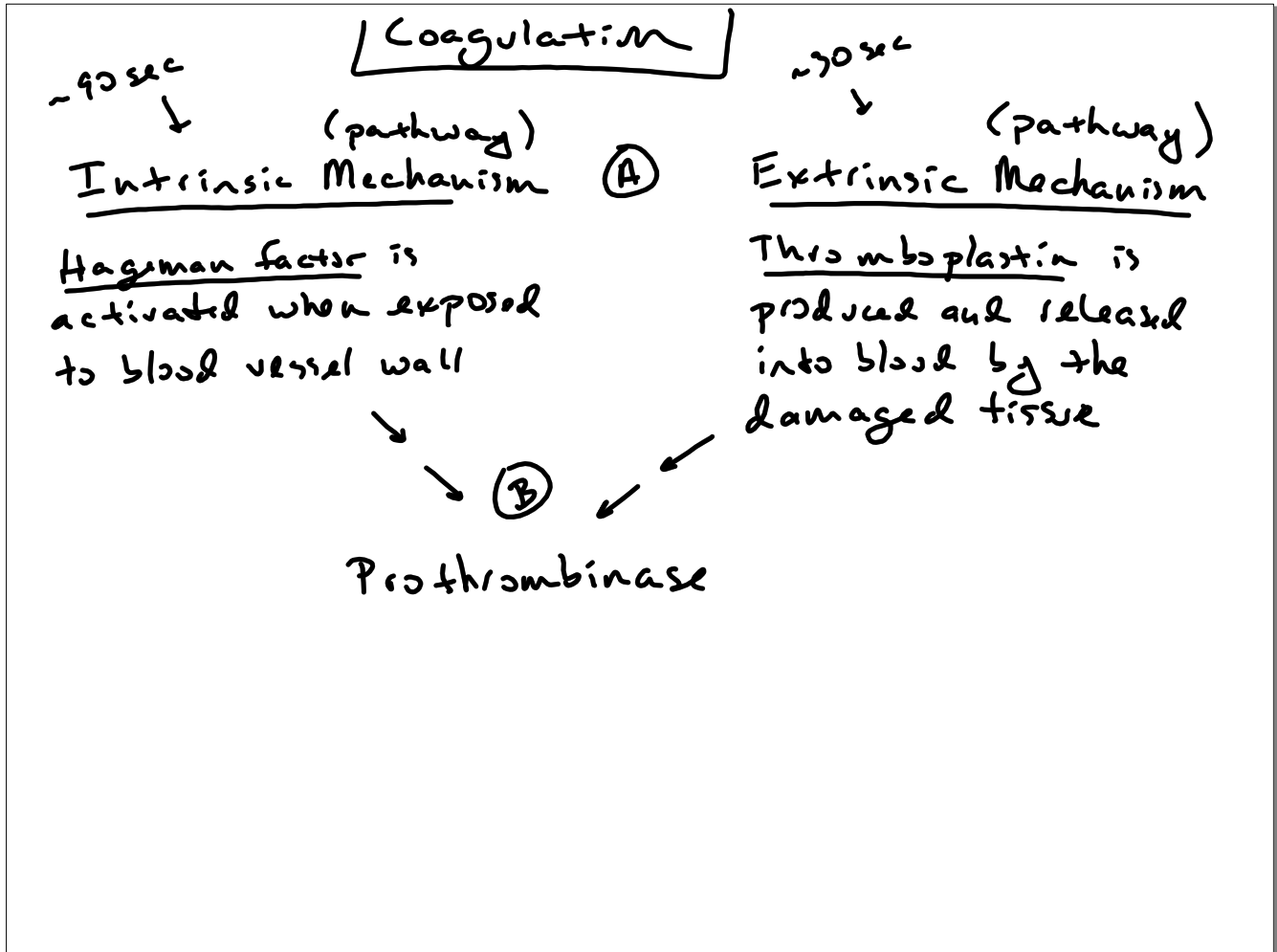
\* Blood Doping  
- transfusing RBC  
- EPO

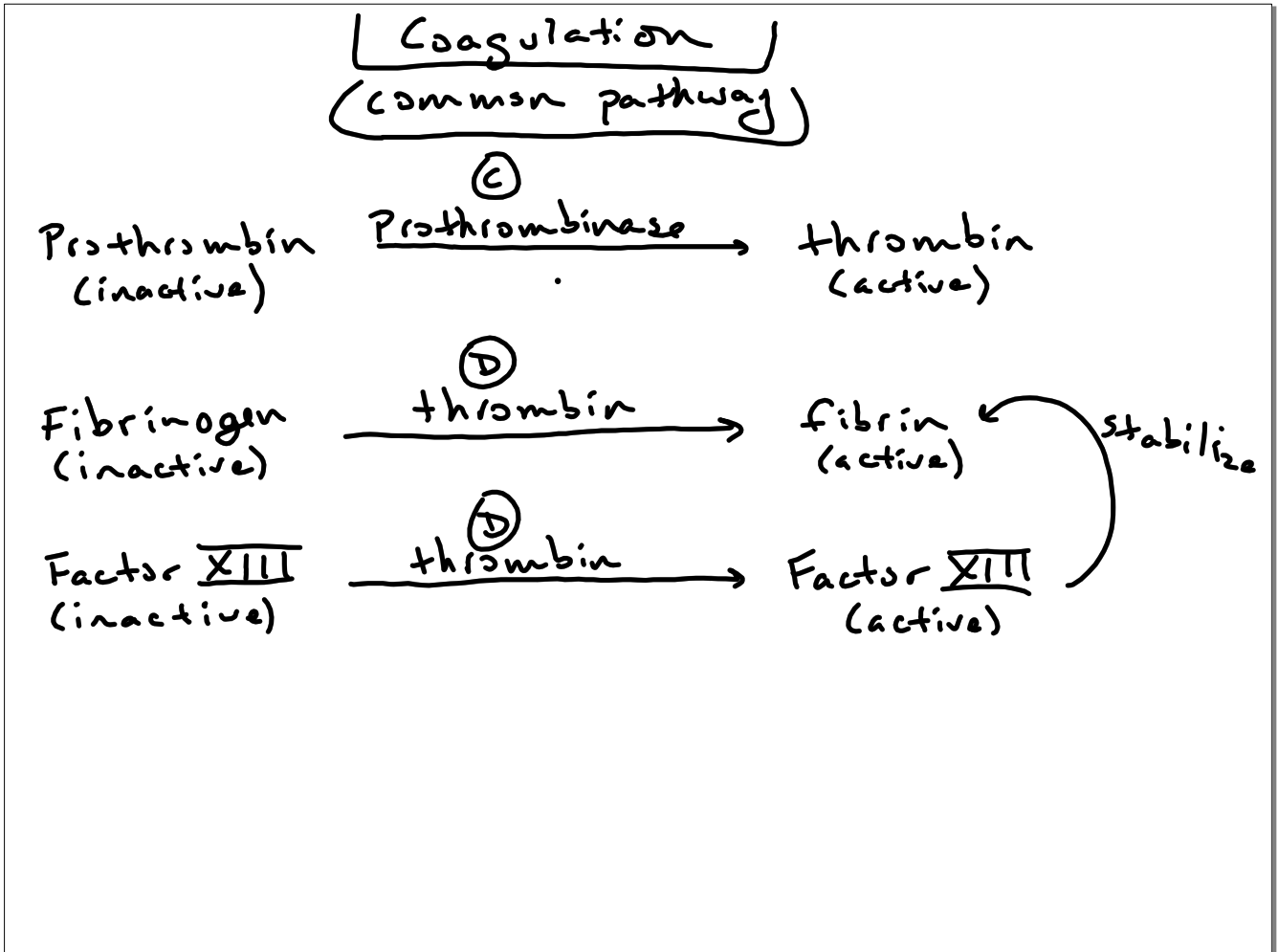
↑  
cheating

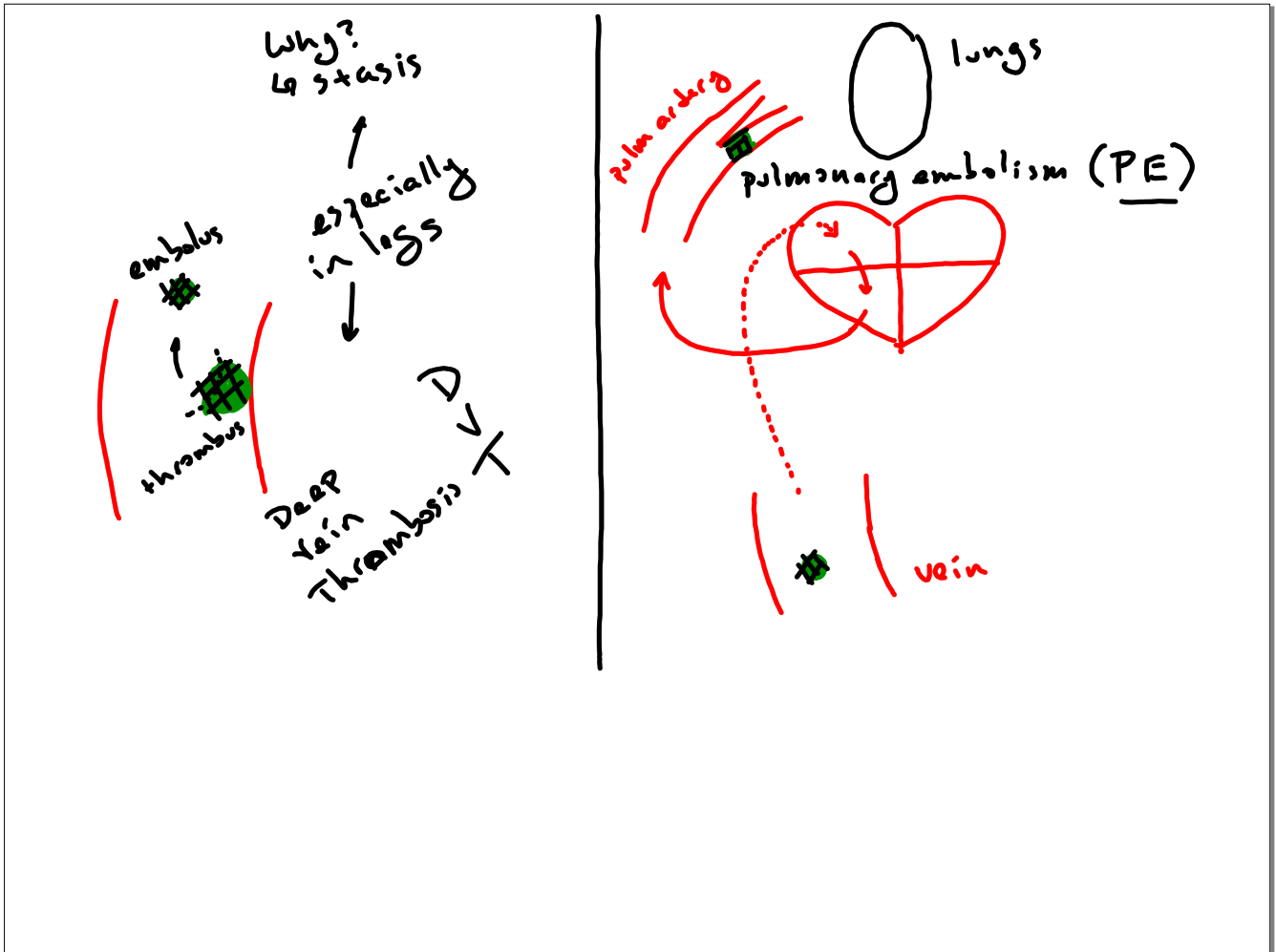














Type A

Mom  
(oocyte)

Dad  
(sperm)

A

A → AA

A

O → AO

O

A → AO

Type B

Mon

Dad

B

B

BB

B

O

BO

O

B

BO

Type AB

Mom

Dad

A

B

AB

B

A

AB

---

Type O

Mom

Dad

O

O

OO

A and B genes are dominant  
↳ dominant are expressed

---

O is recessive

↳ two recessive genes needed  
to be expressed



Pos vs Neg Blood Type

Mom	Dad		
D	d	→ Dd	} positive
d	D	→ Dd	
D	D	→ DD	

---

Mom	Dad		
d	d	→ dd	← negative

D = dominant

d = recessive

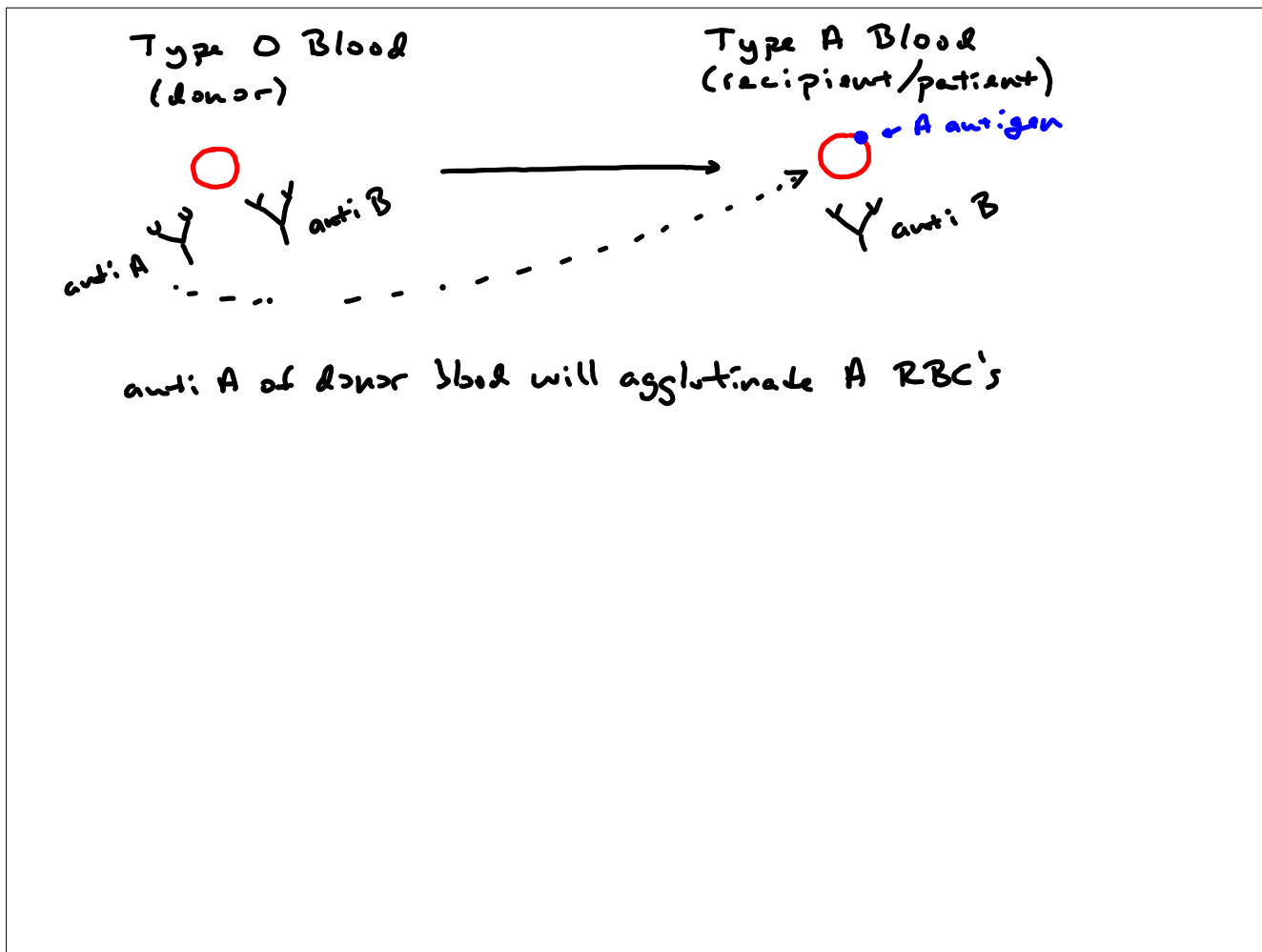
Mom	A+	AODd	Mom	A+	AADd
Dad	B+	BOdd	Dad	B+	BBDD
Baby	O-	Oodd	Baby	AB+	ABDD
	O+	Oodd or ODDd			
	A-	Aodd			
	A+	AODD or AODd			
	B-	BOdd			
	B+	BODD or BODd			
	AB-	ABdd			
	AB+	ABDD or ABDD			

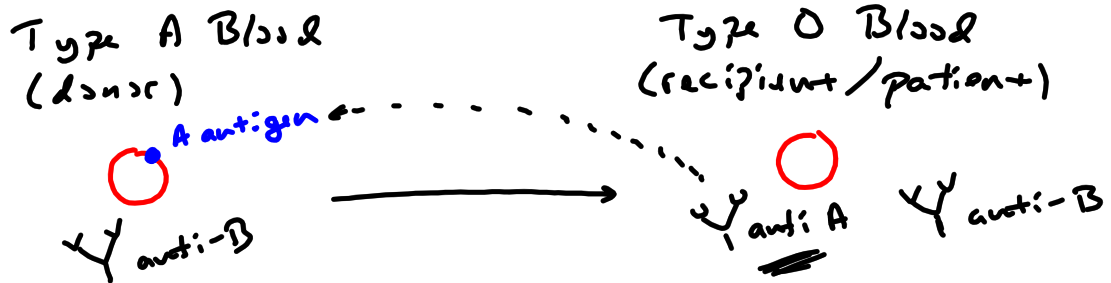
Mom A - Aodd  
Dad B - Bodd  
Baby O + ODDd or ODDD

Mommy  
was naughty

# Transfusions

	Whole Blood	Cell	Plasma
RBC (antigen)	✓	✓	X
Plasma (antibody)	✓	X	✓





Recipient/Patient anti A agglutinate A RBC's from donor  
↳ worse  
↳ why?  
↳ activated the immune system of the recipient

Cell Transfusions

A cells	do not give to ...	Type B recipient
		Type O "
B cells	" " " " ...	Type A "
		Type O "
AB cells	" " " " ...	Type A "
		Type B "
		Type O "
O cells	can be given to all blood types	

\* Neg blood/cells can be given  
to a recipient w. pos blood

---

\* Pos blood/cells can NOT be given  
to a recipient w. neg blood

↳ Why?

↳ D antigen is foreign to the immune system  
of a recipient w. neg blood

↳ anti-D will therefore be produced  
in the recipient



E. F.

Mom : neg  
Dad : pos  
1<sup>st</sup> baby : pos

} If during birthing, baby's pos blood gets into Mom's neg circulation  
↳ Mom produces anti-D

If 2<sup>nd</sup> baby has pos blood ... Mom's anti-D will agglutinates baby's D RBC's

