NECROSIS

General Pathology 2.

March 2020

Prepared by Mr. Ephraim.

Definitions

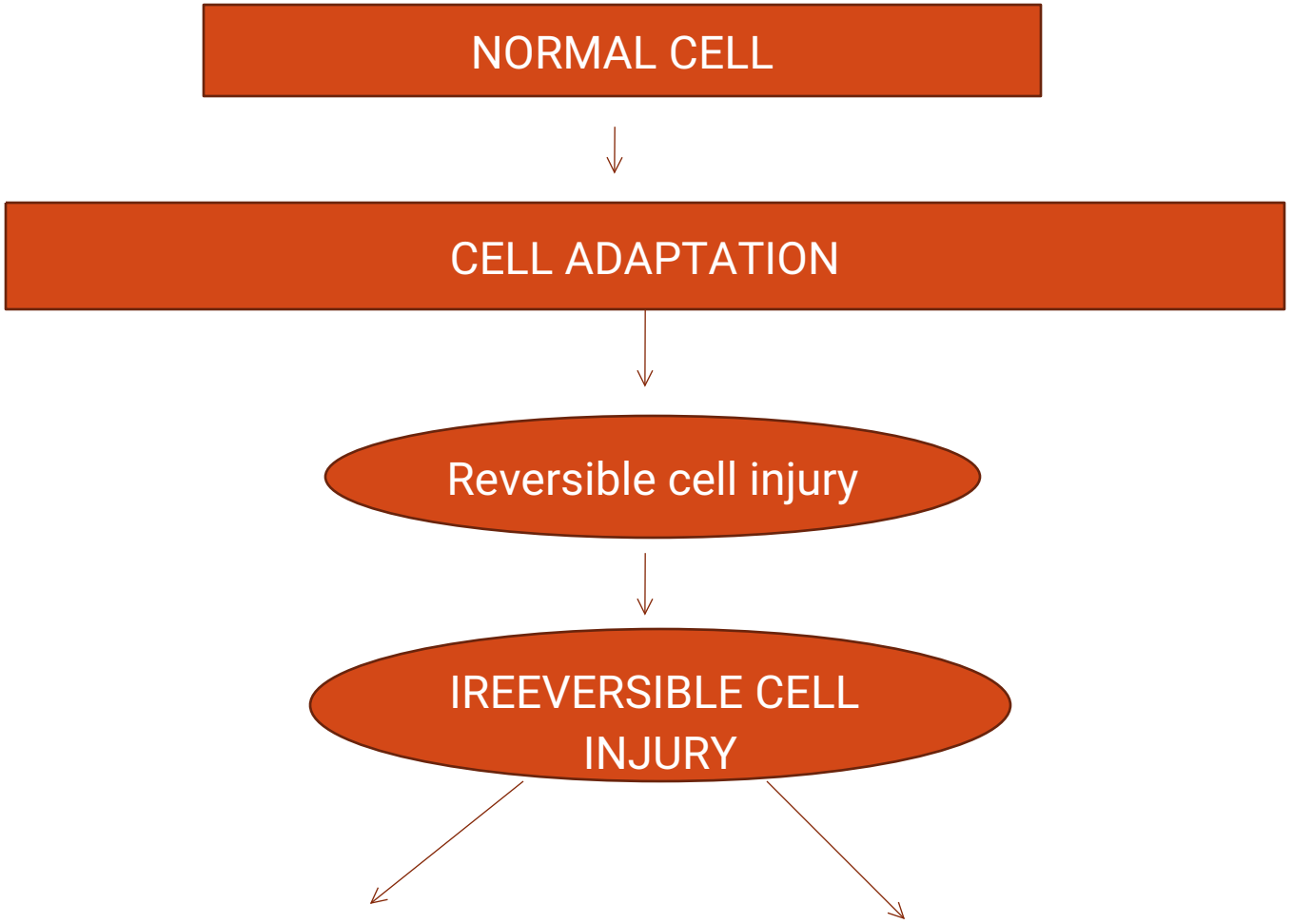
Necrosis is the death of a cell or groups of cells while they still form part of the living body and implies permanent cessation of normal function.

It’s a spectrum of morphologic changes that follows cell death in living tissues.

Necrosis can be sudden or gradual.

Brains storm; what can cause Necrosis????

pictorial


NORMAL CELL
CELL ADAPTATION
Reversible cell injury
IREEVERSIBLE CELL INJURY
NECROSIS
APOPTOSIS

Causes

- Ischemia
- Physical agents
- Chemical agents
- Immunological injury

Further;>

- Blood supply-cells are cut of from 02.
- Toxins-bacteria, poisons, cyanide
- Antibody antigen reactions
- Severe infections-viruses
- Extreme temperatures or very cold(Frost)
- Mechanical pressure
- Ionizing radiation

Characteristics of a necrotic cell

Increased membrane permeability

Hydrolysis of nucleus

Nuclear disruption and disappearance

Loss of all the physiological functions and processes.

Assignment; define:

Kayolysis

Pyknosis

Karyorrhexis

Types of Necrosis

1. **Coagulative Necrosis**> whercell death leaves the tissue hardened(MUMIFIED) –same shape-heart, spleen and kidney
2. **Colliquative necrosis-** cell death with softening of the tissue affected(Liquafactive)>the tissue becomes liquid viscous mass,creamy yellow; Brain, abscess.
3. **Causeous Necrosis- f**irm cheese mass-TB- LUNG
4. **Fat Necrosis-** seen in pancrease,breast-Visible white chalky areas**.**
5. **Fibrinoid Necrosis**- Deposition of fibrin like material, seen in immunologic cell injury- HTN, Peptic ulcer.

Cont

Gangrenous Necrosis; Death of a cell tissue as a resultant to acute ischemia and infection- green black change of tissue with foul smelling gas- hydrogen sulpoide is released.

TYPES;

1. **Wet gangrene>** Venous obstruction, Mist, no clear line of demarcation,bacteria is present, poor prognosis,occurs in most tissue like mouth, bowel cervix, diabetic foot, Bed sores- caused by gram positive
2. **Dry gangrene > Arterial obstruction**, limbs, toes due to feet arteriosclerosis, trauma, dry shrunken, black-presence of a clear demarcation, better prognosis
3. **Gas gangrene**; caused by gram positive, seen in muscle and in colon.

Wet Gangrene


WET GANGRENE

DRY gangrene

Effects of necrosis..

Loss of function of the affected cell,tissue, organ.. Depends on the number of cells involved.

Release of cellular enzymes into the blood stream-ie. Transaminases-sgot and sgpt when the liver, heart muscles undergo necrosis as seen in severe hepatitis and M.I

Somatic death- complete cessation of respiration and circulation with extensive and irreversible brain damage.

The END..

Questions???

Haemostasis and Thrombosis Recap

Presented by Mr. Ephraim Shambar.

Defination;

Haemostasis.

To maintain blood in fluids, clot free

>Induces haemostasis clot at the site of injury.

Coagulation is a major haemostatic function responsible for prevention and termination of bleeding following an injury.

Its a balanced by fibrinolytic system.

Mechanism

Mechanism; The blood coagulation takes place in three steps.

1. Formation of prothrombin activator in response to rupture or damage to the blood vessels.
2. Conversion of prothrombin activator to Thrombin
3. The thrombin acts an enzyme to convert fibrinogen to Fibrin threads that mesh platelets, blood cells and plasma to form clots

Pathway of Coagulation

COGULATION SYSTEM IS DIVIDED INTO TWO PATHWAYS

Extrinsic pathway; which begins after trauma to vascular wall and surrounding tissue**.**

(extrinsic pathway is activated through tissue factor released by endothelial cells after external damage)

Intrinsic Pathway; which begins in the blood itself -its Activated through exposed endothelial collagen through a cascade reaction resulting in the formation of fibrin clot.

The coagulation factors

I	FIBRINOGEN
II	PROTHROMBIN
III	TISSUE FACTOR
V	LABILE FACTOR
VII	PROCONVERSION
VIII	ANTIHAEMOPHILIC FACTOR
IX	CHRISTMASS FACTOR
X	STUART-POWER FACTOR
XI	PLASMA THROMOPLASTIN ANTECEDENT
XII	HAGMAN FACTOR
XIII	FIBRIN STABILIZING FACTOR(FLETCHER FACTOR)

FIBRINOLYSIS; IF coagulation is continued and uncontrolled then spontaneous clot formation results in pathological state.

The process of fibrinolysis results breakdown of clot.

In this tissue injury> release of plasminogen> plasmin which binds to fibrin and form fibrin degradation proceeds.

Laboratory

Prothrombin time(PT)

Tests the extrinsive pathway.

It's a measure of vitamin KL dependent factor activity for factor (ii,vii,ix and x)

Standard PT reporting Values 0f 0.8-1.2 seconds

International normalize ratio(INR)-a higher PT/INR means your blood is taking longer to clot. A low INR/PT means your bllod is cloting faster putting you at a risk of clot?DVT.

Cont.

APTT (activated partial prothrombin)- is a test for intrinsic common pathway, it depends activity of all coagulation factor except factor VII,XIII.

Normal values 25-35 seconds. Prolonged only if coagulation factor reduced to less than 30% of normal.

ACTIVATED CLOTTING TIME(act); monitors Heparin anti coagulant in cardiac vascular surgery. Normal value 90-120 seconds.

Cont.

Reflects abnormalities in fibrinogen> Fibrin. Its prolonged by heparin.

BLEEDING TIME;(BT) monitors platelet function, Its non specific and unreliable. No evidence as a predictor of risk of hemorrhage.

Coagulation Disorders

Congenital Disorder; is a disorder of clotting may not present until challenged by trauma and surgery.

Acquired disorder; Is due to lack of synthesis of coagulation factor.

Increased loss due to DIC, Massive blood loss

A FAMILY Hx of Hemophilia A,B sex linked recessive, Von willibrand disease(in severe hemophilia A (lack Factor VIII) bleeding happens spontaneously; in mild hemophilia- bleeding occurs after trauma.

Medical problems such as liver disease, Malabsoption(Vit K deficiency) infection, malignancy, DIC, auto immune disease, SLE, RH arthritis as well as medications like aspirin and NSAIDS.

Drugs affecting Coagulation;

NSAIODS, clopidogrel- anti platelet drugs(prevents platelet plug formation)

Heparin, warfarin – IV anti coagulant, oral coagulant - prevents coagulation cascade.

Urokinase- Firbrinolytic agent- prevents fibrinplysis.

ASPRIN

- Asprin; inhibits cyclo oxygenase
- Reduces thromboxane synthesis and inhibits both COX 1 and 2 irreversibly.
- Adverse effects.
- GI ulceration, Haemorrhage, Bronchospasms,Papillary necrosis, REYEs syndrome in children.
- Should be stopped 7 days prior to surgery.

Heparin

Is a glycoaminoglycan containing a mixture of sulfated muco polysacharides.

It enhances the action of plasma protease inhibitor 1000 fold.

Unfranctionedated (5000-3000)

Low molecular weight(LOMOH)- 1000-1000iu.)

Adverse effect;. Increased bleeding., osteoporosis given over 3-6 months.

Antidote> Protamine sulphate.

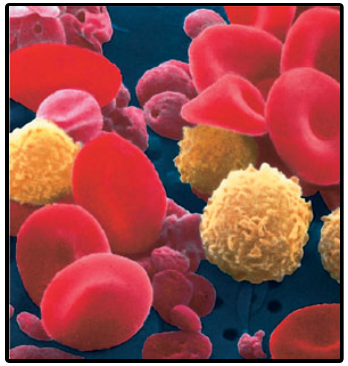
Warfarin

- Highly plasma protein bound, It blocks the VIT K dependant glutamine carboxylation of factor 11,vii,1x, and X
- Action is reversed by VIT K.
- Metabolized by the liver- excreted in urine and stool. Stop 2-4 days prior to surgery.

Questions?

Thank You.

Blood Typing



A, B, AB and O Blood Types

Blood Grouping

- **Transfusion** is the transfer of blood or blood components from one individual to another.
- **Infusion** is the introduction of fluid other than blood, for example: saline solution or glucose solution.
- **Blood Group** is determined by the **antigens** (agglutinogens) on the surface of RBCs.
- **Antibodies** (agglutinins) can bind to RBC antigens, resulting in **agglutination** (clumping) or **hemolysis** (rupture) of RBCs
- **Blood Groups**: ABO and Rh

ABO Blood Typing

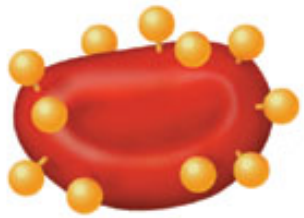
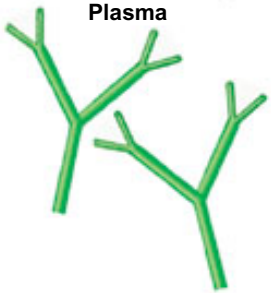
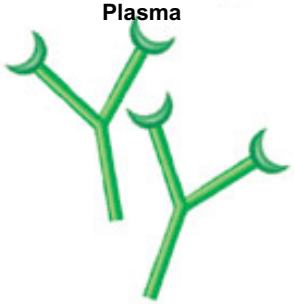
Blood Type	Antigens (Agglutinogens) on Red Blood Cells	Antibodies (Agglutinins) in Plasma
A	A	Anti-B
B	B	Anti-A
AB	A & B	None
O	Neither	Anti-A & Anti-B

http://learn.genetics.utah.edu/content/begin/traits/blood/

Distribution of ABO Blood Types

Blood Type	% of U. S. Caucasian	% of U. S. African American
A	41	27
B	9	20
AB	3	7
O	47	46

ABO Blood Groups

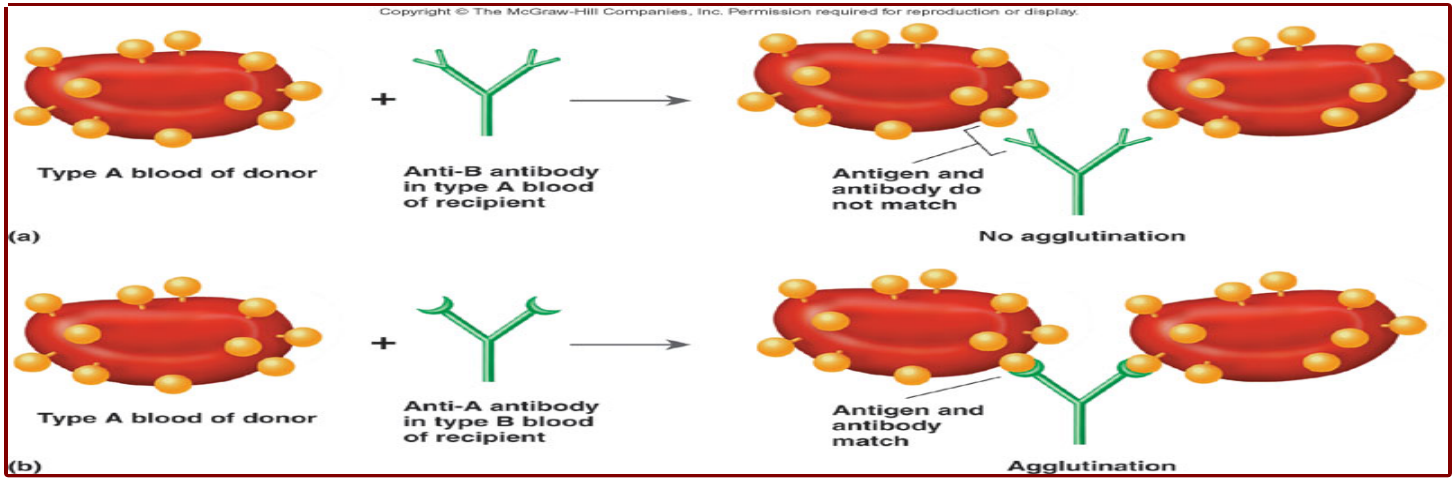
Antigen A	Antigen B	Antigens A and B	Neither antigen A nor B
			
Anti-B antibody Plasma	Anti-A antibody Plasma	Neither Anti-A nor Anti-B antibodies Plasma	Anti-A and Anti-B antibodies Plasma
			

Blood Transfusion

Blood Group	Prevalence	Blood Rec.
O	****	Only O
A	***	O or A
B	**	O or B
AB	*	All

- **If the wrong blood type is used, the person's own immune system immediately attacks the donor's blood and causes clots and RBC destruction that can lead to total kidney failure and death.**

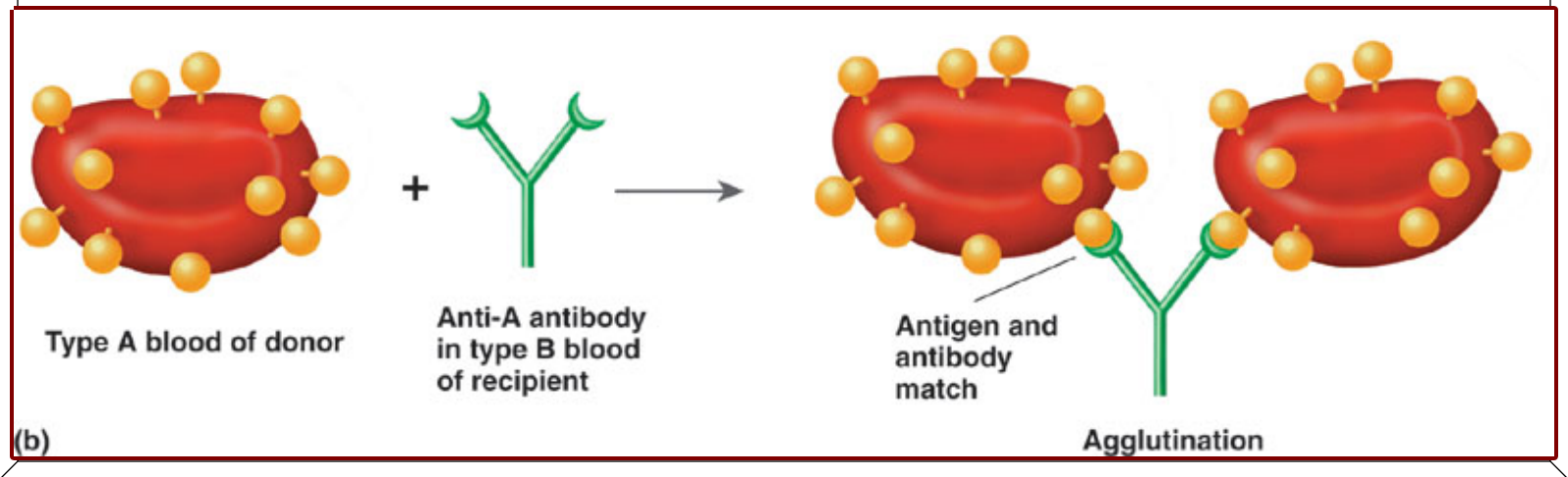
No Agglutination Reaction



- **A person with blood type *A* can receive blood from a donor with blood type *A*.**
  - The *anti-B* antibodies in the recipient **do not** combine with the type *A* antigens on the red blood cells of the donor.

Agglutination Reaction

- **A person with blood type *B* cannot receive blood from a donor with blood type *A*.**
  - The *anti-A* antibodies in the recipient will combine with the type *B* antigens on the red blood cells of the donor.



Blood Replacement

- **If severe blood loss occurs (>30%), the situation is life threatening and requires that the lost blood be replaced.**
- **The infusion of blood requires that the person's blood type be known.**

Plasma and Blood Expanders

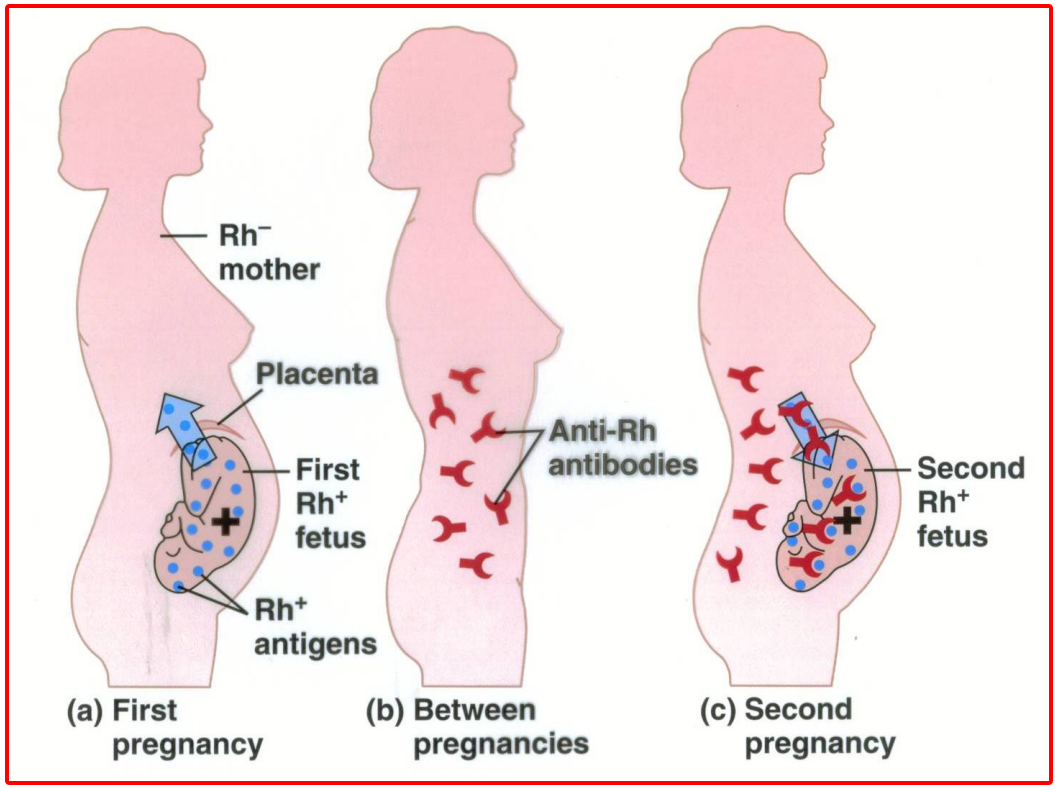
- **In order to avoid blood reactions when blood loss is substantial and there is no appropriate blood for transfusion, either plasma or artificial materials can be used to replace volume.**

- **As long as the expanders have no RBC's, there should be no transfusion reaction.**
  - 0.9% saline
  - Human serum albumin
  - Altered physiological saline.

Development of the Fetus

- In the early developing fetus, the yolk sac, the liver and the spleen are forming blood cells.
- By the seventh month of gestation and into adulthood, only the red bone marrow makes blood cells unless something happens. Liver and spleen can form blood cells in adults.
- The fetus makes a different hemoglobin from the adult. This form is called hemoglobin F and it has a higher affinity for oxygen than does the adult form.

Hemolytic Disease of the Newborn (HDN)



HDN is the most common problem with *Rh* incompatability.

Development of HDN of the Newborn

- **A small quantity of fetal blood leaks across the placenta into the maternal blood stream.**
- **If the mother is *Rh-* and the baby is *Rh+*, the mother's immune system begins to produce *anti-Rh antibodies*.**
- **The mother's antibodies cross the placenta during the subsequent pregnancy into the fetal blood.**
- **If the second fetus is *Rh+*, the antigen-antibody reaction causes hemolysis of fetal RBCs and it results in HDN.**

Treatment of HDN

- **If a woman has *Rh-* and gives birth to a child, or if she has a miscarriage or abortion, she is given an injection of *anti-Rh antibodies* called *anti-Rh gamma globulin* or *RhoGAM* to prevent HDN.**

- **The antibodies bind to the fetal *Rh antigens* and inactivates them if they crossed the placenta during birth, and the mother's immune system does not respond by producing antibodies.**

Rh Factor

- **Individual with *Rh*+ if**
  - *Rh*+ and *Rh*+
  - *Rh*+ and *Rh*- (*Rh*+ is dominant over *Rh*-)

- ***Anti-Rh* antibodies of the system are not normally present in the plasma, but can be produced if an individual with**

  ***Rh* - is exposed to *Rh*+**