

DEFECTIVE RED CELL METABOLISM GLUCOSE 6-PHOSPHATE DEHYDROGENASE DEFICIENCY

DEFINITION

It is a hereditary hemolytic anaemia due to metabolic defect.

PATHOGENESIS:

G6PD functions is

1. to reduce NADP → NADPH (needed for production of reduce glutathione GSH).
2. Oxidize glucose -6-phosphate
3. It is the only source of NADPH

Deficiency

1. makes the RBCs susceptible to oxidant stress
2. impairs NADPH and GSH synthesis

*Note that Hb and RBCs membrane are protected from oxidant stress agents by GSH
Acute hemolytic anemia occurs in response to oxidant stress: drugs, fava beans or infections.*

TYPES OF G6PD

The most common type is B, A and Á . Other types are called according to the geographic please.

Also more than 400 types are found due to point mutation or deletion

Type B has no clinical appearance but has a Histological one

Type A is found in African countries

Type Á is found mainly in Niagara

GENETICS:

X-Linked.

- it can effect the activity or the stability of the enzyme and in some cases both of them

Female heterozygote has resistance to falciparum malaria.

The gene is located on x-chromosome close to the factor VIII gene." q2-8 "

It is found more in black people

EPIDEMIOLOGY:

The main races affected are West Africa, Middle East, Mediterranean and South East Asia. Most sever in Mediterranean and Middle East.

It usually effect tropical countries that malaria is found in

Note It is thought to confer a selective protection against Plasmodium Falciprum Malaria

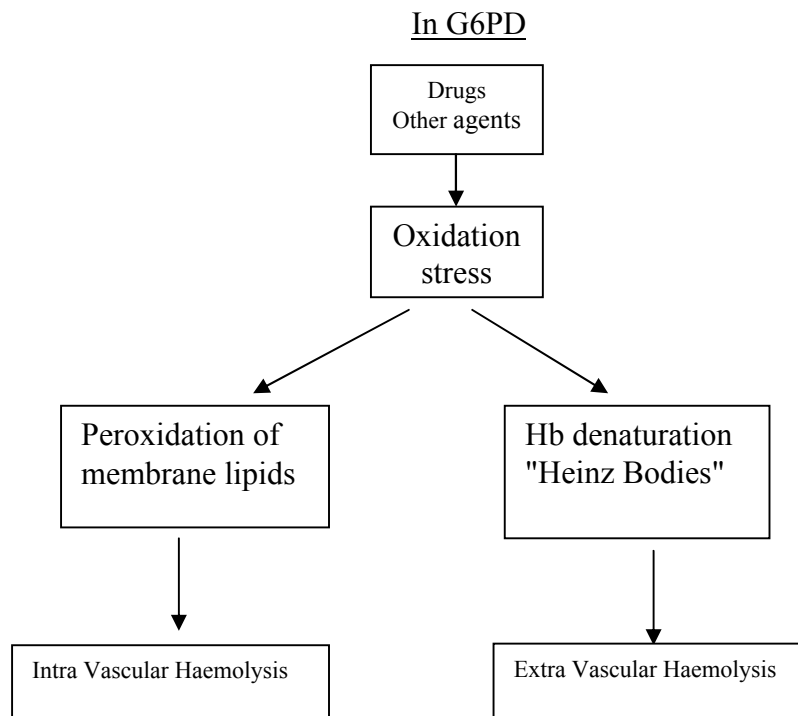
FAVISM

Fava beans ingestion is not always followed by a haemolytic attack in G6PD individuals.

The offending agent may be the glucoside divicine or its aglycone isouramil." Not protein "

Favism has been precipitated with fresh beans, dried beans, canned and frozen beans. (It is commonest with fresh and raw beans)

Oxidative damage may depend on how much isouramil is released by glycosidases present in the beans or in the intestinal tract of the consumer.



Note that Heinz Bodies can be detected by using Methlim Blue

NEONATAL JAUNDICE

The most common case is G6PD

1/2 of children with G6PD will not have NNJ

Note the jaundice is usually not caused by excess hemolysis But by G6PD deficiency which affects neonatal liver function

CLINICAL FEATURES:

Features of intravascular hemolysis precipitated by infection, drugs, ingestion of fava beans.

Anemia/ pallor.

Hemoglobinuria. → is seen most frequently in children with favism.

Renal failure → is common in adults

Dark Urine

Jaundice.

Fever.

Abdominal pain.

Neonatal jaundice

LABORATORY FINDINGS:

- Anemia.
- Reticulocytosis.
- Peripheral blood: fragmented RBCs "bite cells-blister cells" → due to removal of Heinz bodies "HB". "HB on RBCs detected and removed by spleen, and fragmented RBCs formed".
- Heinz bodies: (oxidized, denatured Hb)
- Hemoglobinuria.
- Decrease haptoglobin.
- Hemoglobinemia.
- Hyperbilirubinemia.
- G6PD level: normal within acute phase because young RBC have higher level of enzyme "so we test for the disease after the acute phase".

So we take blood during crises and we test the enzyme between the crises

TREATMENT

- Stop offending drugs
- Treat infection if present
- Maintain high urine output
- Blood transfusion in severe anaemia
- Phototherapy and exchange transfusion in neonatal jaundice