

GLYCOGEN STORAGE DISEASES



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INTRODUCTION

- Glycogen – primary fuel reserve for body's energy needs.
- GSD's (glycogenoses) genetically linked metabolic disorders involving enzymes that regulate glycogen metabolism.
- 10 different types – Types 1 to X
- Classified according to enzyme affected
- Inheritance AR (except GSDVI)

INTRODUCTION

- Incidence 1 : 25 000 (all forms)
1 : 100 000 (Type 1)

- Most common forms:

GSD 1 (von Gierkes disease)

Deficiency : Glucose - 6 - Phosphatase

GSD III (Cori disease)

Debrancher enzyme deficiency

Glycogen molecules – abnormal structure

Cannot be broken down to free glucose

GSD IV (Amylopectinosis)

Glycogen in tissues not increased

Branching enzyme deficiency results in glycogen with long outer branches causing scarring to liver, heart and muscle

GSD 1 LOCAL EXPERIENCE

Jenna

Early infancy:

- Hypoglycaemia
- Hepatomegaly

Late infancy

- Recurrent pneumonias/OM
- Nose bleeds

Tracy

9 Months

- Hypoglycaemia
- Growth delay
- Hepatomegaly

GSD 1b

GSD 1a

GSD 1

LOCAL EXPERIENCE (Continued)

Ovayo

4 Months

- Hypoglycaemia
- Hepatomegaly
- Renal stones



GSD 1a
with d RTA

Tilden

5 Months

- Hypoglycaemia
- Hepatomegaly



GSD 1a

GSD 1

LOCAL EXPERIENCE (Continued)

Irma

27 Years

- Short stature
- Hepatomegaly/Nodular
- Pulmonary Hypertension
- Chronic Inflammatory bowel disease



GSD 1a
(complications)

Tasneem

5 Years

- Recurrent epistaxis
- Short stature
- Hepatomegaly



GSD 1a

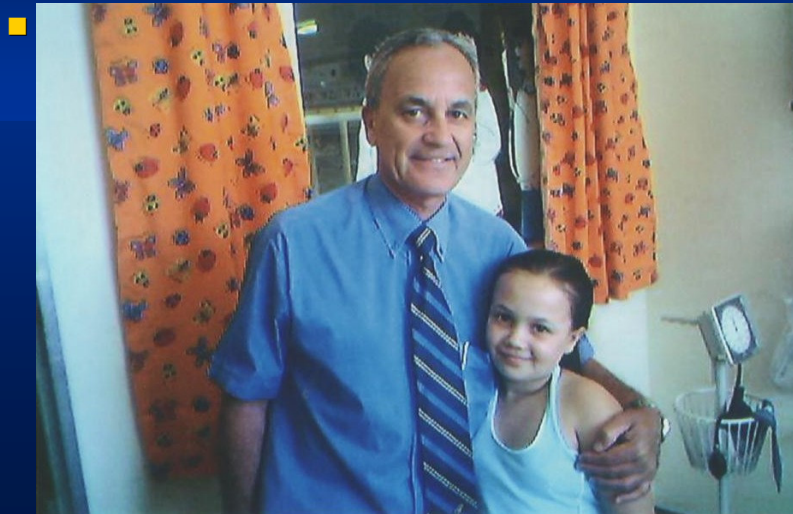
COMMON FEATURES

a) Clinical:

- Short stature (puberty)
- Doll-like facies
- Distended abdomen
- Epistaxis
- Infections →

GSD 1b

GSD



GSD



COMMON FEATURES

b) Laboratory Findings:

- Hypoglycaemia
- Lactic Acidaemia
- Hyperlipidaemia
- Increased glucagon
- Hyperuricaemia
- Thrombocytopenia
- Neutropaenia



GSD 1b

PATHOPHYSIOLOGY

- Deficiency: Glucose-6-Phosphatase
Catalyses conversion of glucose-6-phosphate to glucose
(GSD 1a vs GSD 1b)
- Hypoglycaemia
Hepatic glycogenolysis and gluconeogenesis impaired

PATHOPHYSIOLOGY

- Lactic Acidaemia
Hypoglycaemia stimulates glycogenolysis → metabolic intermediates which cannot be converted to glucose resulting in lactic acid production.
- Hyperuricaemia
Lactate inhibits uric acid excretion from kidneys.
Purine synthesis increase and contributes to ↑ uric acid

PATHOPHYSIOLOGY

- Lipid Abnormalities

Hypoglycaemia



Lipase stimulation

FFA release

Increased glycolysis results in elevated

NADH/NADPH/Acetyl CoA precursors for hepatic synthesis of TGs and cholesterol

- Neutropaenia (in GSD 1b)

Abnormal neutrophil maturation

Decreased colony stimulating activity

Decreased release of neutrophils

Decreased phagocytosis

TREATMENT

Medical

Maintain euglycaemia

- Diet mainstay
- Highly specialised nutritionist
- Overnight feeding (via NGT/Pump can normalise biochemical parameters)

Medication

- Trace elements (iron)
- G-CSF
- Xanthine oxidase

Surgical

- Biopsy
- Liver adenomas/adenocarcinomas

FOLLOW-UP CARE

- Close nutritional, biochemical monitoring (initial and puberty)
- Subspecialist review
- Complications
 - Severe hypoglycaemia
 - Lactic acidosis
 - Renal damage
 - Anaemia
 - Growth failure
 - Hepatic adenoma/adenocarcinoma
 - Pulmonary hypertension
 - Crohn's

PATIENT EDUCATION

- NGT Feeds
- Test blood glucose
- Recognise signs of impending hypoglycaemia
- Intensive nutritional education