Understanding Fabry Disease

The Importance of Health Management

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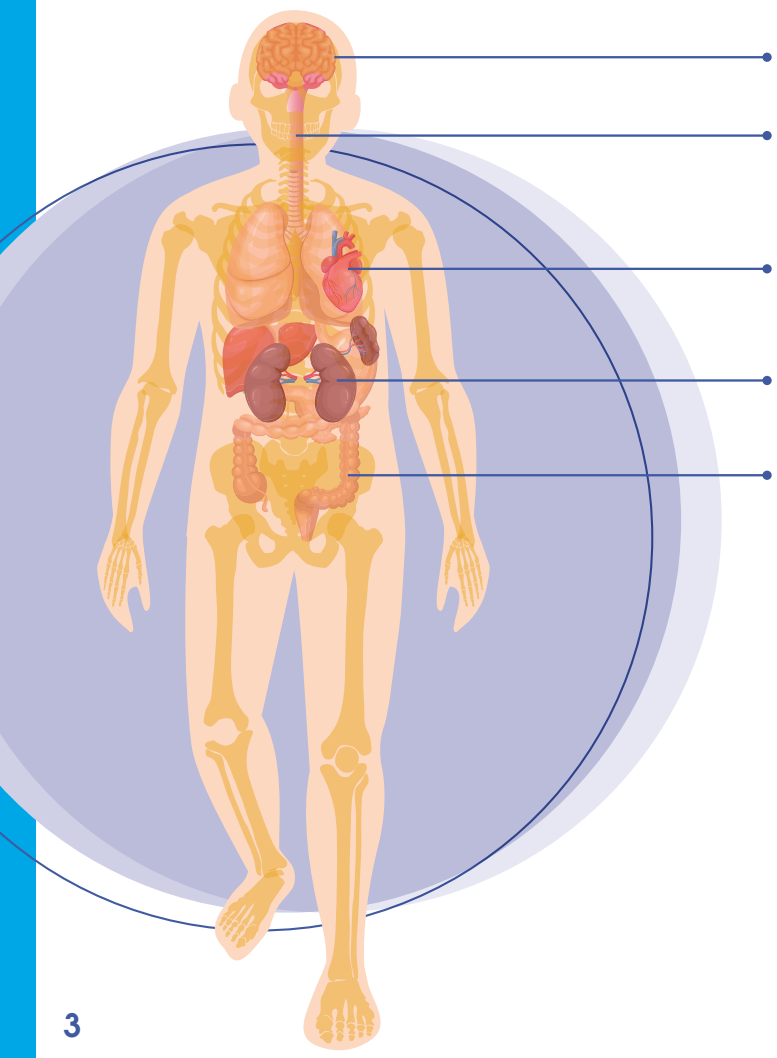
Important Information: Sanofi does not provide medical advice, diagnosis, or treatment. The health information contained herein is provided for general educational purposes only. Your healthcare professional is the best source of information regarding your health. Please consult your healthcare professional if you have any questions about your health or treatment.

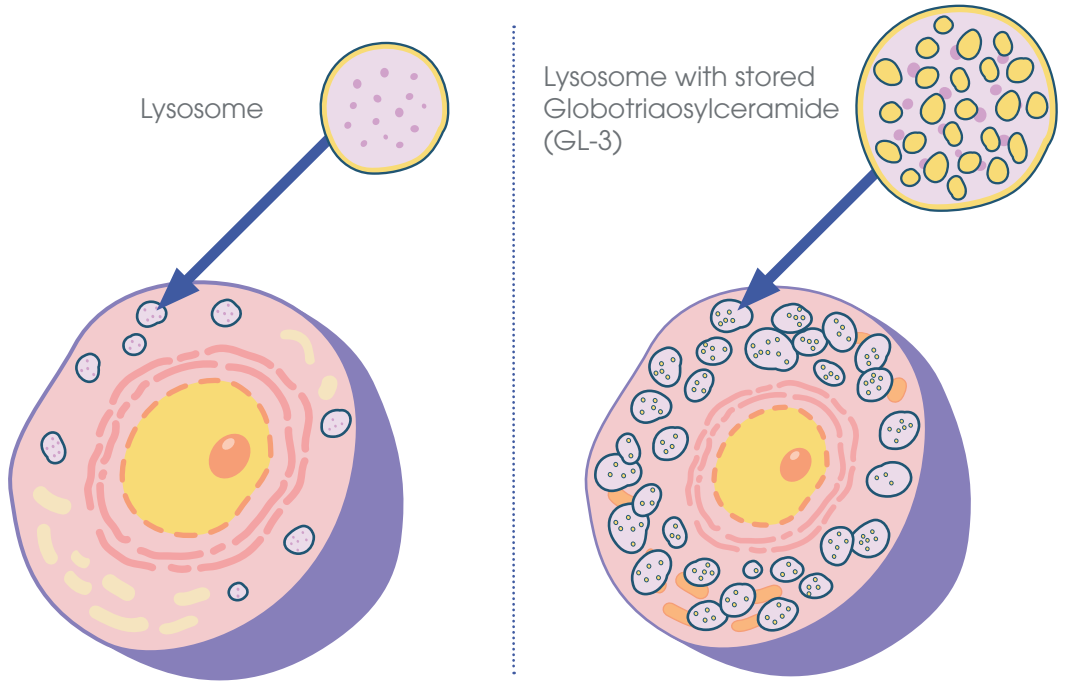
Part 1

Overview of Fabry Disease

Fabry disease is a lysosomal storage disease that can affect many parts of the body.

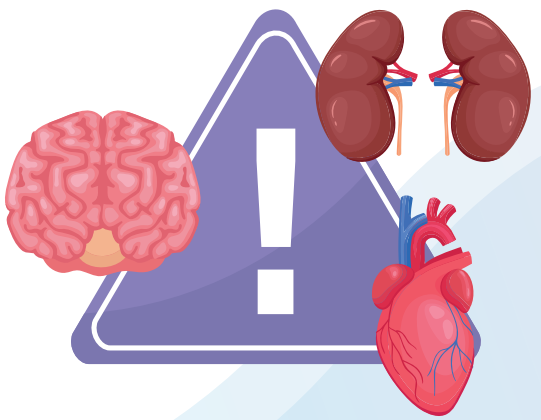


As a result of the deficient enzyme, alpha galactosidase A (alpha-GAL A), a particular type of fat called Globotriaosylceramide (GL-3) builds up in the lysosomes of the cell, which causes the symptoms of Fabry disease.



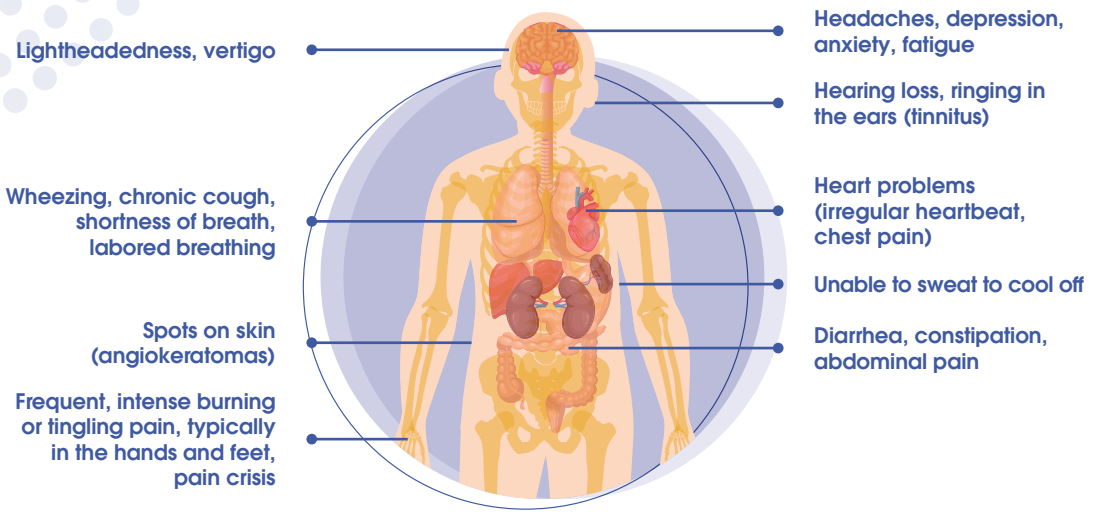
Cell with functioning lysosomes

Cell with swollen lysosomes

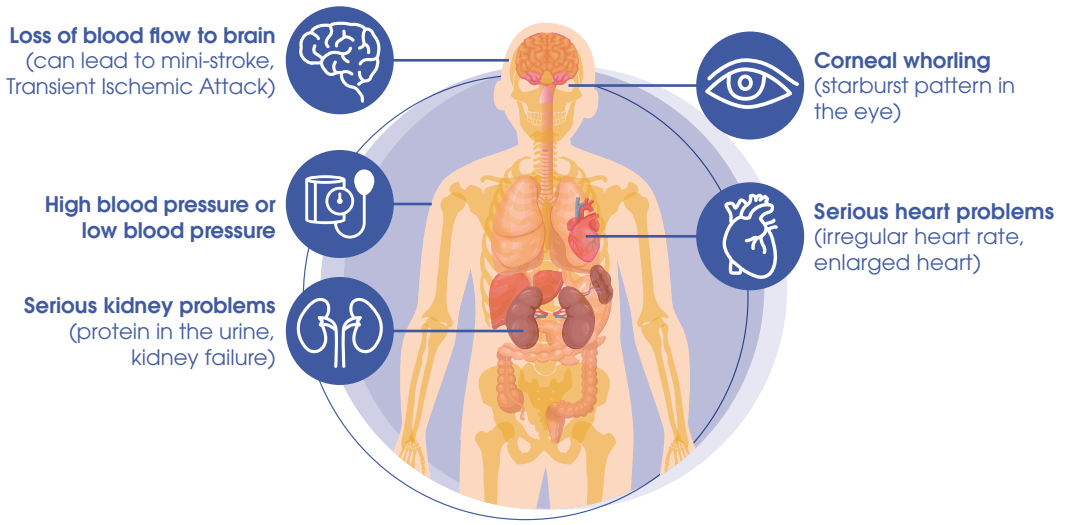


Excessive build up of GL-3 causes various signs and symptoms of Fabry

Symptoms you may see and feel



Symptoms you may not feel



Signs and symptoms

	Childhood	Adolescence	Adulthood
Hearing loss and ringing in the ears	●	●	●
Pain crises	●	●	●
Pain in the hands and feet	●	●	●
Inability to sweat (hypohidrosis/anhidrosis)	●	●	●
Corneal whorling (seen by an eye doctor)	●	●	●
Recurrent fever	●	●	●
Heat and cold intolerance	●	●	●
Anxiety or depression	●	●	●
Gastrointestinal distress	●	●	●
Protein in urine (proteinuria)		●	●
Red skin spots (angiokeratomas)		●	●
Fatigue		●	●
Kidney problems (renal insufficiency)			●
Stroke or mini-stroke			●
Heart disease			●

- Symptoms can change over time
- Symptoms may vary between patients in the same family
- Even if you are not currently experiencing symptoms, test results may show if Fabry disease is progressing silently

Monitoring Your Health

Schedule of **Assessments**

- Your healthcare provider (HCP) will determine which tests you need and how often
- Your Schedule of Assessments may vary
- The first time a test is completed, it is known as your "baseline"
- Additional test results are compared to any previous studies you have had

Schedule of Assessments

The Schedule of Assessments helps you and your doctor monitor your Fabry disease over time. Depending on your individual medical needs, your healthcare team will determine which tests you should have and how often.

Columns: Younger than 18 years old (Baseline; Every 12 months; Every 24-36 months); 18 years old or older (Baseline; Every 12 months; Every 24-36 months)

PATIENT INFORMATION
- Confirmation of Diagnosis: DNA Analysis or Enzyme Assay
- Family History

GENERAL
- Height
- Weight
- Body Mass Index (BMI)
- Blood Pressure
- Heart Rate

LABORATORY TESTS

BLOOD TESTS
- Lyso-GL-3
- Lipid Panel
- Kidney Function Tests
- Serum Creatinine
- Blood Urea Nitrogen (BUN)
- Glomerular Filtration Rate (GFR)

URINE TEST
- Urine Protein Tests (total protein/creatinine and albumin/creatinine ratios)

CLINICAL ASSESMENTS
- Ophthalmology Evaluation
- Audiology Evaluation
- Brain MRI*
- Echocardiogram (ECHO)
- Electrocardiogram (ECG)
- Holter Monitoring
- Cardiac MRI[13]
- Lung Function Test or Spirometry
- Quality of Life[9]
- Pain Evaluation[10]
- GI Symptom Monitoring[11]

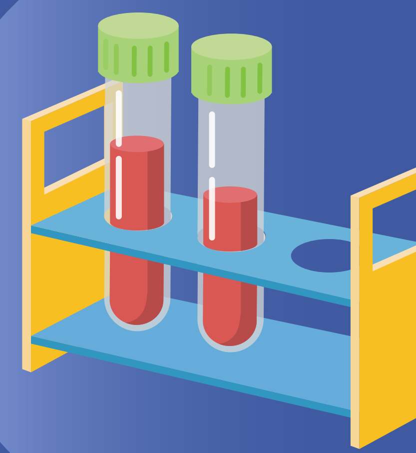
Note: Clinical assessments and frequency may vary due to the onset of new symptoms, a medical event, or where there is a clinical indication.

1. Provide genetic counseling as they mature
2. Every clinic visit
3. Monitor annually in males, every 2-3 years in females
4. Check eGFR annually if low risk, every 6 months if moderate risk, and every 3 months if high or very high risk
5. Test Urine Protein annually, every 6 months if moderate risk, and every 3 months if high or very high risk; microalbuminuria can be used for pediatric patients
6. As clinically indicated
7. Every 2 years evaluations starting at age 10 and as clinically indicated
8. Regular evaluations in males starting at age 21; females starting at age 30
9. Quality of Life Survey (SF36® Health Survey, EuroQOL, or PedsQL® Measurement Model)
10. Pain Evaluation (BPI, Fabry Specific Pain and QOL Questionnaire, or Neuropathic Pain Symptom Inventory)
11. GI symptoms (abdominal pain, bloating, diarrhea, nausea, vomiting, feeling full early, difficulty gaining weight) and endoscopic studies if indicated
12. Whenever there is evidence of clinical progression of disease or at an interval of 2-3 years
13. Cardiac MRI is recommended in patients <25 years if cardiac hypertrophy or significant arrhythmia is present. For adults 25+ years, Cardiac MRI is recommended at the time of diagnosis. If the first MRI is abnormal, patients with moderate or severe left ventricular hypertrophy (LVH) should undergo cardiac MRI at least every 2 years or at a frequency depending on cardiac disease severity and physician clinical judgment. Males with no or mild LVH should undergo MRI every 2 years.

Additional studies may be recommended for individuals with more cardiac or renal involvement: Brain Natriuretic Peptide (BNP), Bone Density, Loop Recorder, Vitamin D

*If an MRI is contraindicated, a CT scan may be recommended

Laboratory Tests



- A Lipid Panel measures various types of fats in the blood
- Globotriaosylceramide (GL-3) is a type of fat that is specific to Fabry disease, is found in the lysosomes, and can be measured in blood

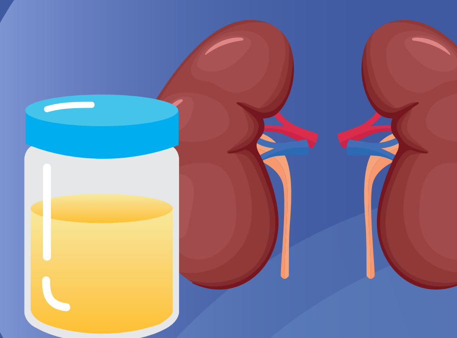
How

- Samples of your blood are analyzed in a lab

Why

- To look at different lipid levels that impact your overall health

Kidney Function Tests



- Blood Chemistry Tests measure certain parts of your blood
  - Serum Creatinine: waste product that comes from the normal wear and tear on muscles
  - Blood Urea Nitrogen (BUN): waste product from the breakdown of protein in your foods
  - Glomerular Filtration Rate (GFR): measure of how well your kidneys remove waste and excess fluid from blood
- Urine Protein Tests compare the presence of specific proteins using ratios

How

- Samples of your blood and urine are analyzed in a lab

Why

- To look at the amount of protein in your blood and urine to see how well your kidneys are working

Echocardiogram (ECHO)

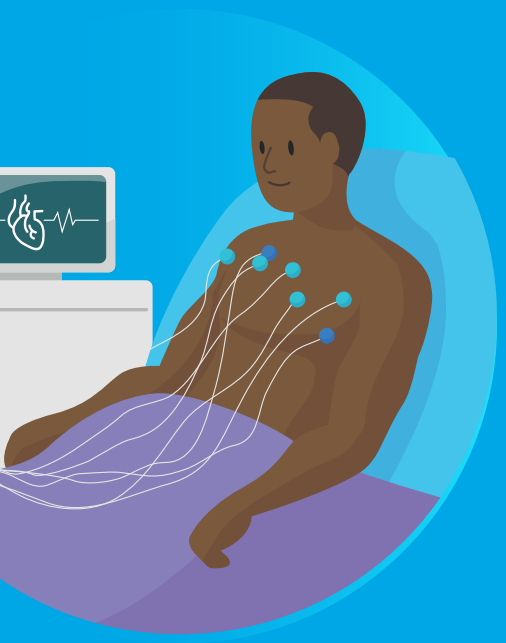
- An ECHO is an ultrasound of your heart

How

- While lying down, a technician rolls a handheld device over your chest and records the sound wave echoes from your heart

Why

- To measure the size of your heart, how well it pumps, or determine if there is any damage



Electrocardiogram (ECG)

- An ECG measures the electrical activity of your heart

How

- Performed in a hospital, medical clinic, or doctor's office by a trained technician
- Stickers with wires (electrodes) are placed across your chest and attached to a monitor
- A Holter monitor is a portable device that can be worn at home to track your heart's activity over a period of time

Why

- To record your heartbeat and any disruption in your heart's normal rhythm

Cardiac MRI

- A Cardiac MRI creates detailed pictures of your heart

How

- In a hospital or imaging center, you will lie still and flat for a collection of images
- You may receive a contrast dye (gadolinium) through an IV injection to improve the visibility of heart structures
- A radiologist will review and interpret your results

Why

- To measure the size and function of your heart
- To look for the presence of Fabry-related fibrosis, which cannot be detected by ECHO or ECG

**If an MRI is contraindicated, a CT scan may be recommended*

Brain MRI

- A Brain MRI creates detailed pictures of your brain

How

- In a hospital or imaging center, you will lie still and flat for a collection of images
- A radiologist will review and interpret your results

Why

- To detect changes to your brain that may relate to a stroke
- To look for any new events compared to previous imaging

**If an MRI is contraindicated, a CT scan may be recommended*

Health Questionnaires and Surveys

- A Quality of Life Survey (QoL) measures your thoughts about your own health, physical functioning, and well-being
- You may be asked to complete a Fabry-Specific Pain Questionnaire
- Your doctor may collect and update a detailed medical history of your Gastrointestinal (GI) symptoms such as abdominal pain, bloating, diarrhea, nausea, vomiting, quickly feeling full, and difficulty gaining weight

How

- You will answer a set of questions about how Fabry disease impacts your daily life

Why

- To better understand new symptoms or challenges

Ophthalmology Evaluation

- An Ophthalmology Evaluation (eye exam) is a comprehensive series of tests completed by an eye doctor

How

- A microscope with a bright light (slit lamp) is used to look at the front and inside of your eyes

Why

- To find corneal whorling, which is a common sign of Fabry disease; these whorls do not affect your vision
- To look for changes in arteries supplying blood to your eye
- To detect the presence of cataracts, or clouding of the lens, which causes blurry vision

Audiology Evaluation

- A series of tests to evaluate hearing

How

- Tympanometry: small earphone probe gently pushes air into your ear, recording the changes in air pressure
- Otoacoustic emissions: small probe sends sounds and records vibrations in your inner ear (cochlea)
- Auditory evoked potential: electrodes placed on your head record brain activity in response to sound
- An audiologist will interpret the results

Why

- To measure hearing loss and how the brain responds to sound

**There is no specific evaluation for tinnitus (ringing in the ears)*

Lung Function Test/ Spirometry

- Spirometry testing measures how your lungs function

How

- You will be asked to take a big breath, and then blow as hard and long as you can into a machine called a spirometer
- The machine measures how much and how forcefully you can blow air out of your lungs in one breath

Why

- To see how well your lungs are functioning

Be Your **Best Advocate**

Stay informed and educated about your health and Fabry disease

Have discussions with your healthcare providers

- Should I have this test or procedure?
- Do I need a referral to a particular specialist?
- What will this test tell us about my health?
- Are there any changes from the last time I had this test?

Think about changes in your symptoms

- Have certain activities become more difficult?
- Do you have new or worsening symptoms?
- When did you notice a difference?

Consider sharing your diagnosis with family as they may also have similar symptoms

- Difficulty completing day-to-day activities due to fatigue
- Unable to sweat to cool off
- Pain caused by extreme hot or cold environments

Participate in Your Health Management

- Stay in close contact with your healthcare professionals about your condition and report any new or worsening symptoms
- Regular monitoring can help your healthcare team understand how to provide the appropriate management for you and offer personalized care
- Use the Schedule of Assessments to develop and maintain a plan of care
- Take an active role by tracking your results in your health tracker tool

Participate in Your Health!

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