

BIRSA 101

India's indigenous CRISPR-based gene-therapy initiative for Sickle Cell Disease

Science for Stronger Futures

Named in honour of **Bhagwan Birsa Munda** (1875 – 1900)

Tribal freedom fighter, a symbol of courage, resilience and service to tribal communities.

BIRSA 101 represents hope for millions affected by sickle cell disease, especially in India's tribal and underserved communities.

WHY BIRSA 101?

- BIRSA means **Biomedical Innovation for Relief from Sickle-Cell Anemia**.
- Named in honour of tribal freedom fighter Bhagwan Birsa Munda, reflecting a commitment to the health and well-being of tribal and underserved communities who are disproportionately affected by sickle cell disease.

WHO IS DEVELOPING IT?



CSIR-Institute of Genomics and Integrative Biology (CSIR-IGIB)
Developed the CRISPR-based technology for BIRSA 101.



Serum Institute of India Pvt. Ltd.
Technology transfer and collaborative clinical and manufacturing development.

WHAT IS SICKLE CELL DISEASE (SCD)?

- An inherited (autosomal-recessive) blood disorder, usually caused by **pathogenic variants in the HBB gene**, leading to production of haemoglobin S (HbS).
- Red blood cells become rigid and sickle-shaped, which can block small blood vessels.
- This can cause anaemia, painful vaso-occlusive episodes and over time lead to damage in various organs.

NORMAL VS SICKLE RED BLOOD CELLS



Normal red blood cells (round and flexible) move easily through blood vessels.



Sickle-shaped red blood cells (rigid and less flexible) can block blood flow and cause complications.

SYMPTOMS OF SCD



Pain crises (severe pain in bones, chest, abdomen or joints)



Fatigue and pallor (due to anaemia)



Jaundice (yellowish eyes/skin)



Swelling of hands and feet (in children)



Recurrent infections



Delayed growth and development



Severity varies between individuals.

GENETIC DIAGNOSIS



Screening tests – especially in high-risk and tribal populations.



Haemoglobin analysis – HPLC or haemoglobin electrophoresis.



HBB molecular testing – to identify pathogenic variants (when indicated).



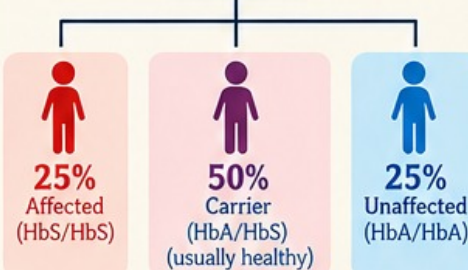
Genetic counselling – for affected individuals and families.



Carrier testing and partner testing – important for family planning.

INHERITANCE PATTERN (Autosomal recessive)

Carrier father (HbA/HbS) Carrier mother (HbA/HbS)



HOW GENE EDITING MAY WORK (Simplified overview)



Collection of blood-forming stem cells (from the patient)



Editing the cells outside the body using CRISPR technology (to correct or modify the gene and support healthier haemoglobin production)



Specialist conditioning treatment (prepares the body to receive edited cells)
Reinfusion of the edited cells into the patient



Aim is to support long-term production of healthier red blood cells and reduce disease complications.

This is an investigational pathway. The precise BIRSA 101 protocol, including the exact gene-editing approach and treatment process, will be established through clinical trials.

HOW TO SEEK CARE?



- ✓ Consult a hematologist or a government Sickle Cell Disease programme or a tertiary care hospital.
- ✓ Ask about screening (HPLC/electrophoresis), genetic testing and counselling.
- ✓ Discuss available standard treatments and supportive care.
- ✓ Inquire about possible eligibility for clinical trials such as BIRSA 101.
- ✓ Genetic counselling is important for patients and family members.



BIRSA 101 is currently under clinical development and is not yet available as routine treatment, so patients should not assume immediate access outside of clinical trials.

IMPORTANT: BIRSA 101 is under development, not yet an approved or routinely available cure.

CSIR-IGIB has stated that Phase-I clinical trials are expected in 2027.
Safety, efficacy, eligibility and access depend on clinical trials and regulatory review.
Do not stop prescribed treatment.



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