# Gene Therapy: The New Frontier in Haemophilia Treatment

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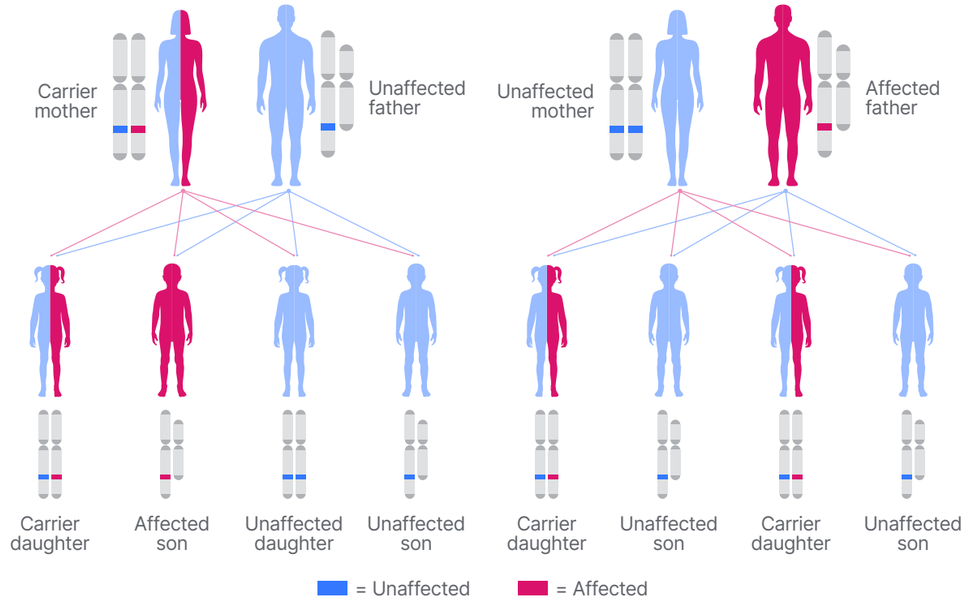
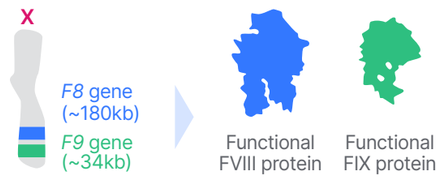
## Introduction

**Gene therapy is the introduction of an exogenous functional gene into cells to correct genetic disorders.**

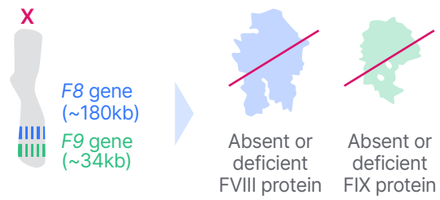
- Haemophilia is a rare, genetic condition caused by a deficiency in clotting factor proteins.[1]
- It is an X-linked recessive inheritance, meaning the gene responsible for the disorders are located on the X chromosome.[1]
- The main types are haemophilia A and B, caused by a deficiency in FVIII and FIX, respectively.[2,3]
- Examples of treatment options include replacement clotting factor therapy, desmopressin, emicizumab, and gene therapy.[3,4,5]
- The most common gene therapy approach for haemophilia is currently based on AAV vectors.[5]
- The goal of all haemophilia treatment is to prevent bleeding, and most bleeding events are joint bleeds that result in crippling arthropathy.



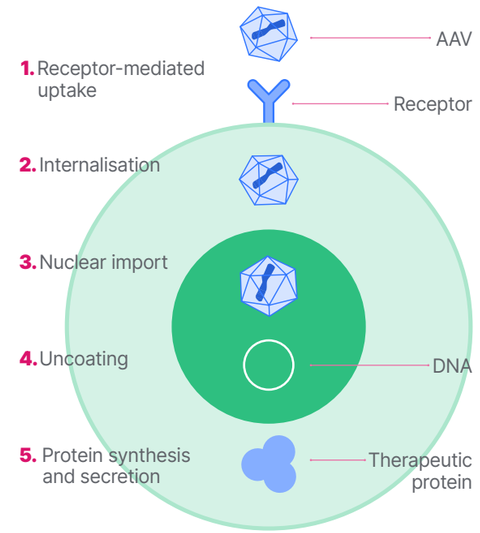

### General population



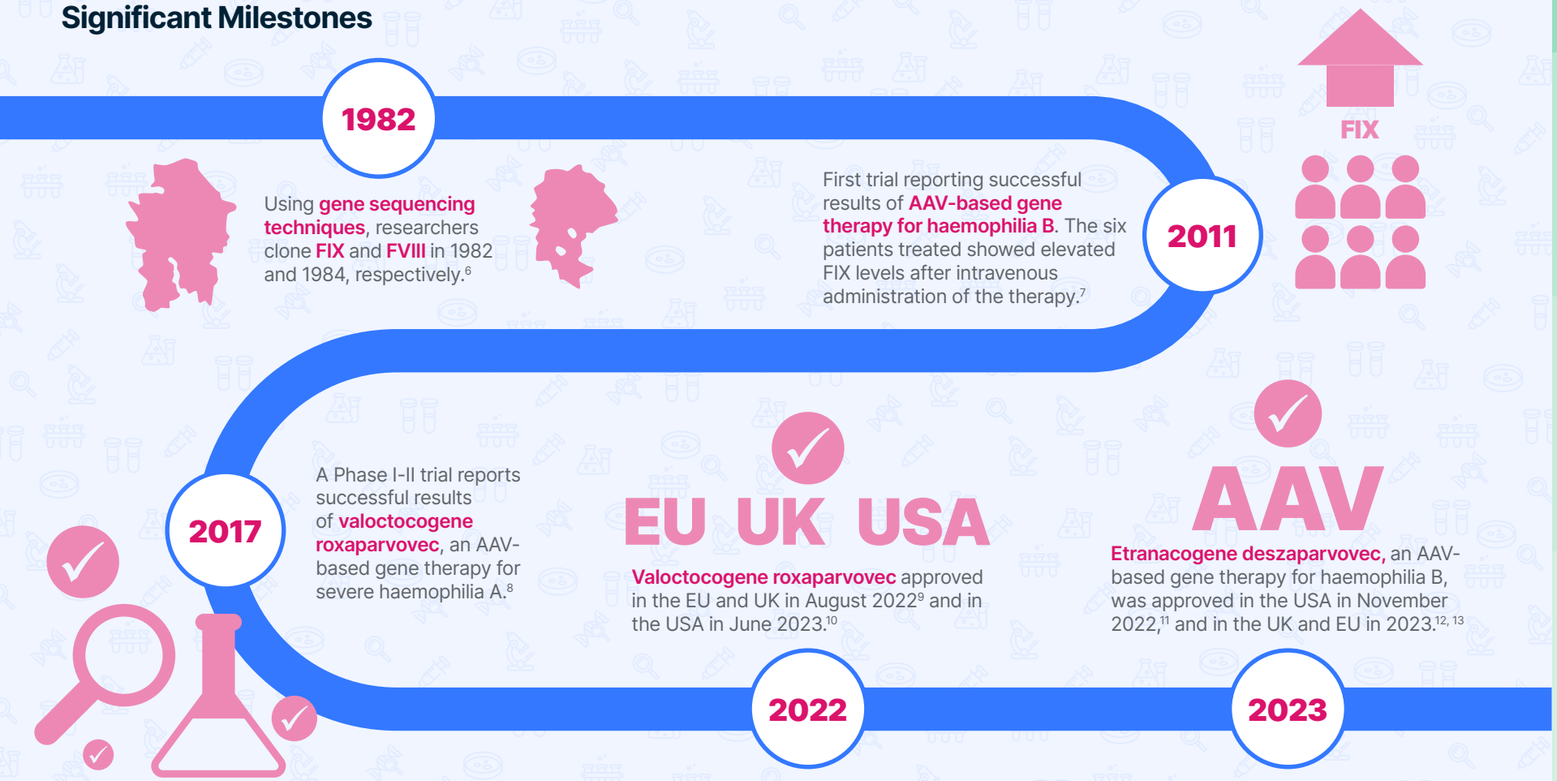

### Patients with haemophilia




### AAV gene therapy



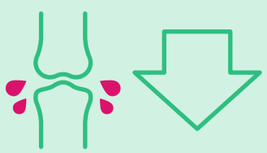

## Significant Milestones




## Advantages[14]

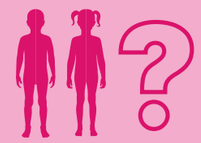
Reduction of bleeding events.

Reduced burden of prophylactic infusion therapy.



Improved quality of life by reducing joint bleeding, pain and arthopathy is a major impact quality of life.

## Disadvantages[14]



Little is known on the suitability of AAV-based gene therapy for children and infants with haemophilia, or its use in symptomatic female carriers.

Liver toxicity has been reported as a side effect from gene therapy. Additionally, side effects from corticosteroids often given to treat transaminitis have a negative impact.

Pre-existing anti-AAV antibodies limit eligibility, while treatment effects vary and long-term durability remains uncertain.

**Abbreviations**

AAV: adeno-associated virus; FIX: factor IX; FVIII: factor VIII.

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