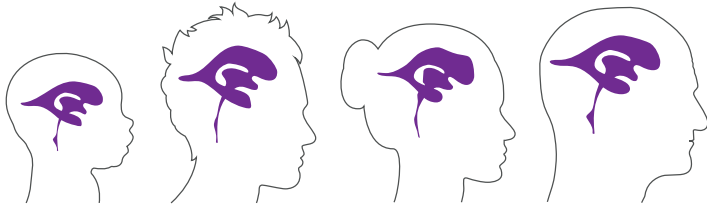


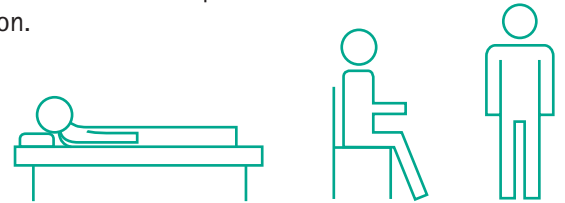
# CHALLENGES FOR HYDROCEPHALUS SHUNT DEVELOPMENT

The main surgical strategy for the treatment of hydrocephalus is the placement of shunts. Shunts are life-saving devices but are notorious for high failure rates and finding the most suitable pressure setting for an individual is challenging.

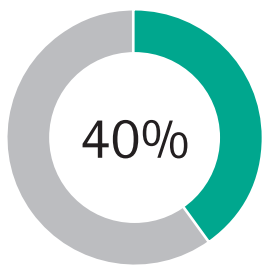
Every patient with hydrocephalus is **unique** and requires customized setting of the valve opening pressure.



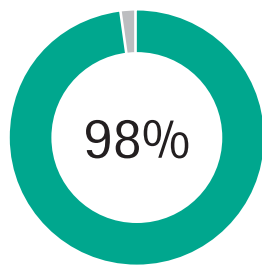
For conventional valves, the valve opening pressure is a **compromise** between the pressure requirements in the supine and upright position.



## HIGH FAILURE RATES (1)



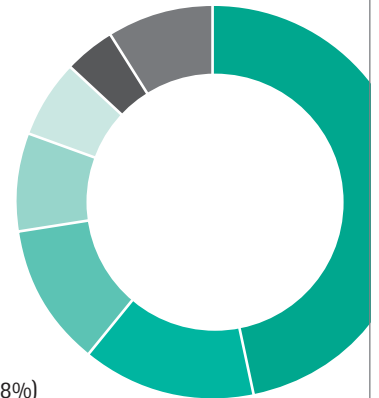
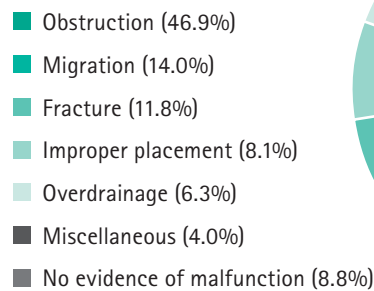
Proportion of shunts failing within **2 years**



Proportion of shunts failing within **10 years**

High failure rates overshadow the effectiveness of shunts (1).

## COMPLICATIONS (2)



About one in four patients experiences at least one complication (3).

## MECHANICAL FAILURES (4)



Catheter breakage



Catheter fracture



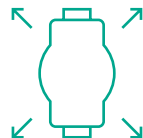
Obstruction



Catheter separation



Damaged housing



Valve migration

Mechanical failure is the most common cause for shunt revisions.

## ACCIDENTAL REPROGRAMMING (5-9)



Mobile devices



MRI



Headphones



Toy magnets

External magnetic fields can change the pressure settings of adjustable shunt valves.

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