

# Elastometry of the lateral nasal wall



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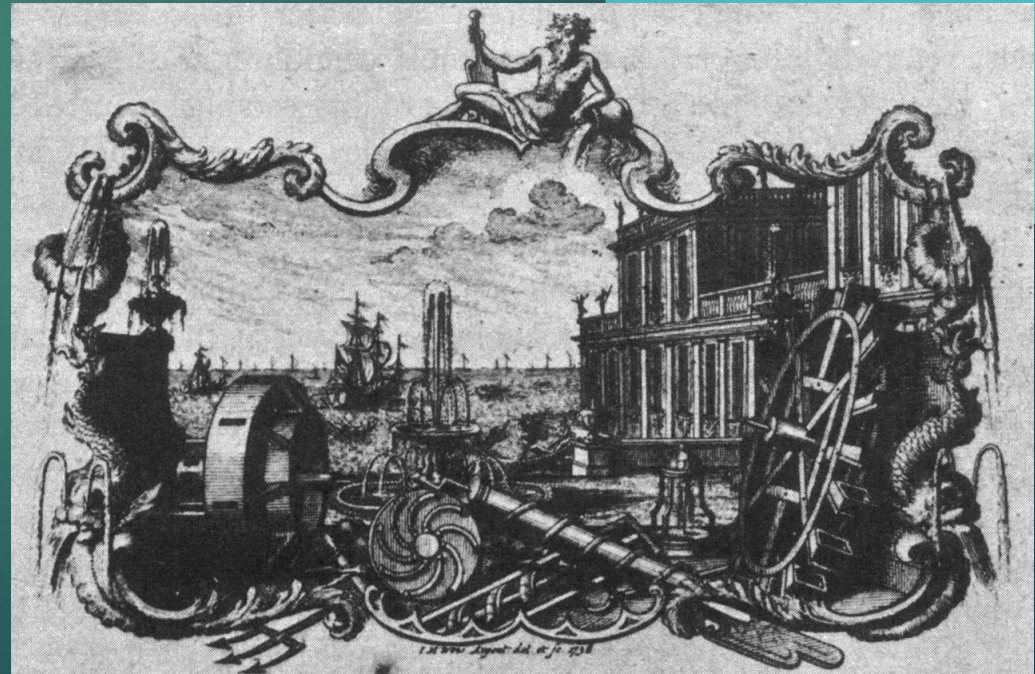
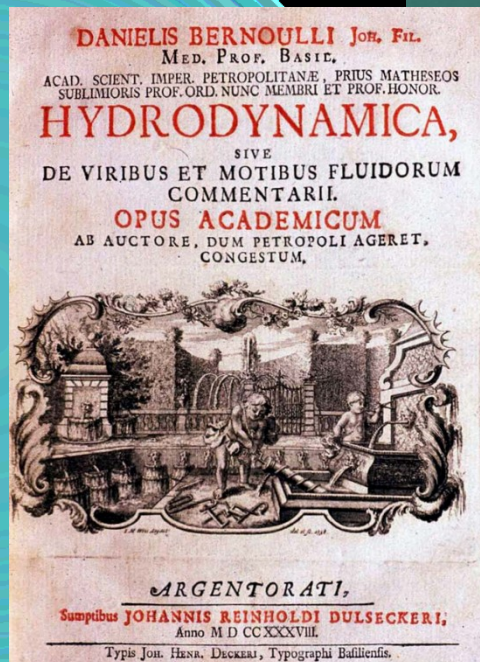
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The authors declare: NO CONFLICTS OF INTEREST!

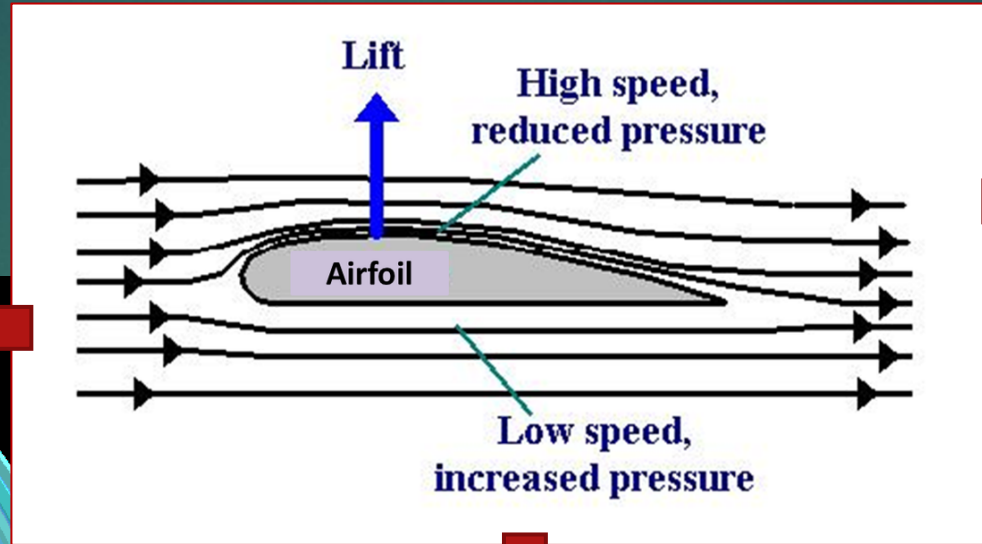
# Daniel Bernoulli, 1700-1782

A pioneer of modern fluid dynamics

**Bernoulli's Principle: As the speed of a moving gas or liquid increases, the pressure within the gas or liquid decreases (HYDRODYNAMICA 1738)**



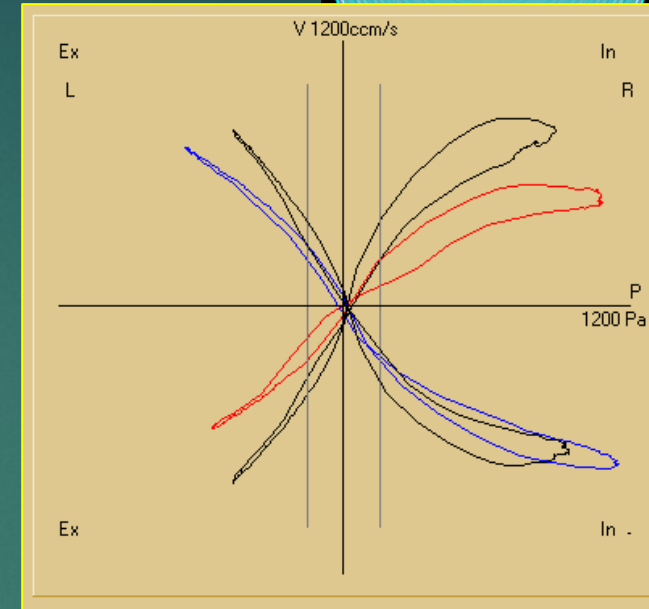
# The „Bernoulli Phenomena“



The nose as a **STARLING-resistor**

# The Aim

- ▶ Quantification of the motility of the lateral nasal wall under the influence of breathing
- ▶ Verification of loops in 4-phase-rhinomanometry
- ▶ Determining the indication for surgical or prosthetic procedures with influence on the nasal valve



# Facts

- ▶ Nearly every surgery is affecting the motility of the lateral nasal wall
- ▶ Quantitative measurement of the elongation is available: elastography
- ▶ No information about the mechanical properties of the lateral nasal wall up to now



# The Bernoulli-effect depends on....

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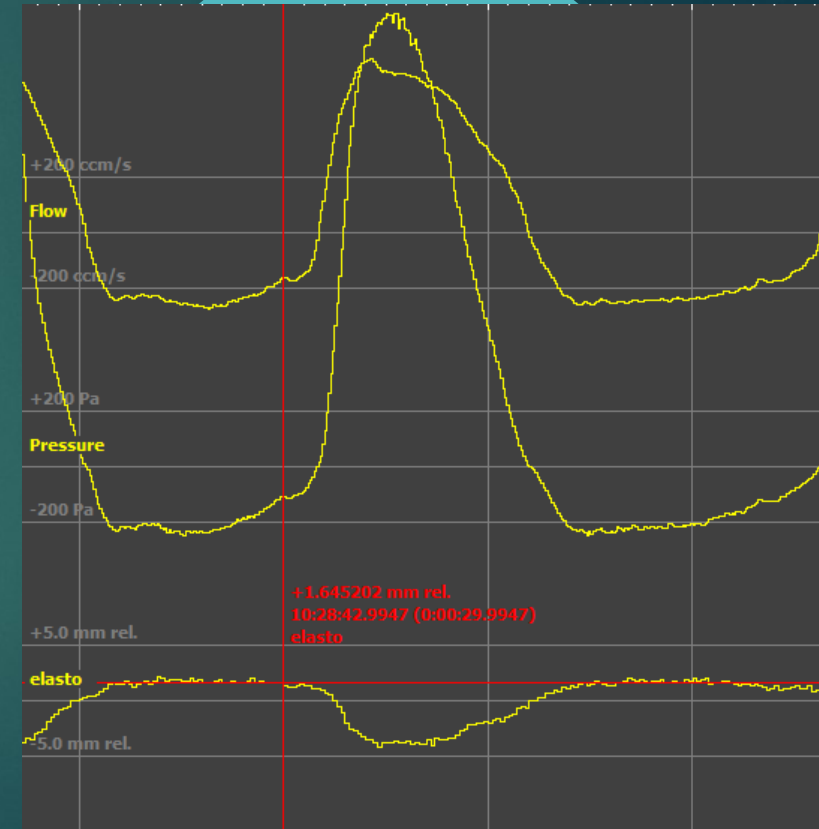
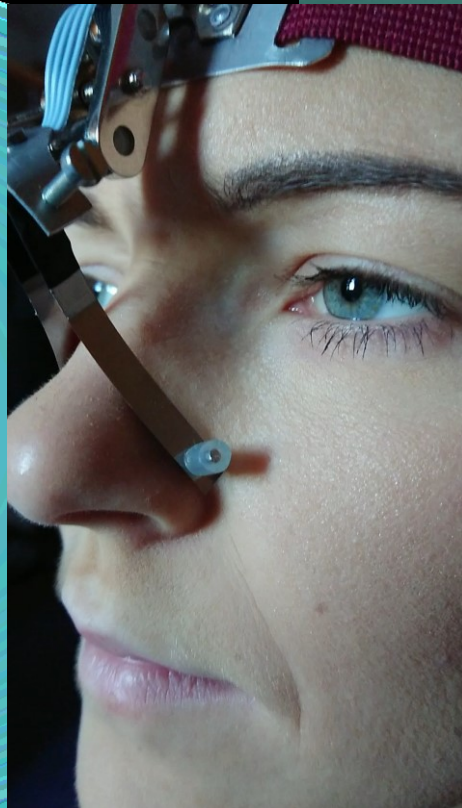
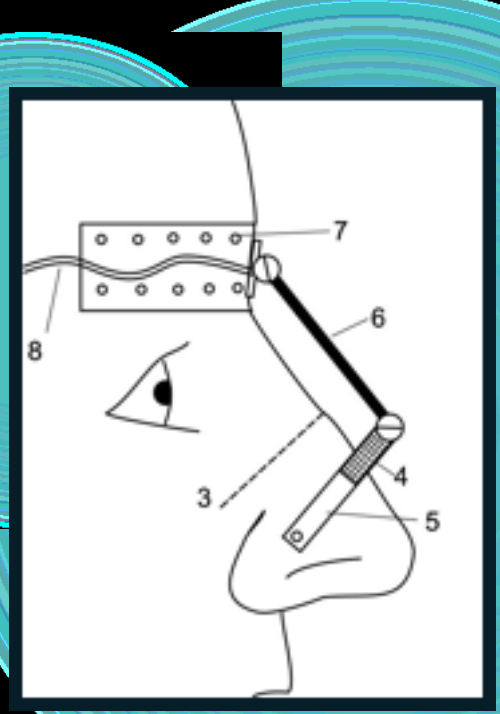
- ▶ 1. Geometric shape of the moving object („nasal wing“)
- ▶ 2. Mechanical properties of the nasal wing and adjacent tissue
- ▶ 3. Volume speed („flux“) of the nasal air stream

Mechanical parameters to be determined and considered before surgery: thickness, curvature, bendibility, compressibility : the task of **elastometry**

**No** nasal breathing without movement of the nasal wing!

2 methods to measure the background of the motility of the lateral nasal wall:

# 1. ELASTOGRAPHY



# 2. Elastometry

Bitte hier noch die verschiedenen Endstücke einfügen!

## Measuring forceps

If both branches are touching the nasal wing outside and inside, electric resistance gets low. The way for possible compression and the force is measured.

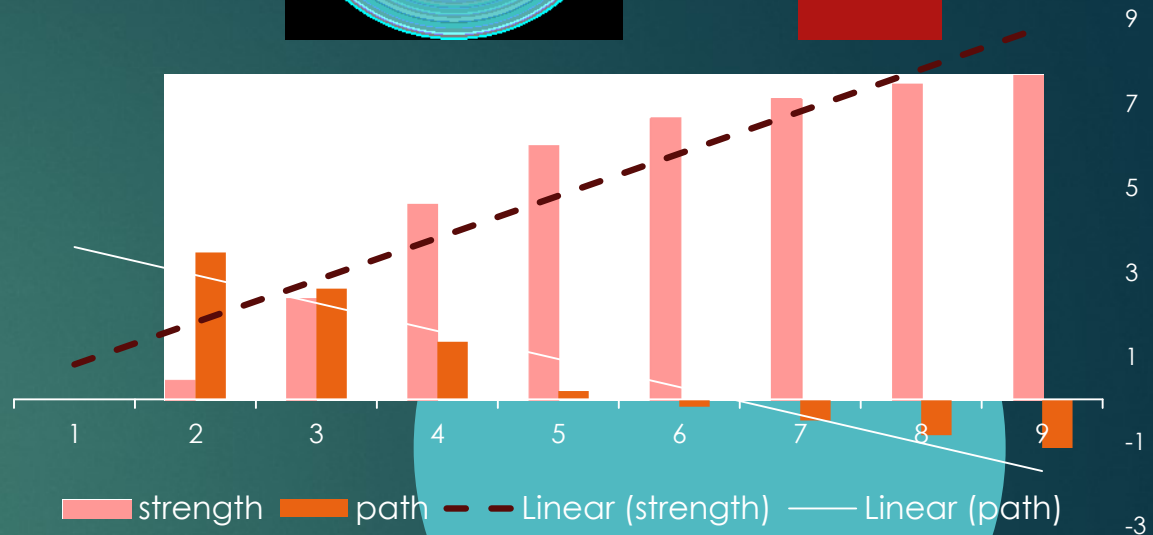
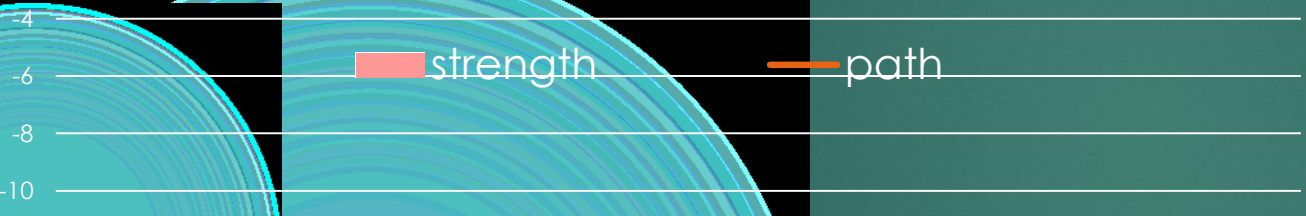
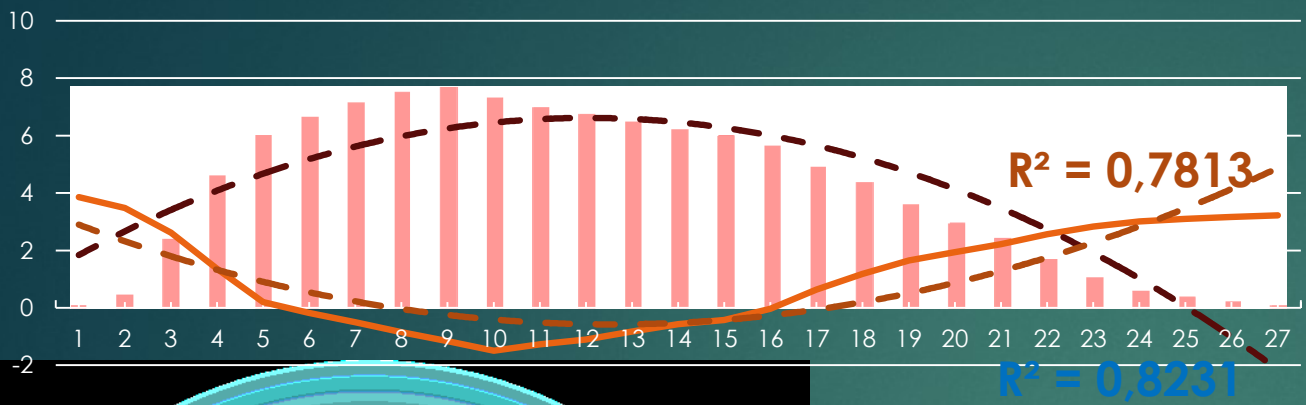




# Example: elastometric record left lateral valve



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**V011.4 medial right nasal valve increasing strength**

Numerical information:  
 1. Mean of modulus of Elasticity([N/mm<sup>2</sup>])  
 2. Way of compression

**V011.1 lateral left valve - complete measurements**



# Expected clinical information:

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- ▶ Differentiation between curvatures caused by cartilage shape or by higher fluid content of the lateral nasal wall
- ▶ Alternative surgical steps are to correct the cartilage curvature or position or to reduce the fluid content and stiffness by radiofrequency application
- ▶ If the lateral nasal wall is regular, the modelling of the air stream may also be achieved by modelling the form or thickness of the septum