

Oral presentation

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## Resistance to CSF outflow depends upon duration of symptoms in patients with Normal Pressure Hydrocephalus

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### Background

Cerebrospinal Fluid (CSF) pressure-volume compensatory parameters may change over time under pathological and normal circumstances. Normal ageing may affect CSF compensation: the resistance to CSF outflow increases and the formation of CSF decreases with age. In acute hydrocephalus after subarachnoid haemorrhage, baseline intracranial pressure (ICP) and resistance to CSF outflow acutely increase but they may return towards baseline over the next few weeks. Idiopathic Normal Pressure Hydrocephalus (iNPH) awaits longitudinal studies. Is NPH always the late (compensated) stage of acute hydrocephalus? Are the CSF compensatory parameters invariant in time (counting from the onset of clinical symptoms) or do they change with time?

### Materials and methods

We have investigated 73 patients presenting with NPH (mean age 73; 45 males and 28 females). They all presented with ventricular dilatation and gait disturbance, with memory deficit in 72% and urinary incontinence in 52%. All patients underwent computerized CSF infusion studies.

### Results

Mean ICP was 10.1 +/- 5.1 mm Hg and mean resistance to CSF outflow was 17.3 +/- 5.2 mm Hg/(ml/min). 34 shunted patients were available for follow up and their improvement was expressed using NPH score. Mean duration of symptoms was 25 +/- 22 weeks (range from 2 to 144 weeks).

### Conclusion

Neither baseline ICP nor brain compliance nor improvement after shunting exhibited any dependence on the duration of symptoms. The resistance to CSF outflow decreased with the duration of symptoms but only for a duration greater than 0.5 year (longer than 27 weeks;  $R = -0.702$ ;  $p < 0.005$ ).

Hence it is inappropriate to use absolute threshold to distinguish normal from abnormal Rout: such value must be adjusted for age and duration of symptoms.