

AGE RELATED DIFFERENCES IN SOMATOSENSORY EVOKED POTENTIALS OF THE LOWER URINARY TRACT

Hypothesis / aims of study

Somatosensory evoked potentials (SEPs) can be recorded after 0.5 Hz stimulation of the human lower urinary tract (LUT). The influence of age on those LUT SEPs is currently unknown. Thus, it was the aim of the present study to evaluate if age has an influence on the latencies of LUT SEPs.

Study design, materials and methods

A group of younger (18 – 35 years) and older (>35 years) healthy female volunteers were recruited. A bipolar square wave electrical stimulation was applied with a special transurethral catheter (8 F) to the bladder dome, trigone, distal and proximal urethra. Measurements were performed three times with an interval of 4 weeks. The impulses were applied with 0.5 Hz and with 3 Hz using intensities as high as bearable for the subjects. SEPs were recorded at Cz referenced to Fz according to the international 10/20 EEG electrode montage. EEG raw data were filtered at 50 Hz (notch) and using a bandpass filter from 0.5–70 Hz. The N1 latencies and the N1P2 amplitudes were determined. Data were approximately normally distributed and results were given as mean ± standard deviation. The two groups were compared using the t-test.

Results

The ten younger volunteers had a mean height of 168 ±6 cm and a mean age of 23 ±4 years. For the older group, ten volunteers with a mean height of 164 ±5 cm and a mean age of 43 ±5 years were included. Stimulation intensities of both groups at the different stimulation localizations are listed in table 1.

Table 1: Comparison of the stimulation intensity of the younger and older volunteers regarding the repetitive stimulation of the bladder dome, trigone, proximal and distal urethra.

	stimulation intensity [mA]		
	younger	older	t-test
bladder dome	14.9 ±10.3	14.7 ±8.4	p = 0.946
trigone	5.5 ±4.2	10.3 ±6.9	p = 0.002
proximal urethra	7.6 ±7.3	9.5 ±5.8	p = 0.261
distal urethra	5.6 ±2.5	10.6 ±7.8	p = 0.002

No reliable latencies could be determined using the 3 Hz stimulation.

With exception the distal urethra, the older subjects demonstrated significantly shorter N1 latencies compared to the younger subjects (table 2).

Table 2: Comparison of the N1 latency and the N1P2 amplitude of the younger and older volunteers with the older group after electrical stimulation of the bladder dome, trigone, proximal and distal urethra.

	N1 latency [ms]			N1P2 amplitude [microV]		
	younger	older	t-test	younger	older	t-test
bladder dome	122.0 ±13.6	108.9 ±7.8	p < 0.001	6.2 ±4.7	8.8 ±4.2	p = 0.045
trigone	124.5 ±19.7	116.2 ±10.7	p = 0.015	4.8 ±3.2	4.1 ±1.2	p = 0.216
proximal urethra	123.3 ±23.6	113.2 ±13.4	p < 0.001	5.6 ±3.1	4.4 ±1.7	p = 0.167
distal urethra	122.3 ±20.5	131.3 ±35.6	p = 0.906	5.0 ±2.9	4.1 ±1.1	p = 0.182

N1 latencies did not correlate with the age.

No significant differences in N1P2 amplitudes at the trigone, proximal and distal urethra (table 2) were observed between both groups, even with significantly higher stimulation intensities in the older volunteers in the trigone and distal urethra (table 1). In contrary, the older volunteers showed significantly higher amplitudes in SEPs from the bladder dome, whereas stimulation intensity was similar to the younger subjects.

Interpretation of results

Shorter latencies and higher amplitudes in the older compared to the younger subjects, especially for SEPs from the bladder dome, might be due to age related structural changes in the LUT in regard to suburothelial density of fiber terminals and intercellular coupling, making the bladder dome more sensible. Further comprehensive studies in humans are needed to investigate the possible reasons for changes in LUT neurophysiology, e.g. histological examinations in combination with SEPs. Despite differences in latencies, both groups showed reliable SEPs only following 0.5 Hz stimulation but not following 3 Hz stimulation, indicating that in healthy younger subjects as well as in healthy older subjects, LUT SEPs are conducted via A-delta fibers.

Concluding message

The latencies after 0.5 Hz stimulation of the human LUT were shorter in the older compared to the younger healthy volunteers. Amplitudes were similar independently of the stimulation intensity.

Disclosures

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