

DOES DIURESIS INFLUENCE ON BLADDER STORAGE CAPACITY?Hypothesis / aims of study

When the size of maximum bladder capacity during conventional urodynamic studies (CU) and natural-fill cystometries (NFC) are compared, the high filling-rate during CU results in higher bladder capacity and subsequently a higher voided volume. In NFC the voided volumes are significantly lower.

This study was designed to elucidate the influence of the diuresis on the storage capacity of the bladder under physiological situations. The storage capacity was evaluated by changes in functional bladder capacity. Finally we wanted to analyse the diurnal rhythm in the relationship between the diuresis and the storage capacity.

Study design, materials and methods

Seventy-three healthy young males aged 18-33 years (mean 26.8) and 21 elderly males aged 55-73 years (mean 60.9 years) were included in the study. Their voiding habits were assessed by completion of a 5-7 days frequency/volume chart (FVC) recording fluid intake and urine output on diurnal basis. The young males recorded their micturitions on a home-flow-device. The elderly men recorded the voided volume with a measuring cup. Fluid intake and food intake was *ad-libitum* and the subjects were allowed to ambulate at will. For calculation of the micturition data, all micturitions were pooled.

Results

Demographic data are listed in table 1. We found no differences in either fluid intake or weight between the two groups. It was shown that elderly men voided more frequently.

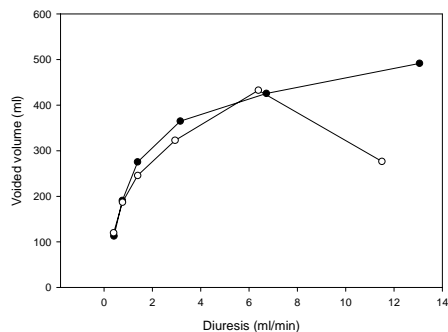
Table 1

Demography	Young n = 37	Elderly n = 21
Age	26.8	60.9
Weight (kg)	76.8	78.8
Fluid Intake ml/kg b.w./day	28.8	26.8
Total number of voids	915	962
Number of voids/day	5.0	6.5

The voids were primarily sorted in six groups depending on the diuresis (table 2).

Table 2

Diuresis (ml/min)	Number of voidings Young	Number of voidings Elderly
0.0-0.5	27	43
0.5-1.0	183	241
1.0-2.0	285	330
2.0-5.0	267	186
5.0-10.0	96	17
>10.0	30	4

Figure 1: Closed circles: Young men. Open Circles: Elderly males

We found a trend towards a higher diuresis in the young men compared to the elderly men (table 2).

Figure 1 shows the voided volume as a function of the diuresis. An increase in diuresis results in a higher volume. This relationship is clear for both groups until a diuresis of more than 10 ml/min. No differences were shown among the two groups. It is not possible to decide, if there is a difference in the high-diuresis area, since the number of micturitions are too low (see table 2).

To focus on the diurnal variation we also sorted the voiding in intervals during the day (table 3).

Table 3

Diurnal Variation	Number of voidings Young	Number of voidings Elderly
Morning	162	133
Morning – 14 00	194	297
14 00-20 00	343	275
20 00-Bedtime	197	216
Nocturia	19	41

There were few nocturnal voidings, and they occurred randomly

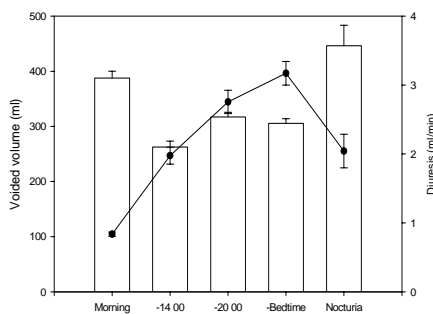


Figure 2: Young Males

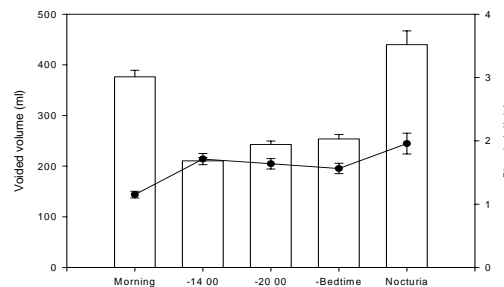


Figure 3: Elderly Males

Figure 2 shows the relationship between voided volume (VV) and the diuresis on a diurnal basis in the group of young men. The morning-voided volume is high even though there is a very low diuresis during night. The diuresis is high in the afternoon/evening, resulting in higher VV than in the morning. In figure 3 the similar data are presented for the elderly group. The diurnal variation has disappeared, and the average VV is lower than in the young group.

Interpretation of results

High diuresis results in a larger bladder capacity. There is a diurnal variation in diuresis in the young group whereas this variation disappears in the elderly group. No significant differences are seen between the two groups in bladder storage capacity but there is a trend towards a larger frequency and smaller VV's in the elderly group. The morning VV as a result of the storage capacity during night, differs significantly from the micturitions during day.

Concluding message

In conclusion, we can resume, that during the day a high diuresis results in a larger VV, whereas a low diuresis results in low VV's. During the night, the regulative mechanism must be different, since a low diuresis results in the high VV. If the regulation either is based on a mechanism depending on chemoreceptors, or it is depending on stretch of the bladder wall is unclear. But urodynamic studies where urine and saline has been used as filling medium has shown, that the same amount of the two medias with a different chemical composition results in the same bladder capacity. So we suggest, that the regulative mechanism is stretch induced.

