Clinical implication of a quantitative frailty assessment tool for prognosis in patients with urological cancers

O. Soma, S. Hatakeyama, T. Matsumoto, A. Kusaka, S. Hosogoe, I. Hamano, Y. Tobisawa, T. Yoneyama, H. Yamamoto, A. Imai, T. Yoneyama, Y. Hashimoto, T. Koie, S. Nakaji, C. Ohyama Dept of Urology, Hirosaki Univ. Sch. of Med., **Hirosaki, Japan**

HIROSAKI UNIVERSITY

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Objectives:

To develop a simple and quantitative frailty assessment tool comparing healthy individuals, and investigate the clinical implication of quantitative frailty on prognosis in urological cancer patients.

Patients and Methods:

Total 605 urological cancer patients presenting to our hospital underwent a prospective frailty assessment. Controls were selected from 2280 community-dwelling subjects. Frailty was assessed via physical status (handgrip strength and gait speed), blood biochemical tests (hemoglobin, albumin, and renal function), and mental status (exhaustion and depression). We compared frailty variables between pair-matched controls and urological cancer patients. We developed a frailty discriminant score (FDS), and the influence of FDS on overall survivals was investigated by Cox regression analysis.

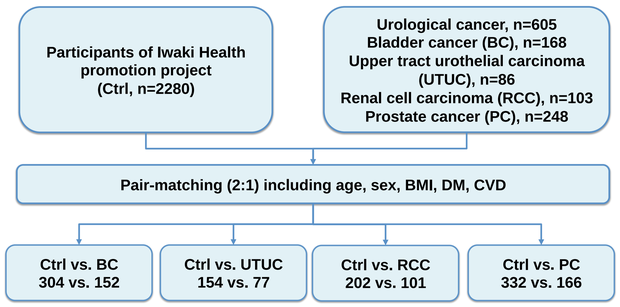
Results:

Gait speed, hemoglobin, serum albumin, exhaustion, and depression were significantly worse in patients with all types of cancers than in pair-matched controls. non-PC = (6.8698 + age x 0.0053 + sex x 1.4794 + BMI × 0.0105 + handgrip x −0.0209 + TGUG x 0.1993 + exhaustion x 0.0876 + depression x 0.2005 + albumin x −0.9037 + eGFR x −0.0112 + hemoglobin x −0.2868), and PC = (5.6418 + age x 0.0110 + BMI x 0.0267 + handgrip × 0.0094 + TGUG x 0.1960 + exhaustion x −0.0880 + depression x 0.0464 + albumin x −0.5343 + eGFR x 0.0175 + hemoglobin x −0.5204). FDS showed clear separation between controls and urological cancer patients. Overall survivals were significantly shorter in patients with a higher score (>2.30) than in those with a lower score among nonprostate cancer (bladder, upper tract urothelial carcinoma, and renal cell carcinoma) patients. In prostate cancer patients, overall survivals were significantly shorter in patients with a higher score (>3.30) than in those with a lower score.

Conclusions:

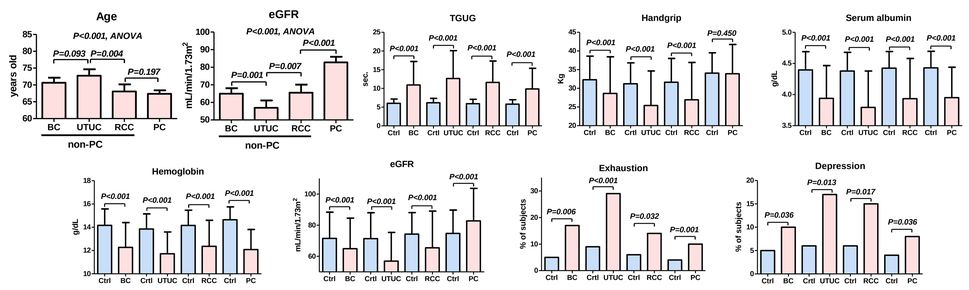
FDS was significantly associated with frailty and prognosis in urological cancer patients. This tool for frailty assessment can help patients and physicians make more informed decisions. Further validation study is needed.

Background of subjects

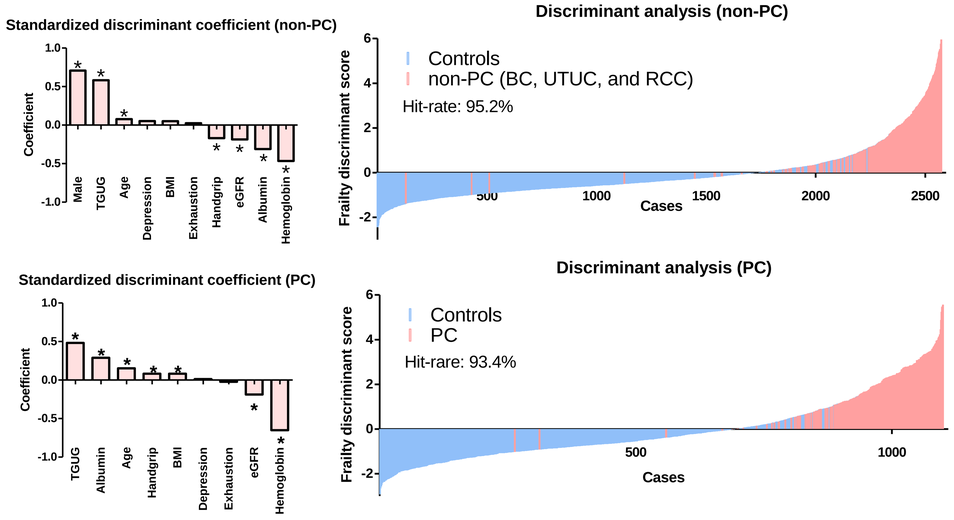


	Ctrl	Urological Cancers
n	2280	605
Age, years	55 ± 15	70 ± 8.7
Sex (male), n=	874 (38%)	495 (85%)
ECOG-PS (>1)		34 (5.6%)
Body mass index (BMI, kg/m^2)	23 ± 3.4	24 ± 8.2
Diabetes mellitus (DM), n=	182 (8.0%)	95 (16%)
Cardiovascular disease (CVD), n=	196 (8.6%)	74 (13%)
Handgrip strength (Kg)	28 ± 8.4	30 ± 9.4
TGUG (sec.)	5.5 ± 1.2	11 ± 5.5
Exhaustion (yes), n=	139 (6%)	89 (15%)
Depression (yes), n=	150 (7%)	75 (12%)
Serum Albumin (g/dL)	4.5 ± 0.3	3.9 ± 0.5
eGFR (mL/min/1.73m^2)	80 ± 16	71 ± 22
Hemoglobin (g/dL)	14 ± 1.5	12 ± 1.9
Type of urological cancers, n=		
Bladder cancer (BC)		168 (28%)
Upper tract urothelial carcinoma (UTUC)		86 (14%)
Renal cell carcinoma (RCC)		103 (17%)
Prostate cancer (PC)		248 (41%)
Metastatic disease, n=		95 (16%)

Variables comparison between controls and UC patients



Development of a frailty discriminant score (FDS), n=2885

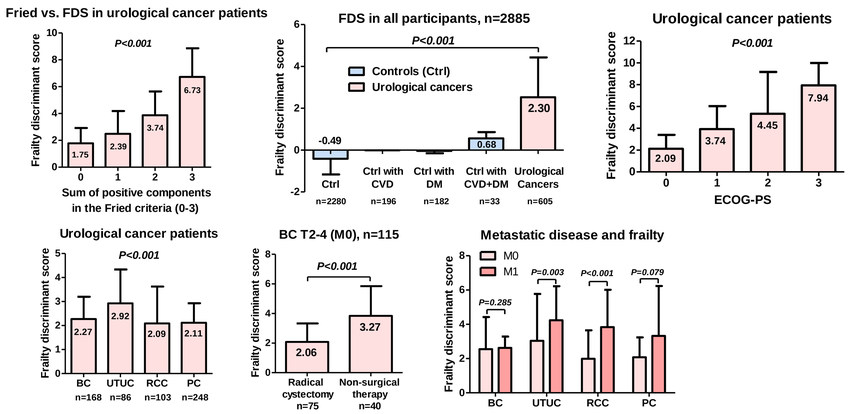


Frailty discriminant (FDS) formula

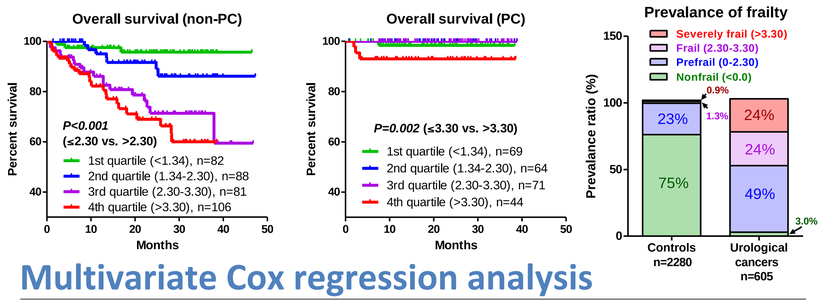
non-PC = (6.8698 + age × 0.0053 + sex × 1.4794 + BMI × 0.0105 + handgrip × −0.0209 + TGUG × 0.1993 + exhaustion × 0.0876 + depression × 0.2005 + albumin × −0.9037 + eGFR × −0.0112 + hemoglobin × −0.2868).
PC = (5.6418 + age × 0.0110 + BMI × 0.0267 + handgrip × 0.0094 + TGUG × 0.1960 + exhaustion × −0.0880 + depression × 0.0464 + albumin × −0.5343 + eGFR × 0.0175 + hemoglobin × −0.5204).

TGUG: timed get-up and go test. TGUG is a simple test used to assess a person's mobility and requires both static and dynamic balance. It uses the time that a person takes to rise from a chair, walk three meters, turn around, walk back to the chair, and sit down.

Characteristics of FDS



Relationship between FDS and OS, n=605



Multivariate Cox regression analysis

Variable	Factor	*P value*	HR	95.0% CI
Age	Continuous	*0.367*	1.02	0.98-1.05
Sex	Male	*0.001*	0.36	0.20-0.66
ECOG-PS	>1	*0.034*	2.13	1.06-3.39
Comorbidities (CVD or DM)	Positive	*0.084*	0.53	0.25-1.07
Metastatic disease	Positive	*<0.001*	9.34	5.12-17.1
Frailty discriminant score (FDS)	>2.30	*0.005*	3.03	1.41-5.51

COI: The authors have no financial conflicts of interest disclose concerning the study. Osamu Soma