Physical Activity and Risk of Prostate Cancer Grade Reclassification on Active Surveillance: Results from a Prospective Cohort Study

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Abstract

Background: Physical activity has been associated with reduced risk of developing lethal prostate cancer (PCa). However, for men with low risk PCa on active surveillance (AS) there remain limited and conflicting data regarding whether physical activity may influence disease progression evidenced by grade reclassification (GR). Furthermore, it is unclear whether physical activity affects risk independently of other lifestyle factors such as diet and smoking.

Methods: This is a prospective cohort study of men diagnosed with Grade Group (GG) 1 PCa undergoing AS. Patients completed questionnaires detailing medical history, physical activity, lifestyle variables, and diet quality upon AS enrollment. Physical activity was evaluated as metabolic equivalent of task (MET) hours per week, diet quality as energy-adjusted Healthy Eating Index (E-HEI) score. Multivariable competing risk regression was utilized to examine the association of physical activity with GR to ≥GG2 and to ≥GG3, adjusting for clinicopathological factors, diet quality, and smoking history.

Results: We included 828 men with a median follow up of 6.4 years. In multivariable models adjusted for clinicopathologic factors, smoking, and diet quality, increased physical activity levels (3 to <9 MET hours per week versus <3: subdistribution hazard ratio [SHR]=0.18 (95% CI 0.05–0.61), p=0.01; 9 to <18 hours per week versus <3: SHR=0.26 (95% CI 0.10–0.68), p=0.01; ≥18 hours per week versus <3: SHR=0.31 (95% CI 0.12–0.80), p=0.02) was associated with significantly decreased risks of GR to ≥GG3. Increased physical activity was also associated with statistically non-significant decrease in the risk of GR to ≥GG2. Increased E-HEI score was also significantly associated with decreased GR to ≥GG3, and non-significant reduction in GG2. Smoking history was not associated with either GR outcome.

Conclusions: In this prospective cohort study with longitudinal follow-up of men diagnosed with GG1 PCa pursuing AS, increased physical activity, compared to a sedentary lifestyle defined as <3 MET hours per week, and higher diet quality, reflecting stricter adherence to American dietary guideline recommendations, were independently associated with a lower risk of PCa GR, particularly to ≥GG3 disease which universally mandates curative treatment.

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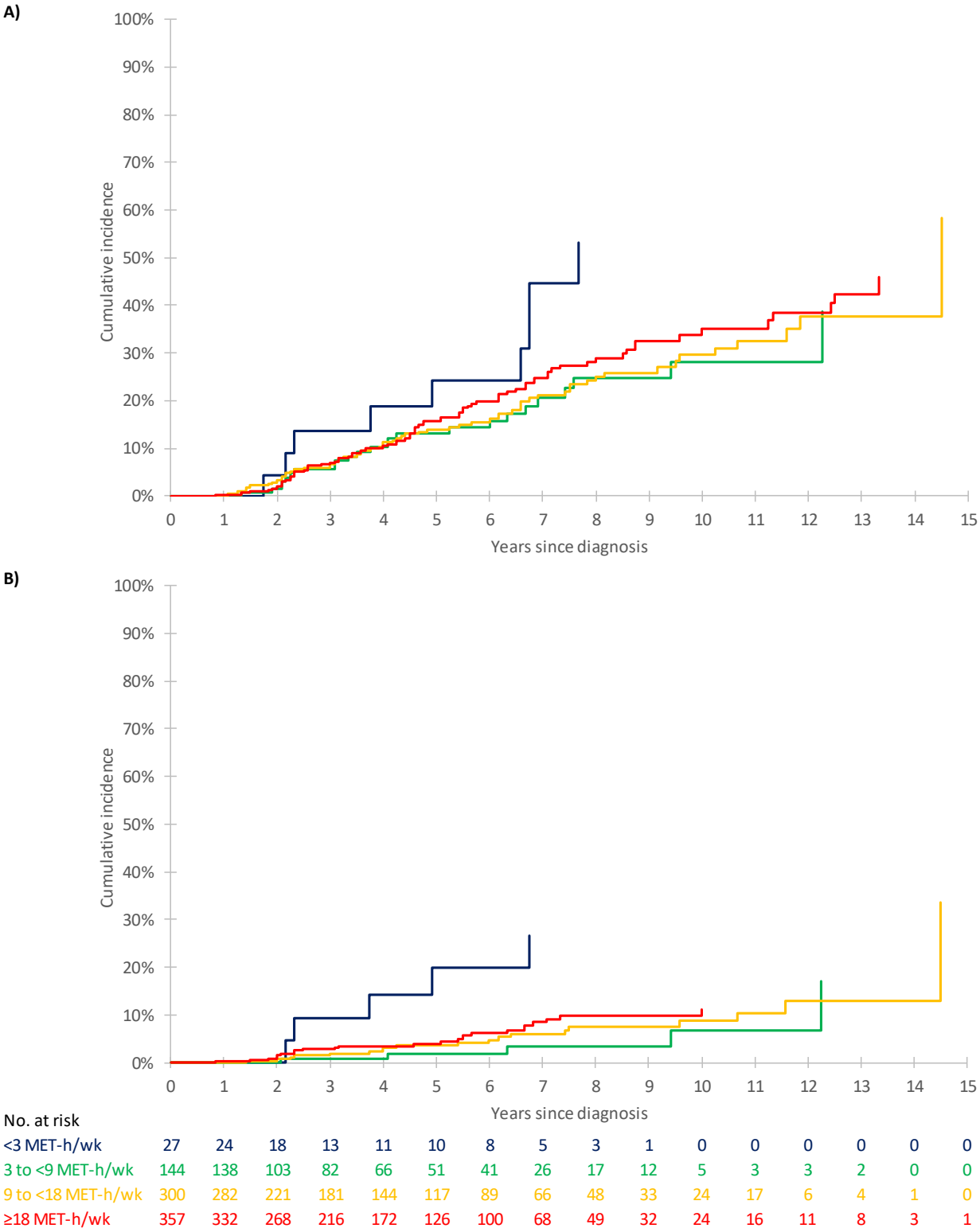
Table. Multivariable regression analysis of baseline physical activity (as MET hours per week) and prostate cancer grade reclassification during active surveillance

	Grade reclassification to ≥GG2 (No. events/N: 167/806)			Grade reclassification to ≥GG3 (No. events/N: 51/806)		
Characteristic	SHR	95% CI	*p*	SHR	95% CI	*p*
MET hours per week						
<3	Reference			Reference		
3 to <9	0.55	0.27 – 1.15	.11	0.18	0.05 – 0.61	**.01**
9 to <18	0.57	0.29 – 1.13	.11	0.26	0.10 – 0.68	**.01**
≥18	0.64	0.33 – 1.23	.18	0.31	0.12 – 0.80	**.02**

Note: Multivariable regression models were adjusted for year of diagnosis, age, race, PSA density, number of positive biopsy cores, maximum percentage of biopsy involved with tumor, use of pre-enrollment MRI, smoking, and diet quality (as energy adjusted Healthy Eating Index).

Abbreviations: MET, metabolic equivalent of task; CI, confidence interval; GG, Grade Group; SHR, subdistribution hazard ratio.

Figure. Cumulative incidence of (A) GG ≥ 2, and (B) GG ≥ 3 vs. physical activity measured as metabolic equivalent of task (MET) hours per week in active surveillance patients.



No. at risk

<3 MET-h/wk	27	24	18	13	11	10	8	5	3	1	0	0	0	0	0	0
3 to <9 MET-h/wk	144	138	103	82	66	51	41	26	17	12	5	3	3	2	0	0
9 to <18 MET-h/wk	300	282	221	181	144	117	89	66	48	33	24	17	6	4	1	0
≥18 MET-h/wk	357	332	268	216	172	126	100	68	49	32	24	16	11	8	3	1