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Supplementary table 1. Univariate models for 1-year, 5-year, and overall survival for the whole cohort and males and females separately. Muscle indexes are used as continuous variables.

	All			Males			Females		
	1-year survival (HR [95% CI])	5-year survival (HR [95% CI])	Overall survival (HR [95% CI])	1-year survival (HR [95% CI])	5-year survival (HR [95% CI])	Overall survival (HR [95% CI])	1-year survival (HR [95% CI])	5-year survival (HR [95% CI])	Overall survival (HR [95% CI])
Age (years)	1.03 [1.01-1.05]	1.03 [1.01-1.05]	1.03 [1.01-1.05]	1.03 [1.01-1.06]	1.04 [1.01-1.07]	1.04 [1.02-1.07]	1.03 [1.00-1.06]	1.03 [1.00-1.06]	1.03 [1.00-1.07]
WHO/ISUP grade									
Grade 1	REF	REF	REF	REF	REF	REF	REF	REF	REF
Grade 2	>100* [0.00->100]	2.84 [0.86-9.40]	2.63 [1.03-6.70]	>100* [0.00->100]	1.82 [0.42-7.92]	2.53 [0.59-10.77]	>100* [0.00->100]	4.28 [0.54-33.76]	2.48 [0.71-8.64]
Grade 3	>100* [0.00->100]	5.76 [1.66-20.06]	4.44 [1.65-11.98]	>100* [0.00->100]	2.92 [0.61-14.06]	3.91 [0.85-17.97]	>100* [0.00->100]	11.66 [1.43-94.84]	4.65 [1.23-17.57]
Grade 4	>100* [0.00->100]	14.78 [4.47-48.86]	12.21 [4.72-31.55]	>100* [0.00->100]	8.09 [1.86-35.12]	10.62 [2.46-45.84]	>100* [0.00->100]	27.57 [3.51->100*]	12.07 [3.38-43.08]
Histology									
Clear cell	REF	REF	REF	REF	REF	REF	REF	REF	REF
Non-clear cell	0.92 [0.22-3.12]	1.16 [0.56-2.43]	1.25 [0.63-2.50]	1.18 [0.26-5.34]	1.03 [0.46-2.33]	1.09 [0.51-2.32]	0.62 [0.08-5.07]	2.40 [0.33-17.67]	3.20 [0.44-23.38]
Stage									
Stage 1	REF	REF	REF	REF	REF	REF	REF	REF	REF
Stage 2	10.59 [1.10->100*]	2.83 [1.31-6.09]	2.68 [1.43-4.99]	10.11 [1.05-97.18]	3.52 [1.38-8.93]	2.90 [1.25-6.71]	1.00 [0.00->100*]	1.96 [0.49-7.85]	2.38 [0.94-6.05]
Stage 3	4.13 [0.37-45.50]	2.21 [1.11-4.42]	1.93 [1.08-3.43]	3.16 [0.29-34.87]	1.80 [0.76-4.23]	1.87 [0.91-3.85]	1.00 [0.00->100*]	2.77 [0.84-9.07]	1.74 [0.61-4.99]
Stage 4	67.32 [8.87->100*]	12.25 [6.52-23.04]	9.66 [5.56-16.78]	27.37 [3.36->100*]	7.63 [3.33-17.51]	6.76 [3.19-14.32]	0.74 [0.00->100*]	21.06 [7.77-57.06]	12.77 [5.64-28.89]
Body mass index (kg/m <sup>2</sup> )	0.93 [0.89-0.97]	0.92 [0.88-0.96]	0.92 [0.88-0.96]	0.94 [0.89-0.99]	0.93 [0.88-0.99]	0.93 [0.87-0.99]	0.93 [0.87-0.99]	0.91 [0.85-0.97]	0.91 [0.85-0.97]
PMI (cm <sup>2</sup> /m <sup>2</sup> )	0.85 [0.75-0.97]	0.83 [0.73-0.94]	0.82 [0.72-0.93]	0.75 [0.63-0.90]	0.72 [0.60-0.86]	0.72 [0.60-0.86]	0.78 [0.60-1.02]	0.75 [0.58-0.98]	0.73 [0.56-0.96]
PMI+ESI (cm <sup>2</sup> /m <sup>2</sup> )	0.94 [0.86-1.03]	0.95 [0.90-0.99]	0.94 [0.90-0.99]	0.88 [0.77-0.99]	0.93 [0.87-1.00]	0.93 [0.87-0.98]	0.98 [0.83-1.17]	0.90 [0.82-0.99]	0.90 [0.83-0.98]
SMI (cm <sup>2</sup> /m <sup>2</sup> )	0.98 [0.95-1.00]	0.97 [0.95-1.00]	0.97 [0.95-1.00]	0.95 [0.91-0.99]	0.95 [0.91-0.98]	0.94 [0.91-0.98]	0.95 [0.90-1.00]	0.94 [0.89-0.99]	0.94 [0.89-0.99]

Abbreviations. HR: hazard ratio, CI: confidence interval, PMI: psoas muscle index, ESI: erector spinae index, SMI: skeletal muscle index.

\* >100 denotes that the HR or the upper CI are high values as a result small statistical power.

Supplementary table 2. Univariate models for 1-year, 5-year, and overall survival with categorized muscle indexes.

	1-year survival (HR [95% CI])	5-year survival (HR [95% CI])	Overall survival (HR [95% CI])
Age (years)	<b>1.03 [1.01- 1.05]</b>	<b>1.03 [1.01- 1.05]</b>	<b>1.03 [1.01- 1.05]</b>
Sex			
Female	REF	REF	REF
Male	1.43 [0.59-3.44]	1.38 [0.85-2.23]	1.27 [0.84-1.94]
BMI (kg/m <sup>2</sup> )			
≥25	REF	REF	REF
<25	1.26 [0.51-3.13]	<b>1.65 [1.02-2.67]</b>	<b>1.65 [1.02-2.67]</b>
WHO/ISUP grade			
Grade 1	REF	REF	REF
Grade 2	>100* [0.00->100]	2.84 [0.86-9.40]	<b>2.63 [1.03-6.70]</b>
Grade 3	>100* [0.00->100]	<b>5.76 [1.66-20.06]</b>	<b>4.44 [1.65-11.98]</b>
Grade 4	>100* [0.00->100]	<b>14.78 [4.47-48.86]</b>	<b>12.21 [4.72- 31.55]</b>
Stage			
Stage 1	REF	REF	REF
Stage 2	<b>10.59 [1.10-&gt;100*]</b>	<b>2.83 [1.31-6.09]</b>	<b>2.68 [1.43-4.99]</b>
Stage 3	4.13 [0.37-45.50]	<b>2.21 [1.12-4.42]</b>	<b>1.93 [1.082-3.425]</b>
Stage 4	<b>67.32 [8.87-&gt;100*]</b>	<b>12.25 [6.52-23.04]</b>	<b>9.66 [5.56-16.78]</b>
Muscle mass (PMI)			
Normal	REF	REF	REF
Low	<b>3.68 [1.48-9.11]</b>	<b>3.09 [1.75-5.48]</b>	<b>2.56 [1.67-3.91]</b>
Muscle mass (PMI+ESI)			
Normal	REF	REF	REF
Low	<b>4.90 [2.06-11.62]</b>	<b>2.81 [1.74-4.53]</b>	<b>2.84 [1.87-4.33]</b>
Muscle mass (SMI)			
Normal	REF	REF	REF
Low	<b>4.75 [1.71-13.18]</b>	<b>3.10 [1.85-5.20]</b>	<b>3.29 [2.07-5.24]</b>

Abbreviations. HR: hazard ratio, CI: confidence interval, PMI: psoas muscle index, ESI: erector spinae index, SMI: skeletal muscle index, BMI: body mass index.

Cut-off values (cm<sup>2</sup>/m<sup>2</sup>) for males/females: 1-year PMI: 7.2/3.0; 5-year PMI: 7.7/4.8; OS PMI: 6.4/4.8, 1-year PMI+ESI: 24.9/16.3; 5-year PMI+ESI: 24.9/21.2; OS PMI+ESI: 24.9/21.2, and 1-year SMI: 48.0/37.8; 5-year SMI: 48.4/36.3; OS SMI: 48.4/36.3.

\* >100 denotes that the HR or the upper CI are high values as a result small statistical power.

Supplementary table 3. Multivariate models for 1-year, 5-year, and overall survival adjusted for continuous muscle indexes, age, sex, stage, grade, and BMI.

	1-year survival			5-year survival			Overall survival		
	PMI HR [95% CI]	PMI+ESI HR [95% CI]	SMI HR [95% CI]	PMI HR [95% CI]	PMI+ESI HR [95% CI]	SMI HR [95% CI]	PMI HR [95% CI]	PMI+ESI HR [95% CI]	SMI HR [95% CI]
Age (years)	1.03 [0.98-1.08]	1.01 [0.95-1.06]	0.99 [0.93-1.04]	1.02 [0.99-1.04]	1.01 [0.98-1.03]	1.01 [0.98-1.04]	<b>1.03</b> <b>[1.01-1.06]</b>	1.02 [0.99-1.05]	1.02 [0.99-1.05]
Sex									
Female	REF	REF	REF	REF	REF	REF	REF	REF	REF
Male	2.70 [0.74-9.82]	2.13 [0.68-6.70]	<b>3.35</b> <b>[1.02-11.81]</b>	<b>1.94</b> <b>[1.01-3.74]</b>	1.46 [0.79-2.69]	2.17 [1.06-4.47]	<b>2.12</b> <b>[1.19-3.76]</b>	1.48 [0.86-2.55]	<b>2.36</b> <b>[1.22-4.56]</b>
Stage									
Stage 1	REF	REF	REF	REF	REF	REF	REF	REF	REF
Stage 2	6.06 [0.61-60.09]	5.43 [0.54-54.53]	2.67 [0.23-31.68]	1.91 [0.86-4.25]	1.83 [0.82-4.07]	1.31 [0.51-3.33]	1.71 [0.88-3.30]	1.65 [0.86-3.19]	1.05 [0.47-2.32]
Stage 3	2.03 [0.18-22.91]	1.89 [0.16-22.04]	2.01 [0.18-23.00]	1.40 [0.67-2.93]	1.44 [0.69-3.04]	1.42 [0.64-3.12]	1.19 [0.64-2.20]	1.27 [0.68-2.37]	1.13 [0.57-2.22]
Stage 4	<b>37.22</b> <b>[4.42-&gt;100*]</b>	<b>29.23</b> <b>[3.58-&gt;100*]</b>	<b>23.34</b> <b>[2.82-&gt;100*]</b>	<b>7.99</b> <b>[3.91-16.33]</b>	<b>6.82</b> <b>[3.37-13.78]</b>	<b>7.71</b> <b>[3.50-16.96]</b>	<b>7.03</b> <b>[3.72-13.29]</b>	<b>5.80</b> <b>[3.11-10.80]</b>	<b>5.99</b> <b>[2.90-12.34]</b>
WHO/ISUP grade									
Grade 1	REF	REF	REF	REF	REF	REF	REF	REF	REF
Grade 2	>100* [0.00->100]	>100* [0.00->100]	>100* [0.00->100]	1.73 [0.51-5.91]	1.78 [0.52-6.04]	1.82 [0.41-8.06]	1.76 [0.67-4.59]	1.81 [0.70-4.72]	2.13 [0.63-7.18]
Grade 3	>100* [0.00->100]	>100* [0.00->100]	>100* [0.00->100]	<b>3.72</b> <b>[1.01-13.70]</b>	3.68 [0.99-13.62]	<b>5.19</b> <b>[1.10-24.57]</b>	<b>2.90</b> <b>[1.01-8.31]</b>	<b>2.93</b> <b>[1.03-8.36]</b>	<b>4.58</b> <b>[1.25-16.80]</b>
Grade 4	>100* [0.00->100]	>100* [0.00->100]	>100* [0.00->100]	<b>4.39</b> <b>[1.21-15.98]</b>	<b>5.17</b> <b>[1.43-18.77]</b>	<b>5.65</b> <b>[1.20-26.56]</b>	<b>4.09</b> <b>[1.46-11.45]</b>	<b>4.59</b> <b>[1.65-12.80]</b>	<b>6.06</b> <b>[1.68-21.83]</b>
BMI (kg/m <sup>2</sup> )	1.03 [0.92-1.16]	1.01 [0.91-1.13]	1.04 [0.92-1.18]	1.00 [0.95-1.06]	0.99 [0.93-1.04]	1.01 [0.94-1.08]	0.99 [0.94-1.05]	0.98 [0.93-1.03]	0.99 [0.93-1.06]
MI (cm <sup>2</sup> /m <sup>2</sup> )	0.72 [0.48-1.06]	0.89 [0.78-1.03]	<b>0.90</b> <b>[0.83-0.99]</b>	<b>0.74</b> <b>[0.60-0.90]</b>	<b>0.92</b> <b>[0.85-0.99]</b>	<b>0.94</b> <b>[0.89-0.99]</b>	<b>0.74</b> <b>[0.62-0.89]</b>	0.94 [0.88-1.01]	<b>0.94</b> <b>[0.90-0.99]</b>

Abbreviations. HR: hazard ratio, CI: confidence interval, MI: muscle index, PMI: psoas muscle index, ESI: erector spinae index, SMI: skeletal muscle index, BMI: body mass index.

\* >100 denotes that the HR or the upper CI are high values as a result small statistical power.

Supplementary table 4. Multivariate models for 1-year, 5-year, and overall survival adjusted with categorized muscle indexes, age, BMI, stage, and grade.

	1-year survival			5-year survival			Overall survival		
	PMI HR	PMI+ESI HR	SMI HR	PMI HR	PMI+ESI HR	SMI HR	PMI HR	PMI+ESI HR	SMI HR
	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]	HR [95% CI]	[95% CI]
Age (years)	1.04 [0.98-1.09]	1.01 [0.97-1.06]	0.99 [0.94-1.05]	1.02 [0.99-1.04]	1.00 [0.98-1.03]	1.00 [0.98-1.03]	<b>1.02 [1.00-1.05]</b>	1.02 [0.99-1.04]	1.02 [0.99-1.04]
BMI									
≥ 25	REF	REF	REF	REF	REF	REF	REF	REF	REF
< 25	0.77 [0.29-2.05]	0.78 [0.31-2.01]	0.56 [0.20-1.63]	0.88 [0.52-1.48]	0.89 [0.53-1.51]	0.79 [0.44-1.43]	0.79 [0.49-1.27]	0.88 [0.55-1.40]	0.82 [0.49-1.39]
Stage									
Stage 1	REF	REF	REF	REF	REF	REF	REF	REF	REF
Stage 2	6.17 [0.63-60.76]	5.27 [0.52-53.63]	2.76 [0.23-33.64]	1.89 [0.86-4.17]	1.83 [0.82-4.08]	1.34 [0.52-3.47]	1.66 [0.86-3.21]	1.62 [0.83-3.12]	1.04 [0.46-2.34]
Stage 3	1.87 [0.17-21.14]	1.95 [0.17-22.34]	2.10 [0.19-23.82]	1.47 [0.72-3.00]	1.42 [0.69-2.93]	1.35 [0.62-2.93]	1.34 [0.74-2.42]	1.27 [0.70-2.33]	1.10 [0.57-2.12]
Stage 4	<b>35.90 [4.20-&gt;100*]</b>	<b>26.71 [3.19-&gt;100*]</b>	<b>23.57 [2.67-&gt;100*]</b>	<b>7.89 [3.87-16.10]</b>	<b>6.27 [3.12-12.61]</b>	<b>8.97 [3.94-20.43]</b>	<b>7.91 [4.21-14.88]</b>	<b>5.46 [2.96-10.04]</b>	<b>7.18 [3.38-15.27]</b>
WHO/ISUP grade									
Grade 1	REF	REF	REF	REF	REF	REF	REF	REF	REF
Grade 2	>100* [0.00->100]	>100* [0.00->100]	>100* [0.00->100]	1.74 [0.52-5.88]	1.90 [0.57-6.40]	1.77 [0.40-7.80]	1.93 [0.75-4.98]	1.90 [0.74-4.92]	2.08 [0.62-6.97]
Grade 3	>100* [0.00->100]	>100* [0.00->100]	>100* [0.00->100]	3.44 [0.95-12.46]	<b>4.03 [1.11-14.63]</b>	<b>5.42 [1.15-25.47]</b>	<b>3.35 [1.20-9.39]</b>	<b>3.32 [1.18-9.33]</b>	<b>5.02 [1.37-18.37]</b>
Grade 4	>100* [0.00->100]	>100* [0.00->100]	>100* [0.00->100]	<b>4.53 [1.29-15.87]</b>	<b>5.78 [1.66-20.09]</b>	<b>4.75 [1.01-22.23]</b>	<b>4.78 [1.77-12.91]</b>	<b>5.56 [2.07-14.98]</b>	<b>5.69 [1.58-20.47]</b>
Muscle mass									
Normal	REF	REF	REF	REF	REF	REF	REF	REF	REF
Low	<b>3.71 [1.35-10.20]</b>	<b>2.77 [1.13-6.76]</b>	<b>5.28 [1.62-17.25]</b>	<b>2.82 [1.55-5.14]</b>	<b>2.29 [1.32-3.96]</b>	<b>3.36 [1.83-6.17]</b>	<b>2.52 [1.56-4.08]</b>	<b>2.17 [1.34-3.52]</b>	<b>3.14 [1.84-5.38]</b>

Abbreviations. HR: hazard ratio, CI: confidence interval, PMI: psoas muscle index, ESI: erector spinae index, SMI: skeletal muscle index.

Cut-off values (cm<sup>2</sup>/m<sup>2</sup>) for males/females: 1-year PMI: 7.2/3.0; 5-year PMI: 7.7/4.8; OS PMI: 6.4/4.8, 1-year PMI+ESI: 24.9/16.3; 5-year PMI+ESI: 24.9/21.2; OS PMI+ESI: 24.9/21.2, and 1-year SMI: 48.0/37.8; 5-year SMI: 48.4/36.3; OS SMI: 48.4/36.3.

\* >100 denotes that the HR or the upper CI are high values as a result small statistical power.