Supplementary material

Pekař M, Branny P, Špaček R, et al. CT-derived fat density as a predictor of cause-specific mortality in patients undergoing TAVI: Findings from a large registry subanalysis. Pol Heart J. 2024.

Table S1. Methodological Overview of the 2024 Published Large Cohort Study on All-Cause and Current Cause-Specific Mortality in TAVI Patients Subanalysis

Parameter/Aspect	**All-Cause Mortality Study (2024)**	**Actuall Cause-Specific Mortality Study**
Study Design	Retrospective survival analysis	Subanalysis of retrospective cohort
Patient Cohort	Patients undergoing TAVI	Same cohort as the all-cause mortality study
CT Parameters Analyzed	CTL3 parameters at the third lumbar vertebra (L3)	Same as all-cause mortality study
Segmentation Tool	AutoMATiCA neural network	Same tool used
Data Censoring Date	December 31, 2022	December 31, 2022
Data Source for Mortality	UZIS (state central authority)	UZIS (state central authority)
Cause of Death Definition	Not specifically addressed in all-cause mortality study	Detailed by ICD codes and clinical review for ambiguities
Statistical Models Used	Multivariable Cox proportional hazards model	Same statistical approach with cause-specific adjustments
Covariates Included	Age, sex, comorbidities	Same, with additional consideration for cause-specific factors
Outcome Measures	Overall survival	Mortality from specific causes (e.g., cardiovascular, infection)

Significant Findings	Association of CTL3 parameters with all-cause mortality	Association of specific CTL3 parameters with cause-specific mortality

Note: This table provides a comprehensive overview of the methodological elements used in two interconnected studies: the large cohort study published in 2024 on all-cause mortality and the subanalysis focused on cause-specific mortality in patients undergoing TAVI (Transcatheter Aortic Valve Implantation). Both studies utilize data sourced from UZIS (Ústav zdravotnických informací a statistiky ČR — National Institute of Health Statistics of the Czech Republic), ensuring a reliable and centralized collection of mortality data. This overview is intended to aid in understanding the continuity and differences in the research methodologies, emphasizing the progression from general mortality analyses to more detailed cause-specific evaluations.

Table S2. Descriptive Statistics of the Study Cohort for Cause-Specific Mortality in TAVI Patients

Characteristic	**Total Cohort (N=866)**	**Median**	**IQR**
Baseline Characteristics			
Age (years)		79.7	74.9 - 83.3
Body Mass Index (kg/m²)		28.9	25.9 - 32.6
Sex N (%)			
Male	429 (49.5%)		
Female	437 (50.5%)		
Comorbidities N (%)			
Hypertension	778 (89.8%)		
Diabetes Mellitus	375 (43.3%)		
Coronary Heart Disease	178 (20.6%)		
Respiratory Disease	267 (30.8%)		
Follow-up			
Duration (years)		5.89	3.44 - 7.89
CT-Derived Parameters			
Muscle Parameters			
SMI		44.4	39.4 - 49.8
Muscle HU		30.7	26.0 - 34.9
Fat Parameters			
IMAT HU		-67.3	-71.0 - -63.9
IMAT index		8.3	6.1 - 11.5
SAT HU		-99.6	-105.0 - -93.4
SAT index		62.9	44.4 - 87.3
VAT HU		-95.4	-99.8 - -89.9
VAT index		65.5	41.3 - 87.8

Note: This table provides a comprehensive overview of baseline characteristics, comorbidities, follow-up duration, and CT-derived parameters for the study cohort of 866 patients undergoing Transcatheter Aortic Valve Implantation (TAVI). The interquartile range (IQR) is presented, representing the range between the first quartile (Q1) and the third quartile (Q3) for continuous variables. These statistics provide a foundation for further analyses on cause-specific mortality within this cohort. Abbreviations:

IMAT - intramuscular adipose tissue, SAT - subcutaneous adipose tissue, SMI - skeletal muscle index, VAT - visceral adipose tissue, HU - Hounsfield Units.

Table S3. Prevalence of Sarcopenia, Obesity, and Sarcopenic Obesity in the Study Cohort by Sex

Characteristic	Total (N=866)	Male (N = 429)	Female (N = 437)
Sarcopenic Patients	479 (55.3%)	371 (86.5%)	108 (24.7%)
Obese Patients	523 (60.4%)	359 (83.7%)	164 (37.5%)
Sarcopenic Obesity Patients	341 (39.4%)	307 (71.6%)	34 (7.8%)

Note: This table details the prevalence of sarcopenia, obesity, and sarcopenic obesity within our study cohort, split by sex. The data illustrate not only the individual prevalences of sarcopenia and obesity but also the combined condition of sarcopenic obesity, highlighting significant sex disparities. This additional layer of analysis provides insights into the complex interplay between muscle loss and fat accumulation, particularly significant in the male subgroup of our study.

Table S4. Clinical Significance of CT-Derived Fat Parameters in Predicting Cause-Specific Mortality After TAVI

CT Parameter	Interquartile Range	HR per Unit (95% CI)	Risk Difference (75th vs 25th percentile)
IMAT density	6.99 HU	1.058 (1.001-1.117)	1.49-fold increase
VAT density	9.93 HU	1.043 (1.007-1.080)	1.52-fold increase
SAT density	11.53 HU	1.035 (1.009-1.061)	1.49-fold increase
IMAT index	5.32 cm^2/m^2	1.057 (1.007-1.109)	1.35-fold increase
SAT index	42.89 cm^2/m^2	0.985 (0.973-0.997)	1.50-fold decrease

Note: This table illustrates the clinical significance of CT-derived fat density and index parameters in predicting cause-specific mortality among TAVI patients. While per-unit changes in hazard ratios (HR) may appear small, they represent substantial risk differences when considered over the range (interquartile range) of CT measurements in our cohort.
The 'Risk Difference' column shows the fold change in mortality risk between patients at the 25th and 75th percentiles for each parameter, calculated as HR^IQR. For example, patients at the 75th percentile of IMAT density have a 1.49-fold higher risk of cancer-related mortality compared to those at the 25th percentile.
These findings should be contextualized within our broader research. While this subanalysis focused on cause-specific mortality and highlighted the importance of fat-related parameters, our previous work on the same cohort [1] demonstrated that skeletal muscle index (SMI) was a significant predictor

of all-cause mortality in male TAVI patients (HR 0.986, 95% CI 0.975-0.996, p=0.009).
Abbreviations: IMAT - intramuscular adipose tissue, VAT - visceral adipose tissue, SAT - subcutaneous adipose tissue, HU - Hounsfield Units, IQR - interquartile range, HR - hazard ratio, CI - confidence interval.

Table S5. Limitations of the Study

Limitation	**Description**
1. Retrospective Design	The study's retrospective nature may introduce selection biases and limits control over the exposure status or outcome assessment, potentially affecting the findings.
2. Single-Center Data	Data derived from a single tertiary cardiac center which may not be generalizable to other settings or populations.
3. Small Sample Size for Certain Analyses	The study faced limitations in statistical power, particularly in the assessment of causes of death with very few occurrences, limiting the reliability of findings in these subgroups.
4. Non-Involvement of Some Patients	Due to missing or low-quality CT scans, some patients from the registry could not be included in the study, potentially introducing bias.
5. AI-Based Segmentation	Reliance on automatic segmentation of CT images by AI, which may introduce errors not identifiable without manual review.
6. Lack of Randomization	Without randomization, the study is more susceptible to confounding factors that could influence the results.
7. Limited Follow-Up	The median follow-up period may not have been sufficient to observe long-term outcomes in some patients.
8. Confounding Variables	Although the study adjusted for numerous variables, residual confounding due to unmeasured or inadequately measured factors cannot be excluded.

Note: This table summarizes the inherent limitations identified in our study, which should be considered when interpreting the results. These limitations highlight potential areas for further research and refinement in future studies.