

## Background:

- Maintenance hemodialysis patients have a higher mortality rate than the general population, even more if they also have diabetes mellitus type 2 (T2DM).
- Data concerning long range mortality predictors and exact characterization of long-term survivors in a large diabetic dialysis patient collective are still scarce.
- We compared long-term survivors to non-survivors concerning ten parameters chosen by clinical expertise, literature and obtainability in clinical practice: age, sex, care status, body mass index (BMI), albumin, diabetes duration, HbA1c, cardiovascular, cerebrovascular and peripheral vascular co-morbidities.

## Methods:

- Data were drawn from the German Diabetes Dialysis Study (4D Study), a multicenter, prospective, randomized trial among 1255 hemodialysis patients with T2DM, and its post-trial phase.
- For the present analysis these patients were retrospectively monitored until death, kidney transplantation or date of the last contact (mean time of overall follow-up: 11.5 years).
- All ten variables were analyzed by standard descriptive statistics. Patients' survival was analyzed calculating relative risks of mortality (hazard ratios) for presence and value of ten parameters at baseline.
- Additional subgroup analyses to determine whether predictive effects of parameters differed according to gender and age (< or ≥ 66 years (median)).

## Results:

	Total mortality		p-value
	survived (n = 103)	dead (n = 1132)	
Age [years] (MW ± SD)	59.3 ± 8.8	66.3 ± 8.0	< 0.001*
Diabetes duration [years] (MW ± SD)	16.3 ± 8.2	18.3 ± 8.9	0.034*
BMI [kg/m <sup>2</sup> ] (MW ± SD)	29.0 ± 5.0	27.4 ± 4.8	0.001*
HbA1c [%] (MW ± SD)	6.4 ± 1.3	6.8 ± 1.3	0.004*
Albumin [g/dl] (MW ± SD)	3.9 ± 0.29	3.8 ± 0.30	0.072
Sex [%male]	68.0	52.9	0.003*
Need of care [% yes]	8.7	24.6	0.001*
Cardiovascular diseases [% yes]	33.0	61.0	< 0.001*
Cerebrovascular diseases [% yes]	14.6	18.1	0.421
Peripheral vascular diseases [% yes]	26.2	48.6	< 0.001*

\*p < 0.05

Table 1: Patient characteristics at baseline by vital status (continuous and categorical variables) of survivors and non-survivors after an observational period of 11.5 years.

	Multivariate	
	HR (95% CI)	p-value
Age [years]	1.031 (1.022 - 1.040)	< 0.001*
Sex [female]**	1.019 (0.890 - 1.165)	0.789
Need of care	1.199 (1.031 - 1.394)	0.018*
BMI [kg/m <sup>2</sup> ]	0.977 (0.964 - 0.992)	0.002*
Albumin [g/dl]	0.723 (0.589 - 0.887)	0.002*
Diabetes duration [years]	0.998 (0.991 - 1.006)	0.685
HbA1c [%]	1.084 (1.032 - 1.139)	0.001*
Cardiovascular diseases	1.423 (1.249 - 1.621)	< 0.001*
Cerebrovascular diseases	0.858 (0.729 - 1.009)	0.063
Peripheral vascular diseases	1.549 (1.364 - 1.759)	< 0.001*

\*p < 0.05

\*\*Reference: male gender

Table 2: Association of mortality of diabetic dialysis patients with age, sex, care status, BMI, albumin, diabetes duration, HbA1c, and cardiovascular, cerebrovascular, and peripheral vascular co-morbidities.

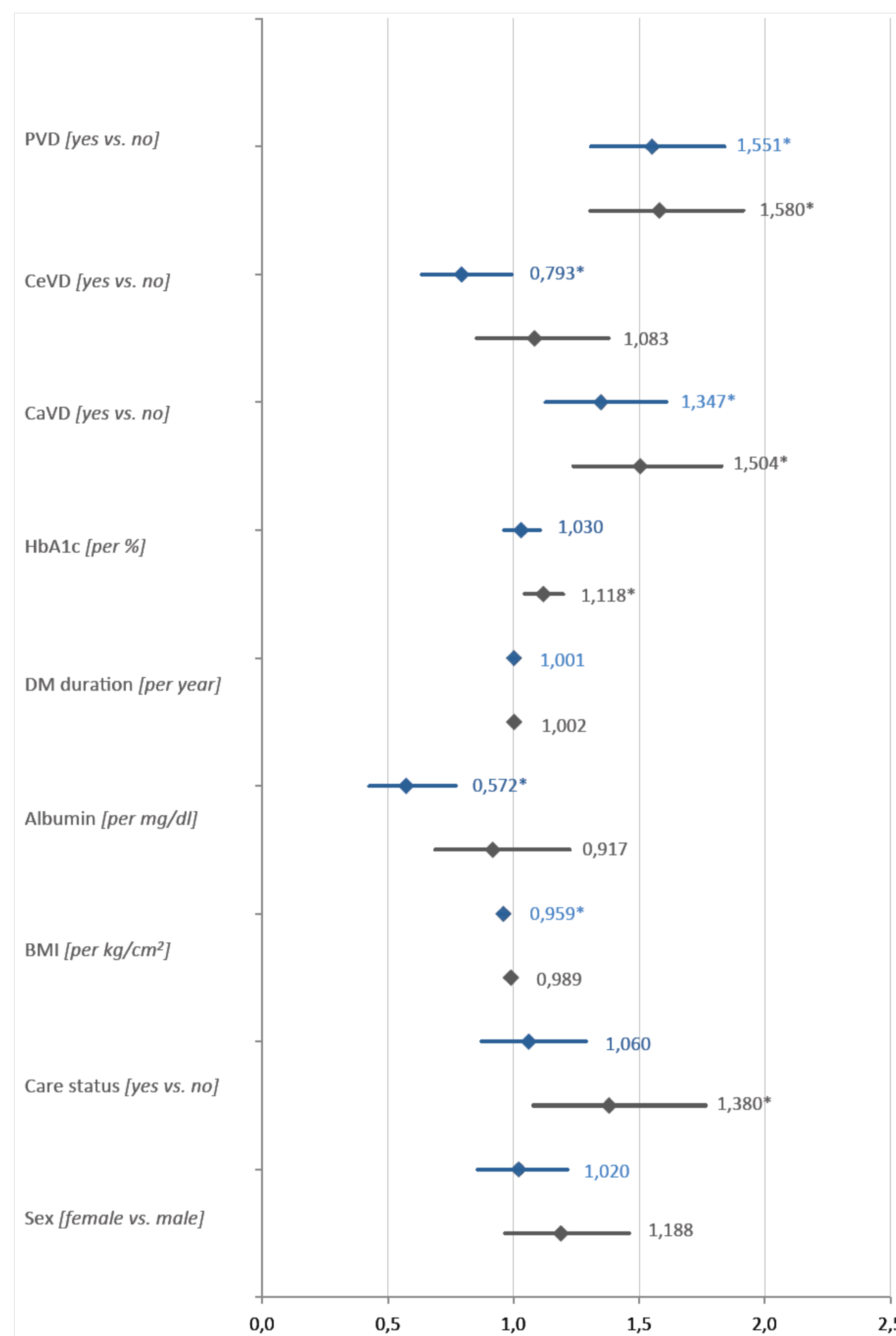


Figure 1: Mortality risk (hazard ratio) of diabetic dialysis patients, by age.

Association of mortality with sex, care status, BMI, albumin, diabetes duration (DM duration), HbA1c, and peripheral (PVD), cardiovascular (CaVD) and cerebrovascular (CeVD) co-morbidities in patients aged ≥ 66 years (blue) and patients aged < 66 years (grey), respectively (\*p ≤ 0.005).

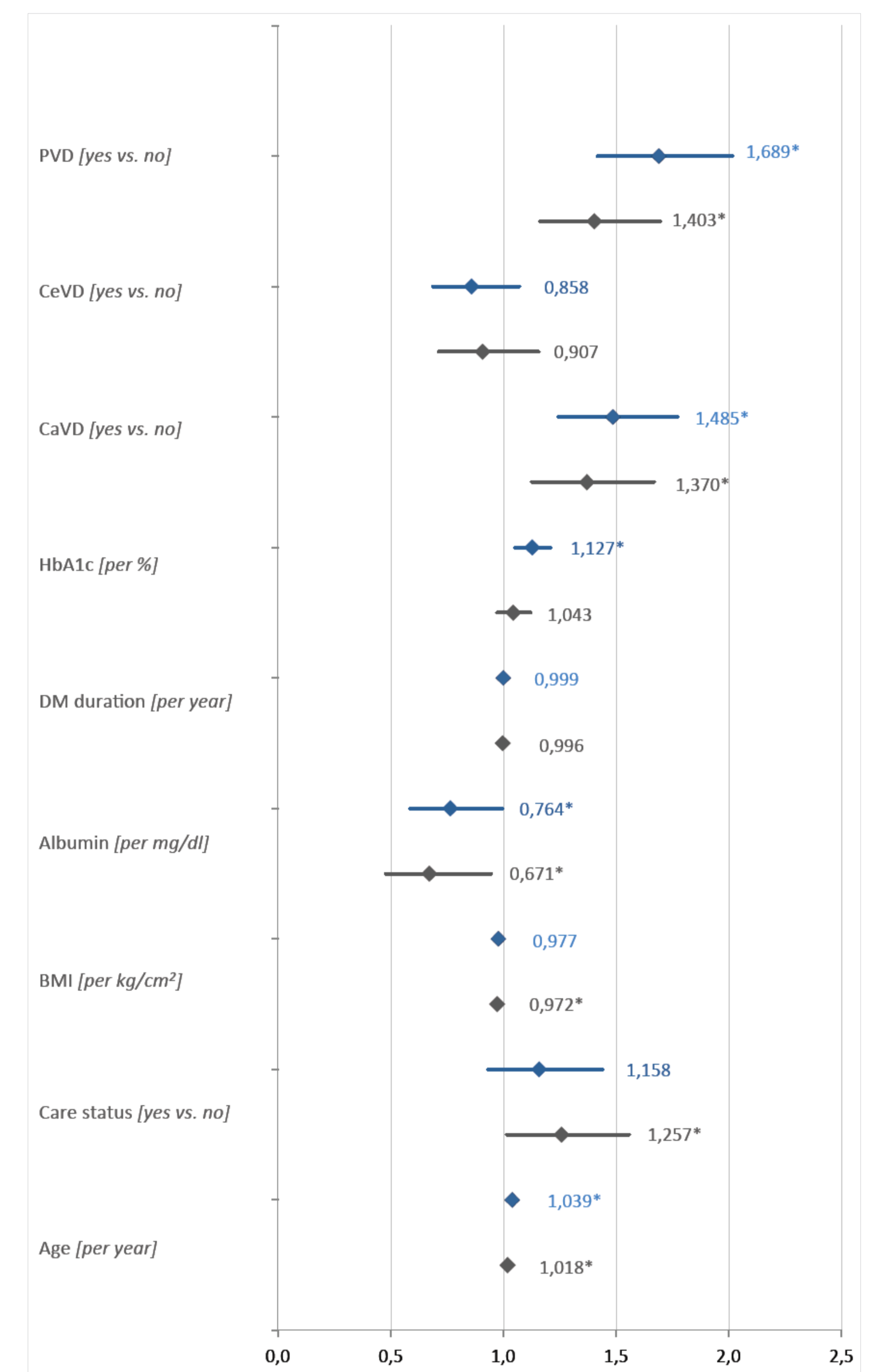


Figure 2: Mortality risk (hazard ratio) of diabetic dialysis patients, by sex.

Association of mortality with age, care status, BMI, albumin, diabetes duration (DM duration), HbA1c, and peripheral (PVD), cardiovascular (CaVD) and cerebrovascular (CeVD) co-morbidities in male (blue) and female (grey) patients, respectively (\*p ≤ 0.005).

## Conclusion:

- The average long-term survivor: he (!) is relatively young, doesn't need care, and has no or little co-morbidities and a low HbA1c.
- If he is a woman after all: she has high energy resources (high BMI and an elevated albumin) and has no or little co-morbidities.
- If he is already older: he has good energy resources in the form of a high BMI and an elevated albumin.
- Furthermore we were able to identify patient subgroups necessitating a further individualized prognosis estimation and therapy, which should strongly depend on age, diabetes duration and sex of the patient.

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