

## Cornell voltage left ventricular hypertrophy predicts all-cause mortality better than Sokolow-Lyon voltage in patients with and without diabetes – data from 183,749 primary care ECGs

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**Background:** Cornell voltage criteria (CL) and Sokolow-Lyon criteria (SL) for electrocardiographic left ventricular hypertrophy (ECG-LVH) are well known predictors of cardiovascular outcome. However, their predictive value may differ according to patient type and remains to be further tested in diabetic mellitus (DM) patients.

**Purpose:** The present study aims to determine the prevalence of each ECG-LVH criteria and their respective predictive value in DM patients.

**Method:** A retrospective cohort study of individuals age >40 years with digital ECGs from primary care were collected during 2001 to 2011. Data on medication, comorbidity, and outcomes were collected from Danish nationwide registries. DM was defined if individuals were prescribed oral antidiabetics or insulin, if they were diagnosed with DM type I or II, or had a HbA1c >48 mmol/l. Cox multivariable analysis was used for estimating hazard ratio (HR) and 95% confidence intervals (95% CI) for all-cause mortality during follow-up of up to 17 years.

**Results:** Included were 183,749 individuals with a digital ECG collected in primary care. A total of 13,003 (7.1%) individuals had DM, they were older

(65.8 vs. 61.3 years), had more myocardial infarction (16.1% vs. 5.2%), stroke (14.4% vs. 6.2%), hypertension (35.1% vs. 13.2%), CL LVH (8.0% vs. 5.6%) and more were males (53.3% vs. 45.3%) compared to the non-DM individuals (all  $p < 0.001$ ). CL identified a larger percentage of LVH in DM compared to non-DM individuals (8.0% vs. 5.6%,  $p < 0.001$ ), whereas SL identified similar percentage LVH in DM and non-DM individuals (8.5% vs. 8.1%,  $p = 0.068$ ). In multivariable adjusted analysis CL LVH remained strongly associated with all-cause mortality [HR 1.45 (95% CI: 1.42–1.48)] compared to SL LVH which found only a modest association [HR 1.06 (95% CI: 1.03–1.10)] (Figure 1). Of note, the association of CL LVH and all-cause mortality was even stronger than DM per se. There was no interaction with DM and either ECG LVH criteria ( $p > 0.45$ ).

**Conclusion:** Cornell Voltage Left Ventricular Hypertrophy is a strong predictor of mortality in patients with and without diabetes and an independent risk factor compared to hypertension and diabetes. The predictive value was substantially stronger than Sokolow-Lyon Voltage criteria for hypertrophy.

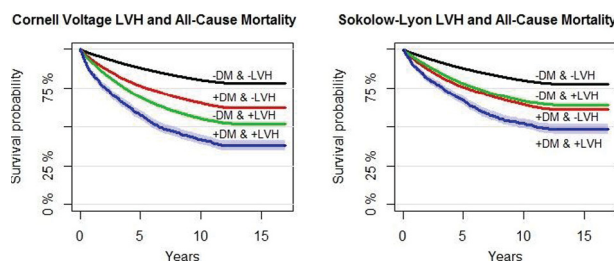


Figure 1. LVH and all-cause mortality