# The Correlation of Ventricular Arrhythmias in Hypertrophic Cardiomyopathy and the Late Gadolinium Enhancement on Cardiac Magnetic Resonance

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**Backgroud**    The ventricular arrhythmias are often seen in hypertrophic cardiomyopathy (HCM) patients, and they maybe a main cause of sudden cardiac death (SCD) in this disease, besides the left ventricular out track obstruction (LVOTO).

**Objectives**    To evaluate the correlation between the ventricular arrhythmias, including frequent premature ventricular arrhythmia (PVC), doublets and non-sustained ventricular tachycardia (NSVT) on 24h Holter electrocardiogram (ECG) in HCM, and the late gadolinium enhancement (LGE) on cardiac magnetic resonance (CMR) in a large cohort of HCM patients, and to evaluate the capability of LGE extent and LA diameter to predict fatal ventricular arrhythmias.

**Methods**        310 consecutive patients were enrolled in this cohort and divided into two groups according to whether they had ventricular arrhythmias or not. The extent of myocardial scar was subsequently graded different score as 0,1,2,3 and 4 as follows: none, 0-25%, 25%-50%, 50%-75% and 75%-100% of the transmural scar of the ventricular wall, respectively. For patients who had presence of LGE on CMR, the prevalence of all kinds of ventricular arrhythmias were calculated with respect to the extent of LGE score in three groups: LGE score <10, 10<LGE score<20 and LGE score >20. When referring to the NSVT, univariate Logistic regression and multivariate Logistic regression were analyzed to figure out the risk factor of this fatal ventricular arrhythmia. Receiver operating curve was used to assess the diagnostic capability of LGE on NSVT.

**Results**    Patients with ventricular arrhythmias had more presence of extreme LV wall hypertrophy, more LGE score, larger LVEDV, LVESV and LV mass than those patients without ventricular arrhythmias, all $p<0.05$. LGE was present in 217 patients (70%), and the LGE score in the two groups was $15.7\pm10.4$ and $4.2\pm2.7$, respectively. 142 patients (46%) had different morphologic ventricular arrhythmias, including frequent premature ventricular contraction in 61(20%) patients, ventricular doublets in 34(11%) patients and 50(16%) patients in NSVT. Patients with LGE had a nearly 6-fold higher risk of NSVT than those LGE negative patients (relative risk 5.7, 95%CI 2.4 to 13.6). The correlation coefficient between the fatal ventricular arrhythmia and the LGE score was 0.680. In multivariate analysis, LA anteroposterior diameter and LGE score were the independent determinants of NSVT (p=0.003 and p<0.000). The area under the ROC curve (AUC), for LGE score and LA diameter to discriminate NSVT, were 0.798 (95% CI 0.745 to 0.850) and 0.633 (95% CI 0.569 to 0.698), respectively, and the cut off value of LGE score 11.5 had a sensitivity of 67.4% and specificity of 85.1% to predict NSVT.

**Conclusions**   The ventricular arrhythmias are closely correlated with the LGE of CMR, and its prevalence is increased with the increase of LGE extent. Both LGE extent and enlarged LA diameter are the independent determinants of NSVT.
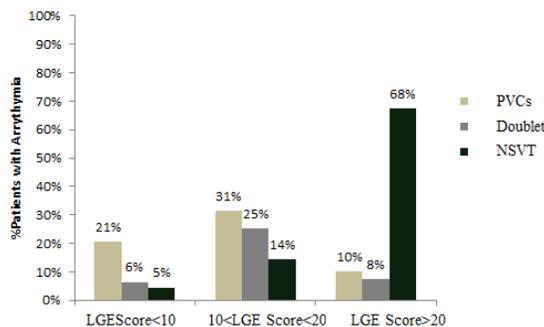


**Figure 1.Prevalence of Ventricular Arrhythmias with Respect to Extent of LGE**
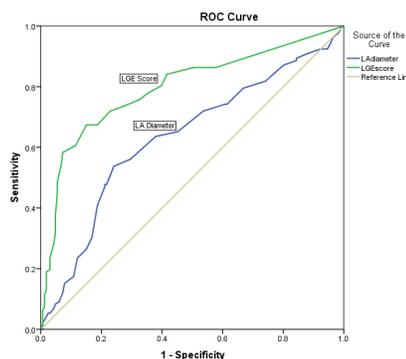PVCs: frequent premature ventricular contraction; NSVT: nonsustained ventricular tachycardia;

Figure 2. ROC Curve to Access the Ability of LA Diameter and LGE Score to Discrinminate NSVT.