

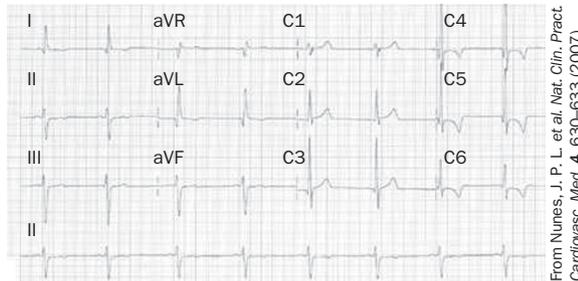
RESEARCH HIGHLIGHTS

HYPERTENSION

ECG strain predicts cardiovascular risk

Hypertensive patients who develop electrocardiographic strain despite treatment to control their blood pressure are at an increased risk of cardiovascular morbidity and mortality. These findings from the LIFE study confirm the prognostic value of electrocardiographic strain patterns and demonstrate the importance of serial electrocardiographic monitoring in hypertensive patients, regardless of whether or not they are responsive to antihypertensive therapy.

ST-segment depression and T-wave inversion are classic markers of the presence and severity of left ventricular hypertrophy, which increases the risk of cardiovascular mortality and morbidity in patients with essential hypertension. The predictive value of electrocardiographic strain patterns in hypertensive patients was not well defined until the LIFE study—a multicenter, double-blind trial to compare the effects of the angiotensin II receptor antagonist losartan with those of the β -blocker atenolol. This investigation showed that there was a correlation between baseline electrocardiographic strain and cardiovascular risk in hypertensive patients with left ventricular hypertrophy. Baseline electrocardiographic strain was found to be associated with increased risk, whereas regression of left ventricular hypertrophy resulted in a decrease in risk. On the basis of these findings, the LIFE investigators postulated



From Nunes, J. P. L. et al. *Nat. Clin. Pract. Cardiovasc. Med.* 4, 630–633 (2007)

“ST-segment depression and T-wave inversion are classic markers of the presence and severity of left ventricular hypertrophy”

that development of new strain in patients with normal baseline electrocardiographic patterns might also be correlated with an increase in cardiovascular risk, despite adequate control of blood pressure.

Electrocardiographic recordings from 7,409 patients enrolled in the LIFE study were obtained before (baseline) and 1 year after antihypertensive therapy. Patients were assessed over a 4-year period for the development of adverse events. Development of new strain between baseline and year 1 was associated with significant increases in the risk of cardiovascular morbidity and mortality and all-cause mortality, confirming the predictive value of a single indication of electrocardiographic strain pattern. “Potential implications for patient care,” says LIFE investigator Peter Okin, “are that these findings suggest, but do not prove, that additional therapy aimed at further lowering blood pressure in patients who develop new electrocardiographic strain

may be indicated to attempt to reduce the increased cardiovascular risk associated with this electrocardiographic finding.” Further studies are required to determine whether treatments that either prevent the development of new strain or promote regression of pre-existing strain will improve outcomes in hypertensive patients.

The LIFE investigators now plan to use computerized electrocardiography to accurately measure the absolute magnitude of ST-segment depression and T-wave inversion and to assess serial changes in the measurements. These quantitative measures of electrocardiographic strain should allow for better quantification and stratification of cardiovascular risk.

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Original article Okin, P.M. et al. Prognostic value of changes in the electrocardiographic strain pattern during antihypertensive treatment: the Losartan Intervention For End-point reduction in hypertension study (LIFE). *Circulation* 119, 1883–1891 (2009).