1: *J Cardiovasc Electrophysiol* 1997 Sep;8(9):980-6

Tissue Magnesium Levels and the Arrhythmic Substrate in Humans.

Haigney MC, Berger R, Schulman S, Gerstenblith G, Tunin C, Silver B, Silverman HS, Tomaselli G, Calkins H

Department of Medicine, Division of Cardiology, Johns Hopkins Medical Institutions, Baltimore, Md, Uniformed Health Services University of the Health Sciences, Bethesda, Maryland 20814, USA. and IntraCellular Diagnostics, Inc. Foster City , Ca.

Magnesium and Arrhythmias.*INTRODUCTION*: Magnesium deficiency has been implicated in the pathogenesis of sudden death, but the investigation of arrhythmic mechanisms has been hindered by difficulties in measuring cellular tissue magnesium stores. METHODS AND RESULTS: To see if magnesium deficiency is associated with a propensity toward triggered arrhythmias, we measured tissue magnesium levels and QT interval dispersion (as an index of repolarization dispersion) in 40 patients with arrhythmic complaints. Magnesium was measured in sublingual epithelium using X-ray dispersive analysis.(EXAtest) QT interval dispersion was assessed on 12-lead surface ECGs in all patients, and programmed stimulation was performed in 28. The sublingual epithelial magnesium level ([Mg]1), but the not the serum level, correlated inversely with QT interval dispersion in 40 patients ($r = 0.58$, $P < 0.005$); in 12 patients undergoing repeat testing on therapy, the change in magnesium also correlated inversely with the change in QT dispersion ($r = 0.61$, $P < 0.05$). Patients with left ventricular ejection fractions > 40% had significantly higher tissue magnesium and lower QT dispersion (34.5 +/- 0.5 mEq/L, 81 +/- 8 msec) than those with left ventricular ejection fractions < 40% (32.7 +/- 0.5 mEq/L, $P < 0.01$, and 114 +/- 9 msec, $P < 0.05$). There was no difference in either [Mg]1 or QT dispersion in the 16 patients with inducible monomorphic ventricular tachycardia versus the 12 noninducible patients.
CONCLUSION: Reduced tissue magnesium stores may represent a significant risk factor for arrhythmias associated with abnormal repolarization, particularly in patients with poor left ventricular systolic function, but may not represent a risk for excitable gap arrhythmias associated with a fixed anatomic substrate (e.g., monomorphic ventricular tachycardia).

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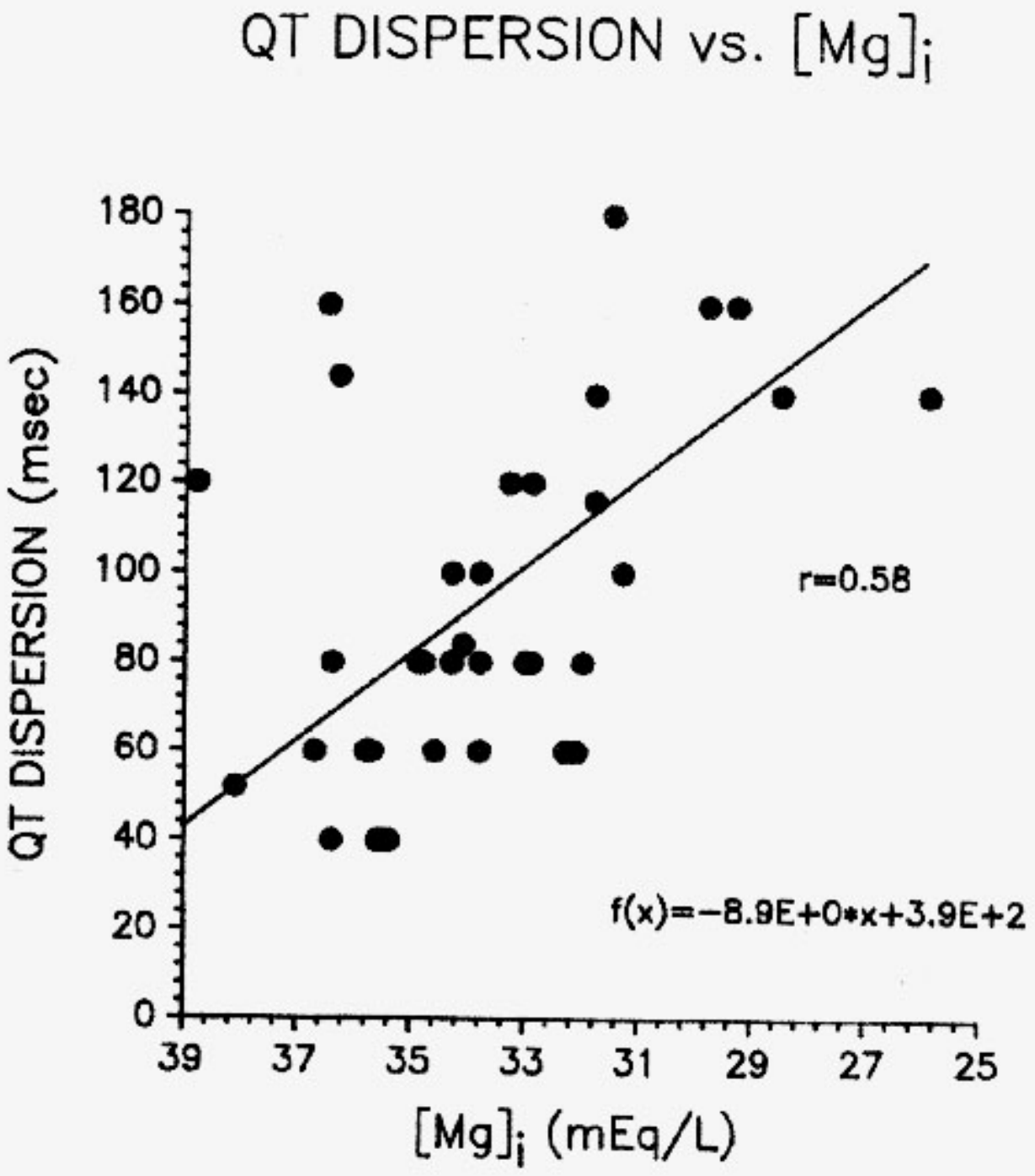
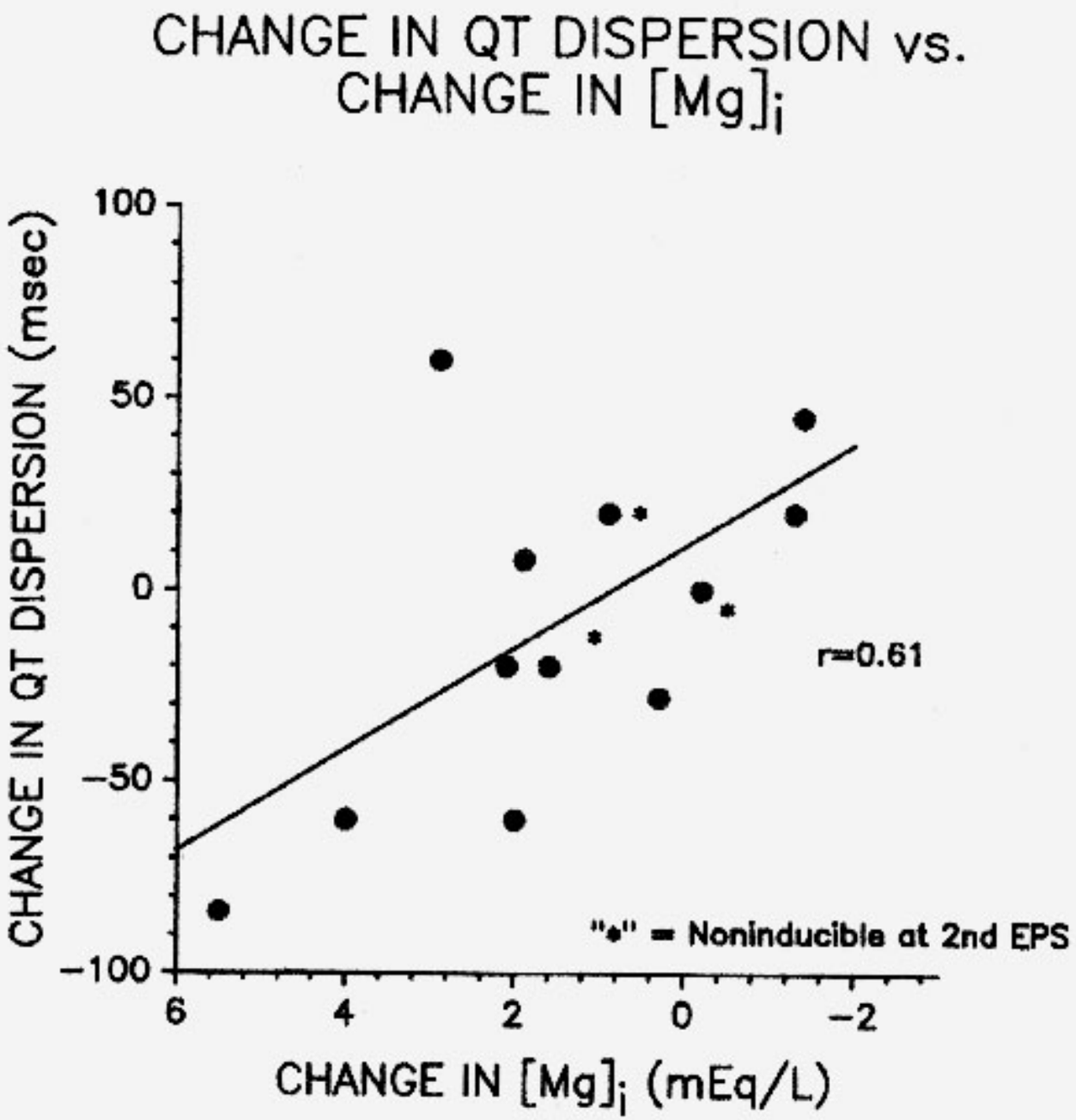


Liner regression comparing QT Dispersion and Sublingual intracellular magnesium in 40 Subjects (EXAtest)



QT Dispersion and change in sublingual intracellular Magnesium (EXAtest) in 12 patients having two Measurements 3-7 days apart.