tigated with respect to depressive disorders and suicide. Calcium channel blockers should be considered as a possible cause of depression and suicide

Contributors: GL initiated the ecological and cohort studies, formulated the study aims, designed the layouts, organised the data collection, and participated in the statistical analysis and interpretation of results and in writing the paper. KB participated in collecting and interpreting results for the cohort study. JR participated in the statistical analysis and interpretation of the data and contributed to writing the paper. LR participated in the interpretation of the data and the writing of the paper. AM, head of the Swedish Network for Pharmacoepidemiology (NEPI), participated in the interpretation of the data and contributed to writing and editing the paper.

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QT and QTc dispersion are accurate predictors of cardiac death in newly diagnosed non-insulin dependent diabetes: cohort study

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Patients with non-insulin dependent diabetes mellitus have an excess risk of dying from cardiovascular disease. One small study suggested that a prolonged QT interval could predict cardiac death in patients with diabetic nephropathy who have received insulin treatment. The question now is whether the same is true in newly diagnosed diabetes in patients who have no apparent complications. In addition, QT dispersion, a new but related electrocardiographic variable, predicts cardiac death in patients who have chronic heart failure, peripheral vascular disease, or essential hypertension.¹⁻³ We investigated whether it also predicted cardiac death in diabetic patients.

Subjects, methods, and results

The study group of 182 patients with non-insulin dependent diabetes mellitus (103 men; mean age 52.8 (SD 8.5) years) represented the Dundee cohort of the United Kingdom prospective diabetes study, which was recruited between 1982 and 1988. Patients were followed up for a mean of 10.3 (1.7) years. The inclusion and exclusion criteria of the study have been reported elsewhere. Patients with overt cardiac disease at baseline were excluded. A single observer (AAON) measured QT intervals as described previously.¹⁻³ Cardiac death was mostly classified at the coordinating centre in Oxford, using the codes of the international classification of diseases, ninth revision. All analysis was done by Cox regression analysis, with cardiac death as the sole end point. We used forward stepwise analysis, each time using all three QT variables along with age, systolic blood pressure, sex, smoking, blood

glucose concentration, and antihypertensive drug. As a result, we identified age, systolic blood pressure, sex, diuretics, and all QT variables as the potentially important variables. Finally we fitted the regression using these four variables with each of the three QT variables.

In those who had a cardiac death, the mean time of death after the baseline electrocardiogram was 7.3 (3.2) years; after the 3 year electrocardiogram it was 4.9 (2.3) years and after the 6 year electrocardiogram 3.8 (1.0) years. The table shows that QTc max, QTc dispersion, and QT dispersion are all highly significant and independent predictors of cardiac death at baseline, at 3 years, and at 6 years. In multivariate analysis they outperformed all other predictors.

Comment

Our main finding was that QT dispersion, QTc dispersion, and QTc max are excellent predictors of cardiac death in patients with non-insulin dependent diabetes mellitus. QTc interval analysis has two major advantages over other possible ways of stratifying risk in patients. Firstly, measurements of QTc interval are easily obtained with a non-invasive routine test: other potential predictors of cardiac death often require extra testing with specialised equipment. Secondly, comparisons between QTc dispersion and microalbuminuria suggest that QTc dispersion is a better predictor of cardiac death.⁴ A QTc dispersion >78 ms at year 6 in this study had 100% sensitivity and 90% specificity, giving an odds ratio of 9.0, whereas the odds

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Cox multivariate regression analysis for prediction of cardiac death from data at various time points

	B	SE	Wald χ^2 statistic	P value
Baseline				
QTc dispersion	0.021	0.0069	9.40	0.002**
Age	0.080	0.0312	6.61	0.010*
Systolic blood pressure	0.016	0.0080	4.16	0.041*
Sex	0.682	0.5130	1.77	0.183
QT dispersion	0.018	0.0068	7.07	0.008**
Age	0.075	0.0314	5.74	0.017*
Systolic blood pressure	0.016	0.0081	3.96	0.047*
Sex	0.534	0.5016	1.13	0.287
QTc max	0.0166	0.0042	15.45	0.0001**
Age	0.0699	0.0322	4.69	0.0303*
Sex	1.143	0.5269	4.71	0.0300*
Systolic blood pressure	0.0139	0.0077	3.27	0.0707
Year 3				
QTc dispersion	0.017	0.0074	5.15	0.023*
Systolic blood pressure	0.019	0.0118	2.58	0.108
Age	0.046	0.0371	1.51	0.219
Sex	0.569	0.6090	0.87	0.351
QT dispersion	0.018	0.0070	6.46	0.011*
Systolic blood pressure	0.018	0.0115	2.46	0.117
Age	0.045	0.0370	1.48	0.225
Sex	0.539	0.6004	0.80	0.372
QTc max	0.017	0.0054	9.79	0.002**
Sex	0.910	0.6440	2.00	0.157
Age	0.051	0.0380	1.85	0.174
Systolic blood pressure	0.015	0.0117	1.63	0.202
Year 6				
QTc dispersion	0.036	0.0113	10.29	0.001**
Sex	1.667	0.9790	2.90	0.089
Age	0.034	0.0610	0.31	0.575
Systolic blood pressure	0.000	0.0160	0.00	0.986
QT dispersion	0.024	0.0105	5.37	0.020*
Sex	1.219	0.8530	2.04	0.153
Age	0.050	0.0540	0.87	0.351
Systolic blood pressure	0.003	0.0160	0.04	0.838
QTc max	0.035	0.0110	10.36	0.001**
Sex	1.827	0.9210	3.94	0.047*
Age	0.038	0.5400	0.51	0.477
Systolic blood pressure	0.015	0.0190	0.599	0.439

*P<0.05, **P<0.005. Although diuretics were significant in univariate analysis, they were not significant in multivariate analysis.

ratio for microalbuminuria was only 1.8 in a recent overview.⁵

The question arises why analysis of QT interval should be able to predict cardiac death. QT dispersion may be a composite term reflecting electrical inhomogeneity as a result of ischaemia, left ventricular dilatation, left ventricular hypertrophy, cardiac fibrosis, and autonomic neuropathy. Each one of these individually confers increased cardiac risk, and this may be why QT dispersion, as a composite of them, is highly predictive of cardiac death. The clinical value of analysing the QT interval may therefore be that it could be used as a screening test to select diabetic patients for more extensive cardiac investigations. Importantly, the time between measuring a prolonged QT interval and the subsequent cardiac death is many years, which provides ample opportunity to intervene.

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Contributors: AAON analysed all the electrocardiograms and wrote the first draft of the paper. SO performed the statistical analysis. CT, NCD, and FC helped to extract data on each patient. RWN and RTJ ran the United Kingdom prospective diabetes study in Dundee. ADS supervised the project and wrote the final draft of the paper.

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How often does surgery for peptic ulceration eradicate *Helicobacter pylori*? Systematic review of 36 studies

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Most peptic ulceration is due to chronic infection with *Helicobacter pylori*, and antibiotic treatments can generally cure both the infection and the ulceration.¹ In previous decades, however, persistent peptic ulceration was often treated surgically either by vagotomy, which merely reduces symptoms, or by partial gastrectomy, which removes the ulcer and parts of the stomach likely to be infected with *H pylori*.² There have been several surveys on the prevalence of persistent *H pylori* infection in patients who have undergone surgery for peptic ulceration, often many years previously. We present a systematic review of these surveys and

compare the type of surgery with the likelihood of persistent *H pylori* infection.

Methods and results

We checked in databases, reference lists, and gastroenterology journals for any studies published before January 1997 that assessed *H pylori* infection after surgery for peptic ulceration. Studies were included if they provided information on the indication for surgery and the type of surgery. We tabulated the type of surgery, the mean interval between surgery and testing

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