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117 Years of
CONTINUOUS
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Early Statin Treatment Following Acute Myocardial Infarction and 1-Year Survival

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Lars Wallentin, MD, PhD

for the Swedish Register of Cardiac Intensive Care (RIKS-HIA)

THE SCANDINAVIAN SIMVASTATIN Survival Study,¹ the Cholesterol And Recurrent Events trial,² and the Long-term Intervention with Pravastatin in Ischaemic Disease trials³ have demonstrated that treatment with 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitors (statins) initiated 3 to 6 months after acute myocardial infarction (AMI) reduces mortality in patients with elevated cholesterol levels. Among high-risk individuals with high cholesterol levels but without previous manifestations of coronary artery disease, statin treatment as primary prevention reduces the risk of subsequent coronary events.^{4,5} Even though there are indications that early statin treatment initiated during the hospital stay for acute coronary syndromes would be beneficial,⁶⁻⁹ the only clinical trial that has studied early statin intervention in acute coronary syndromes is the recently completed but not yet published Myocardial Ischemia Reduction with Aggressive Cholesterol Lowering study.¹⁰ Thus, the proportion of patients with AMI who are treated with statins while in the hospital varies among hospitals. Therefore, we investigated the relationship between 1-year mortality and statin treatment initiated before or at the time of hospital discharge in a large cohort of unselected patients with AMI admitted to the coronary care units of Swedish hospitals during 1995-1998.

Context Randomized trials have established statin treatment as secondary prevention in coronary artery disease, but it is unclear whether early treatment with statins following acute myocardial infarction (AMI) influences survival.

Objective To evaluate the association between statin treatment initiated before or at the time of hospital discharge and 1-year mortality after AMI.

Design and Setting Prospective cohort study using data from the Swedish Register of Cardiac Intensive Care on patients admitted to the coronary care units of 58 Swedish hospitals in 1995-1998. One-year mortality data were obtained from the Swedish National Cause of Death Register.

Patients Patients with first registry-recorded AMI who were younger than 80 years and who were discharged alive from the hospital, including 5528 who received statins at or before discharge and 14071 who did not.

Main Outcome Measure Relative risk of 1-year mortality according to statin treatment.

Results At 1 year, unadjusted mortality was 9.3% (1307 deaths) in the no-statin group and 4.0% (219 deaths) in the statin treatment group. In regression analysis adjusting for confounding factors and propensity score for statin use, early statin treatment was associated with a reduction in 1-year mortality (relative risk, 0.75; 95% confidence interval, 0.63-0.89; $P=.001$) in hospital survivors of AMI. This reduction in mortality was similar among all subgroups based on age, sex, baseline characteristics, previous disease manifestations, and medications.

Conclusions Early initiation of statin treatment in patients with AMI is associated with reduced 1-year mortality. These results emphasize the importance of implementing the results of randomized statin trials in unselected AMI patients.

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METHODS

The Swedish Register of Cardiac Intensive Care, also known as the Register of Information and Knowledge About Swedish Heart Intensive Care Admissions (RIKS-HIA), registers all patients admitted to the coronary care units of participating hospitals. Information is reported on case record forms that include 100 variables. On admission, 30 variables are recorded, including information on age, sex, smoking status, hypertension, diabetes mellitus, hyperlipidemia, previous angina pectoris, previous MI, previous coronary revascularization, previous medications, symptoms, and electrocardiogram changes at entry and specified

time points (*previous* refers to events occurring or medication started before the current admission) (TABLE 1). During the hospital stay, another 37 variables are recorded regarding biochemical markers, echocardiography, reperfusion treatment, pharmacological treatment, interventional procedures, major arrhythmias, and other major complications. At discharge, 33 vari-

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ables are recorded, including complications, diagnosis, and outcomes during the hospital stay; risk assessment with stress test, coronary angiography, and revascularization procedures; and medications at discharge.

The criteria for the diagnosis of AMI are standardized and identical for all participating hospitals using World Health Organization criteria¹¹ and a measurement indicating twice the upper limit of normal of an appropriate biochemical marker (usually creatine kinase-MB protein concentration) as the biochemical criterion. Electrocardiograms are evaluated for presence or development of Q waves, ST-segment changes, T-wave inversions, or left bundle-branch block.

Source data verification was continuously performed by comparison of the registry information to the hospital's patient records in 50 randomly selected patients in 10 hospitals every year by an external monitor. In the first 1004 computer forms from 21 hospitals comprising 92 368 variables, there was 94% agreement overall between the registered information and the source data in the patient records.

One-year mortality data were obtained by merging the RIKS-HIA database with the National Cause of Death Register, which includes the vital status of all Swedish citizens in 1995-1999.

All patients for whom data were entered into the RIKS-HIA were informed of their participation in the registry (patients could request to be excluded from the registry) and the long-term follow-up. The registry and the merging with registries were approved by the National Board of Health and Welfare and the Swedish Data Inspection Board.

Comparisons between different patient strata and different categories of hospitals were analyzed by χ^2 tests for categorical variables and by the *t* test for continuous variables. Bivariate analyses and multiple covariate Cox regression analyses¹² were used to identify any variable with a significant influence on mortality. To avoid the influence of early

Table 1. Baseline Characteristics*

Characteristics	Treatment at Discharge		P Value†
	No Statins (n = 14 071)	Statins (n = 5528)	
Demographics			
Age ≤ 59 y (n = 5347)	59	41	<.001
Age 60-69 y (n = 5698)	68	32	<.001
Age 70-79 y (n = 8554)	82	18	<.001
Mean age, y	66.9	61.9	<.001
Male	70	72	.06
Risk factors			
Smoking	26	31	<.001
Hypertension	31	32	.08
Diabetes mellitus	19	17	.008
Previous myocardial infarction	21	24	<.001
Previous PCI/CABG	6	11	<.001
Treatment before entry			
ACE inhibitors	13	14	.12
Aspirin	29	33	<.001
Oral anticoagulants	4	4	.25
β -blockers	29	33	<.001
Calcium channel antagonists	16	17	.72
Digitalis	6	3	<.001
Diuretics	22	17	<.001
Long-acting nitrates	17	17	.92
Statins	1	23	<.001
Index events			
Circulatory arrest at entry	1.0	0.4	<.001
ST-segment elevation/LBBB on admission ECG	51	48	.001

*Data are presented as percentages unless otherwise noted. PCI indicates percutaneous coronary intervention; CABG, coronary artery bypass graft surgery; ACE, angiotensin-converting enzyme; LBBB, left bundle-branch block; and ECG, electrocardiogram.

†P values were calculated using the Pearson χ^2 test except for mean age, for which P values were calculated using the *t* test.

mortality before the opportunity of exposure to the studied treatment, the primary analysis was performed only in patients who were alive at discharge. To identify any possible hazard associated with the studied treatment, the analysis was also performed in all admitted patients. The analyses were also performed for 30-, 60-, and 90-day survivors to allow for even longer periods of early mortality in patients who could have been perceived to have a too-short life expectancy to benefit from statin treatment. In all analyses, statin treatment was defined as statins prescribed at the time of discharge from the hospital, and no statin treatment was defined as no statins prescribed at discharge.

Propensity analysis¹³ was performed regarding the probability of statin use. For each patient, a propensity score in-

dicating the likelihood of having statins prescribed at discharge was calculated by forward logistic regression analysis and included 42 covariates: age, sex, smoking status, previous MI, previous percutaneous coronary intervention or coronary artery bypass graft surgery, history of diabetes mellitus, history of hypertension, circulatory arrest at arrival, medications before study entry (including angiotensin-converting enzyme inhibitors, anticoagulants, aspirin, β -blockers, calcium channel inhibitors, digitalis, diuretics, long-acting nitrates, and statins), acute reperfusion treatment, intravenous β -blockers, intravenous or subcutaneous anticoagulants, intravenous nitroglycerin, atrial fibrillation, congestive heart failure, reinfarction, stress test administration, echocardiography, coronary angiography, medications at hospital discharge

(including angiotensin-converting enzyme inhibitors, oral anticoagulants, aspirin, β -blockers, calcium channel inhibitors, digitalis, diuretics, and long-acting nitrates), revascularization before discharge, type of hospital (primary, secondary, or tertiary), hospital size (number of AMI admissions per year <100, 100-199, 200-399, or ≥ 400), teaching

hospital status, presence of catheterization laboratory in the hospital, admission year, and each hospital's statin prescription rate (divided into <25%, 25%-35%, and >35%) among AMI patients younger than 80 years old. Goodness of fit of the propensity score was evaluated by the χ^2 statistic and the Hosmer-Lemeshow test. Cholesterol levels were

not among the compulsory variables denoted in the RIKS-HIA registry and therefore could not be included.

All these variables together with individual propensity scores were forced into the multiple covariate Cox regression analyses evaluating the association of statins at discharge with 1-year mortality. The same model was also used in subgroups based on age and dichotomized risk factors. All statistical analyses were performed using SPSS Version 10.0 software (SPSS Inc, Chicago, Ill).

RESULTS

Nineteen hospitals participated in the registry in 1995, 32 hospitals participated in 1996, 46 hospitals in 1997, and 58 hospitals in 1998. Data for this study were collected for 1995-1998 and included 137 262 admissions to 58 coronary care units. Of these admissions, 30 240 were patients with a first recorded admission for AMI during the registration period (considered the index event for follow-up) and had information recorded about statin treatment at discharge. Patients who died before hospital discharge ($n=1303$) were excluded from the main analysis. Because the rate of statin treatment at discharge among patients aged 80 years or older ($n=5983$) was only 4% ($n=210$) and because of the increased risk of concomitant disease among these elderly patients, we excluded patients aged 80 years or older from the analyses. An additional 3355 patients were excluded because of incomplete data. The remaining 19 599 hospital discharge survivors of a first registered AMI who were younger than 80 years and had complete data constituted the patient population for this study.

Baseline characteristics of patients with and without statin treatment at discharge are shown in Table 1. Statin-treated patients were younger and less likely to have diabetes mellitus or be taking medications indicative of previous or in-hospital heart failure. Patients who received statins were more often smokers and had more previous MIs, more previous percutaneous coronary inter-

Table 2. Proportion of Treatments, Complications, and Procedures in the Hospital and at Discharge*

Variables	Treatment at Discharge		P Value†
	No Statins (n = 14 071)	Statins (n = 5528)	
Treatment			
Acute reperfusion	38	41	.001
IV/SC anticoagulants	41	50	<.001
IV β -blockers	32	34	.001
IV nitroglycerin	43	46	<.001
Complications			
Atrial fibrillation	15	8	<.001
Congestive heart failure‡	40	29	<.001
Reinfarction	3.4	3.6	.57
Procedures			
Stress test	40	55	<.001
Echocardiography	51	62	<.001
Coronary angiography	13	19	<.001
Revascularization before discharge	10	12	<.001
Discharge medication			
Oral anticoagulants	15	13	.001
Aspirin	83	90	<.001
β -Blockers	78	88	<.001
Calcium channel antagonists	14	15	.02
Long-acting nitrates	37	38	.62
ACE inhibitors	38	37	.33
Diuretics	38	28	<.001
Digitalis	10	5	<.001

*Data are presented as percentages. IV indicates intravenous; SC, subcutaneous; and ACE, angiotensin-converting enzyme.

†P value of significance calculated by Pearson χ^2 .

‡Congestive heart failure was defined as presence of pulmonary rales, administration of IV diuretics, administration of continuous positive airway pressure, or systolic blood pressure <90 mm Hg for at least 1 hour.

Table 3. Propensity Scores Regarding Statin Treatment in Quintiles*

Quintile	No Statin Treatment at Discharge		Statin Treatment at Discharge	
	No. of Patients	Mean (SD) Score	No. of Patients	Mean (SD) Score
1	3749	0.053 (0.021)	171	0.061 (0.020)
2	3453	0.124 (0.021)	467	0.128 (0.020)
3	3082	0.210 (0.030)	838	0.215 (0.030)
4	2509	0.340 (0.048)	1411	0.349 (0.049)
5	1278	0.582 (0.136)	2641	0.724 (0.186)

*Propensity scores indicating the likelihood of prescribing statins at discharge were calculated by forward logistic regression analysis including 42 covariates (see "Methods" section of text for details).

ventions, and more coronary artery bypass graft surgery, as well as more aspirin and β -blocker medication (indicative of more previous manifestations of coronary artery disease). Statin treatment was also associated with a higher rate of acute reperfusion, as well as intravenous or subcutaneous anticoagulant treatment (TABLE 2).

The proportion of patients in each hospital who received different treatments or who developed complications (eg, congestive heart failure) in the hospital that were known to influence or were associated with mortality varied substantially among the 58 participating hospitals (data not shown). For instance, the median (10th-90th percentile) rates were 38% (32%-45%) for acute reperfusion, 29% (14%-50%) for intravenous β -blocker use, 7% (2%-33%) for coronary angiography, and 2% (0.3%-29%) for revascularization before discharge. For statin treatment at discharge, the median rate among hospitals was 27%, and the proportion of treated patients was 12% for the lowest vs 48% for the highest decile.

In the propensity score analysis,¹³ variables most strongly correlated with prescription of statins at discharge were (in descending strength of association) statin treatment before study entry, later admission year, younger age, higher statin prescription rate at the hospital, β -blocker treatment at discharge, pre-discharge administration of stress test,

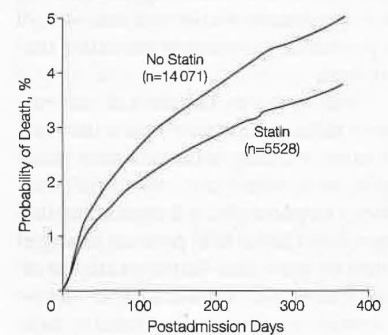
nonteaching hospital status, predischarge echocardiogram, absence of atrial fibrillation, larger hospital, and performance of coronary angiography. The goodness of fit of the propensity score was evaluated by the *c* statistic (area under the receiver operating characteristic curve, 0.81), and the Hosmer-Lemeshow test ($\chi^2=21.87$; $P=.005$). The propensity score itself was associated with improved survival ($P<.001$) and, hence, identified patients with lower risk. When the means and SDs of the propensity scores were compared within quintiles between patients receiving and not receiving statins at discharge, the groups were comparable within the lower 4 strata (TABLE 3).

Among the 14071 patients without statin treatment, the unadjusted 1-year mortality was 9.3% ($n=1307$) compared with 4.0% ($n=219$) among the 5528 patients with statin treatment. In Cox regression analysis, adjusting for the 43 covariates including the propensity score for statin use, statin treatment at discharge was associated with a reduction in 1-year mortality (3.7% vs 5.0%; relative risk [RR], 0.75; 95% confidence interval [CI], 0.63-0.89; $P=.001$) (FIGURE, TABLE 4). When the propensity score variable was excluded from analysis, the RR was 0.73 (95% CI, 0.62-0.87; $P<.001$). Adjusting for the propensity score only, statin treatment was associated with improved 1-year survival (RR of 1-year mortality, 0.78; 95% CI, 0.67-0.91; $P=.001$). Adjusting for

propensity score and all other covariates for the 15 680 patients in the lower 4 quintiles, the RR was 0.71 (95% CI, 0.58-0.86; $P<.001$). In the individual propensity score quintiles, the adjusted RR for 1-year mortality was between 0.66 and 0.83, although it did not reach statistical significance in all subgroups.

Mean (SD) hospitalization time was 7.06 (5.25) days and the median was 6 days. The absence of any possible hazards associated with early treatment with statins was supported by the even larger relative benefit observed when all patients from the time of admission were included (TABLE 5). The consistency of the result, after exclusion of patients possibly perceived to have a

Figure. Adjusted Probability of Mortality by Statin Treatment



Data were calculated using multiple Cox regression analysis (relative risk, 0.75; 95% confidence interval, 0.63-0.89; $P=.001$).

Table 4. One-Year Mortality by Propensity Score

	Patients, No. (%)		Deaths (Unadjusted Mortality), No. (%)		Cox Regression Analysis*	
	Statins	No Statins	Statins	No Statins	Relative Risk (95% CI)	P Value
All	5528 (28)	14 071 (72)	219 (4.0)	1307 (9.3)	0.75 (0.63-0.89)	.001
All (propensity score excluded)	5528 (28)	14 071 (72)	219 (4.0)	1307 (9.3)	0.73 (0.62-0.87)	<.001
All (propensity score only)	5528 (28)	14 071 (72)	219 (4.0)	1307 (9.3)	0.78 (0.67-0.91)	.001
Propensity score quintile 1	171 (4)	3749 (96)	19 (11.1)	678 (18.1)	0.68 (0.43-1.08)	.10
Propensity score quintile 2	467 (12)	3453 (88)	34 (7.3)	329 (9.5)	0.80 (0.56-1.15)	.23
Propensity score quintile 3	838 (21)	3082 (79)	34 (4.1)	169 (5.5)	0.72 (0.50-1.05)	.09
Propensity score quintile 4	1411 (36)	2509 (64)	36 (2.6)	97 (3.9)	0.66 (0.45-0.98)	.04
Propensity score quintile 5	2641 (67)	1278 (33)	96 (3.6)	34 (2.7)	0.83 (0.54-1.28)	.41
Propensity score quintile 1-4	2887 (18)	12 793 (82)	123 (4.3)	1273 (10.0)	0.71 (0.58-0.86)	<.001

*The Cox regression analysis included 42 covariates (see "Methods" section of text for details) as well as the calculated propensity score except where noted otherwise. CI indicates confidence interval.

too-short life expectancy to indicate initiation of statin treatment, was supported by similar reductions in RR when the analysis was restricted to survivors at 30, 60, and 90 days (Table 5).

The benefit associated with early initiation of statin treatment was also supported by the results of the Cox regression analyses in subgroups based on the most important factors related to mortality. The reduction in 1-year mortality was most pronounced in the group aged 60 to 69 years (RR, 0.50; 95% CI, 0.36-0.69) and was similar but less prominent in older and younger patients. Furthermore, statin treatment was associated with lower 1-year mortality regardless of sex, diabetes mellitus, prior MI, congestive heart failure, ST-segment or non-ST-segment elevation MI, treatment with digitalis, diuretics, β -blockers, and subcutaneous or intravenous anticoagulants, and whether the patient was administered a predischarge exercise test (data not shown).

To ensure that inclusion of patients with missing data would not alter the results, missing values for any variable were substituted with "no" and "yes," respectively, in 2 separate analyses of all 22952 AMI patients younger than 80 years old. Statin treatment at discharge was associated with decreased 1-year mortality in both alternatives (RR, 0.76; 95% CI, 0.65-0.88; $P < .001$ and RR, 0.79; 95% CI, 0.68-0.91; $P = .002$, respectively).

Finally, RIKS-HIA does not indicate what type of statin is prescribed. Instead, data on all drugs supplied from wholesalers to all Swedish pharmacies were obtained from the National Cor-

poration of Swedish Pharmacies, which holds a monopoly on pharmaceutical drugs in Sweden. At the time of the analysis, in 1995-1998, the sale of statins, measured in daily doses, in Sweden were: simvastatin, 74%; pravastatin, 14%; atorvastatin, 7%; and fluvastatin, 5% (Karolina Antonov, PhD, written communication, November 11, 2000).

COMMENT

The patient cohort in this study included unselected consecutive survivors of a first recorded MI from a large number of different hospital types. The only exclusion criterion used was age 80 years and older, since the recorded information focused on coronary artery disease and, therefore, data on other important comorbidities influencing survival in the elderly population might not be available. There were no exclusions due to presence or absence of specific risk factors, comorbidities, anticipated adverse effects, participation in clinical trials, or contraindications to certain medications. The representativeness of the cohort was also strengthened by the inclusion of all patients with MI from the general population at centers with different levels of care, including two thirds of the hospitals within an entire country. Compared with the National Registry of Myocardial Infarction¹⁴ in the United States, the Swedish registry does not focus on thrombolytic therapy but includes all types of MI patients and a wider selection of background characteristics and treatments, which allows for adjustment of a large number of confounding factors.

The reason for the choice of patients who were alive at hospital discharge and the evaluation of patients who survived at 30, 60, and 90 days after discharge was to avoid the bias of overloading the non-treated group with patients who died before they had the opportunity to receive statin treatment or were perceived to have a too-short life expectancy to initiate treatment. Another consideration is whether early statin treatment might be associated with increased hospital mortality, which would not be apparent among those who were alive at discharge. However, considering that the results concerning the reduced risk associated with early statin treatment also were consistent when we evaluated all admitted patients as well as 30-, 60-, and 90-day survivors, we believe these possible sources of bias are unlikely to invalidate the major result.

The large variations in certain therapies among hospitals within 1 country, despite similar treatment guidelines, is similar to previous reports of differences among hospitals in different countries.^{15,16} There is consensus concerning some therapies, such as use of reperfusion for patients with ST-segment elevation and use of aspirin and β -blockade at discharge, that were used in fairly similar proportions in all hospitals in this study. However, regarding therapies for which the evidence is weaker and guidelines less clear, such as starting statin treatment in the hospital, there were considerably larger variations than can be explained by different patient populations in different hospitals. These large differences provided an opportunity to evaluate association with outcome of

Table 5. One-Year Mortality in All Patients and in Patients Surviving Until Discharge, Day 30, Day 60, and Day 90

Period	Patients, No.		Deaths, No. (%)		Cox Regression Analysis*	
	Statins	No Statins	Statins	No Statins	Relative Risk (95% CI)	P Value
Days 0-365	5544	14 536	235 (4.2)	1773 (12.2)	0.65 (0.55-0.76)	<.001
Discharge-day 365	5528	14 071	219 (4.0)	1307 (9.3)	0.75 (0.63-0.89)	.001
Days 30-365	5467	13 706	158 (2.9)	943 (6.9)	0.79 (0.65-0.97)	.02
Days 60-365	5437	13 530	128 (2.4)	767 (5.7)	0.77 (0.62-0.97)	.02
Days 90-365	5411	13 388	102 (1.9)	625 (4.7)	0.77 (0.60-0.99)	.04

*The Cox regression analysis included 42 covariates (see "Methods" section of text for details) as well as the calculated propensity score. CI indicates confidence interval.

the almost random variation of some treatments among hospitals in combination with a multivariate adjustment for differences in other factors.

Despite evaluation of the large variation in indications for statin treatment among hospitals and exclusion of early deaths, a selection bias remained, as clinicians seemed to have avoided use of statins in patients perceived to have a short life expectancy. This was illustrated by the differences in baseline characteristics, in which statin-treated patients were younger and were less likely to have diabetes and signs of or medications for congestive heart failure but more likely to have prior MI, revascularization, and treatment for angina. Therefore, the difference in mortality by early statin treatment needed to be documented by a combination of multiple covariate propensity and Cox regression analysis forcing all available possibly confounding factors into the models to compensate for these baseline differences.

The propensity analyses were included to minimize confounding by physician preferences for statin treatment in lower-risk patients. The comparison of patient groups stratified by or with similar propensity scores should provide matched cohorts concerning recorded covariates. Because statin treatment remained associated with lower RR of 1-year mortality within strata with equal probability of statin prescription, the hypothesis that early statin treatment is associated with improved survival after AMI is supported. The propensity score was also included in all multiple covariate Cox regression survival analyses to reduce confounding by factors associated with statin treatment as well as with improved survival. Using this approach, the main results were similar in all subgroup analyses but 1, further suggesting that the improved survival is related to statin treatment rather than patient selection.

This study has several limitations. First, although these results come from a large cohort and adjustment was performed for a large number of confound-

ing covariates, a registry study cannot adjust for all confounders and, hence, cannot replace a randomized controlled trial. Thus, the effects of in-hospital initiation of statin treatment vs initiation several months later need to be demonstrated in the ongoing randomized trials of early vs later start of statin treatment in patients with AMI.

Second, the indication for start of statin treatment was highly variable among and within hospitals, and lipid measurements were not part of the compulsory data set. However, the recommended indication for statin treatment during the study was elevated cholesterol level (>5.2 mmol/L [200 mg/dL]) or low-density lipoprotein cholesterol level (>3.0 mmol/L [115 mg/dL]).^{17,18} Accordingly, we believe the study illustrates the potential benefits of early statin use in patients with an appropriate indication for long-term secondary prevention with statin treatment rather than use of statins in any patient with AMI regardless of lipid levels.

Third, we were unable to determine whether patients who were prescribed statins at hospital discharge continued their medication during the following year, or whether patients who did not receive statins at discharge were given them during the subsequent months. If, as demonstrated in randomized trials, statin treatment reduces mortality, both of these considerations (discontinuation of statins among treated patients and institution of statins among those not treated at hospital discharge) would most likely reduce the estimated benefit of statin treatment that we observed.

Fourth, we evaluated all-cause mortality rather than cardiovascular mortality because cause-of-death data were only available for 1995-1997, not for 1998-1999. However, when the analysis was performed including only patients with available data on cause of death, the statin and no-statin groups had similar rates of mortality due to cardiac death (77% and 73%, respectively).

These results are the first to our knowledge to indicate that initiation of statin treatment at or before hospital dis-

charge in survivors of AMI is associated with reduced mortality during the subsequent year. The relative reduction in mortality is in accordance with previous experiences in randomized trials,¹⁻³ with an apparent early reduction of the event rates in the statin treatment group. Some studies have suggested that the effects of statins, such as improved endothelial function,⁷ plaque regression, and less major cardiovascular events, occur within 6 months.⁶ Statin treatment might also be associated with a reduction in inflammatory activity, as indicated by a decrease in C-reactive protein level,^{19,20} which might contribute to a lower risk of subsequent events.^{21,22} Although it is possible that our findings are related to an early plaque-stabilizing effect of statin treatment that is most effective in patients with a recent acute event, the timing of this benefit needs to be verified in randomized trials that focus on a comparison between early and later initiation of statin treatment (eg, the Myocardial Ischemia Reduction with Aggressive Cholesterol Lowering study¹⁰).

However, considering that the potential benefits seem substantial and adverse effects few, our findings suggest that initiation of statin treatment before or at the time of hospital discharge should be recommended for AMI survivors with total cholesterol or low-density lipoprotein cholesterol levels above the current guideline levels for statin treatment as secondary prevention.^{17,18}

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A single word even may be a spark of inextinguishable thought.

—Percy Bysshe Shelley (1792-1822)