hs-CRP Predicts Improvement in Depression in Patients With Type 1 Diabetes and Major Depression Undergoing Depression Treatment: Results From the Diabetes and Depression (DAD) Study

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hs-CRP is elevated in depression (1), but evidence on decreases of hs-CRP during depression treatment or the role of hs-CRP in the prediction of response to depression treatment is still controversial (2,3). To date, no study has examined this association in patients with diabetes. As elevated hs-CRP increases the risk of diabetes complications in diabetes (4), we aimed to explore hs-CRP in patients with diabetes and major depression undergoing depression treatment based on the data of the Diabetes and Depression (DAD) study (5).

Participants were randomized to 12 weeks (short-term phase) of diabetes-specific group cognitive behavioral therapy or sertraline treatment and followed up for 15 months (long-term phase). hs-CRP was assessed at baseline and at the end of the long-term phase with a latex-enhanced immunoturbidimetric method. Ethics approval and written informed consent were obtained (5). Information on baseline hs-CRP was available in 219 patients (mean age 48.1 ± 12.0 years, 62% female, mean HbA_{1c} 9.25 ± 1.4% [78 ± 16.2 mmol/mol], 51.6% type 2 diabetes, median hs-CRP 0.33 mg/dL [interquartile range 0.10, 0.84]). Depression outcomes included short-term treatment response (≥50% reduction of the Hamilton Depression Rating Scale [HAMD-17] baseline score or HAMD-17 posttreatment score ≤7), remission of depression at the end of the long-term phase (HAMD-17 scores ≤7 and no current diagnosis of major depression according to the Structured Clinical Interview for DSM-IV), and short- and long-term improvement (HAMD-17 change scores after 12 weeks and 15 months).

Multiple linear and logistic regression analyses on depression outcomes did not reveal associations for log-transformed baseline hs-CRP or for interactions between hs-CRP and treatment over all participants (results not displayed). However, we detected significant interactions between baseline hs-CRP and diabetes type for short-term improvement ($B = 3.43$ [95% CI 0.51, 6.33], $P = 0.022$) and long-term improvement (3.60 [95% CI 0.56, 6.63], $P = 0.021$) in depression even after adjustment for confounders (age, sex, BMI, baseline HbA_{1c}, baseline HAMD-17 score, treatment). In type 1 diabetes, higher baseline hs-CRP was associated with less improvement, whereas in type 2 diabetes no significant association could be detected (Fig. 1). Logistic regressions on treatment response and remission stratified by diabetes type showed a similar pattern, although we did not find significant interactions between hs-CRP and diabetes type in the full sample (results not displayed). hs-CRP did not change during the study and changes in depression and type of treatment were not associated with changes in hs-CRP in both groups (results not displayed).

In sum, in a large sample of patients with poorly controlled diabetes, we found evidence that higher baseline hs-CRP predicts poorer outcomes of depression treatment in type 1 diabetes, which highlights the need for a closer examination of inflammatory processes in patients with type 1 diabetes with depression. Although hs-CRP appeared to

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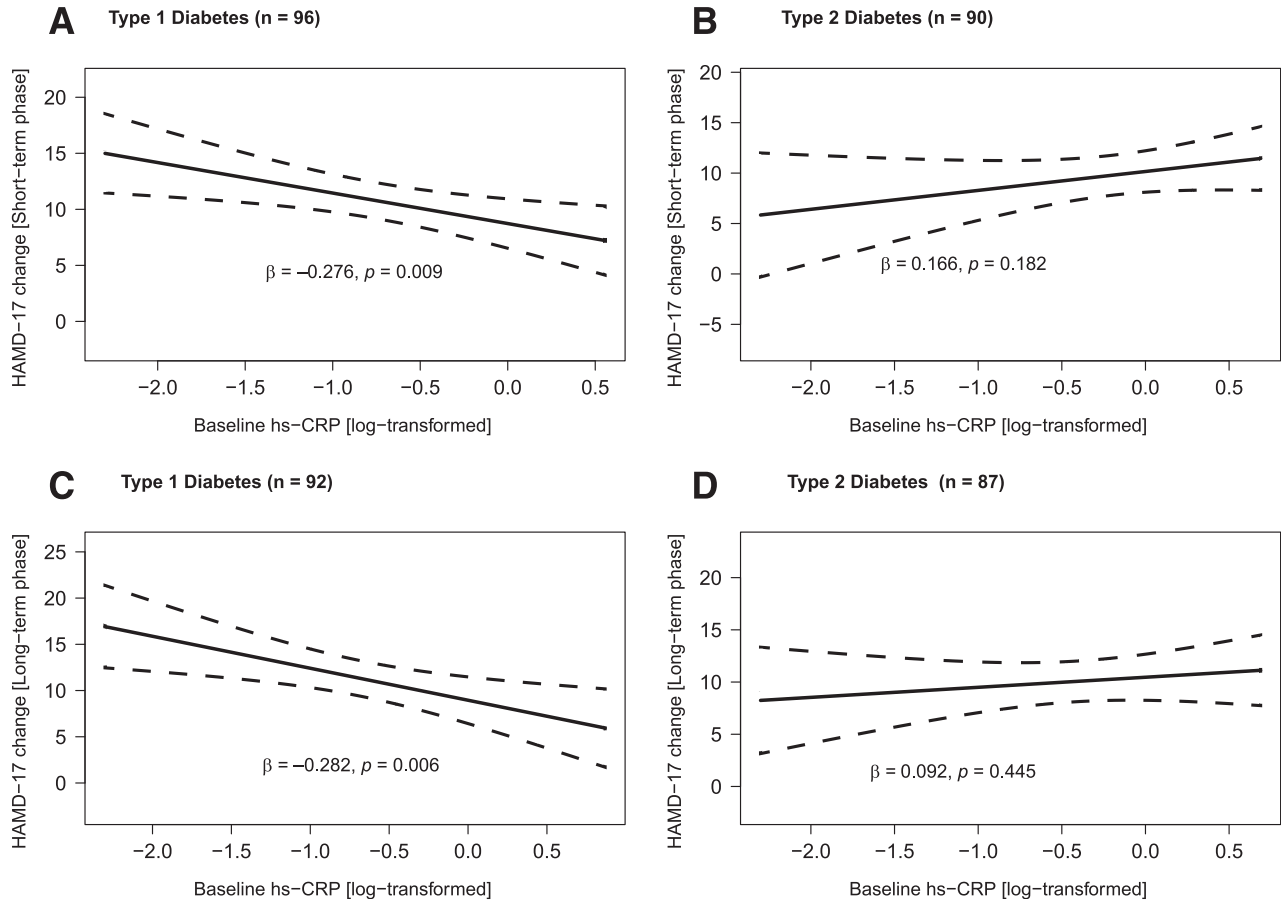

Figure 1—Regression lines (solid lines) (adjusted for age, sex, BMI, baseline HbA_{1c}, baseline HAMD-17, treatment) and 95% CIs (dashed lines) for the relationship between hs-CRP and improvement of depression (HAMD-17 change scores) during the short-term (*A* and *B*) and the long-term (*C* and *D*) phase by diabetes type.

be less relevant in type 2 diabetes, including other markers of inflammation as suggested by others (3) may be necessary to determine the role of inflammation and depression outcomes in this group.

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