LETTERS TO THE EDITOR

Abciximab (ReoPro) removal during cardiopulmonary bypass with a hemoconcentrator

To the Editor:

Poullis and colleagues¹ recently presented their results of an ex vivo study suggesting that a hemoconcentrator could be used to remove the platelet glycoprotein IIb/IIIa (GPIIb/IIIa) inhibitor abciximab (c7E Fab, ReoPro) during cardiopulmonary bypass. On the basis of their findings, they state that the use of a hemoconcentrator would reduce the need for platelet transfusions and decrease the risk of bleeding in patients recently treated with abciximab undergoing coronary bypass. However, we believe their model incorporates severe limitations that invalidate their findings.

The investigators state that the use of a hemoconcentrator will remove "free ReoPro from the plasma." They support this conclusion through studies with a model that used either saline solution or saline plus packed red blood cells to which abciximab was added. However, because of the pharmacokinetics of abciximab, this model is not representative of a patient treated with abciximab. In a patient, abciximab binds with very high affinity ($K_D = 5$ nmol/L) to the platelet GPIIb/IIIa receptor, as well as to the $\alpha_v\beta_3$ receptor found on endothelial and smooth muscle cells^{2,3}; any unbound molecules of this monoclonal antibody fragment are cleared rapidly from the plasma by the reticuloendothelial system. Therefore free plasma concentrations of abciximab diminish very rapidly after the termination of an infusion, with a half-life of about 30 minutes.^{4,5} Thus, although in the model described by Poullis's group there was free abciximab available to be removed by the hemoconcentrator, this was because they used solutions free of platelets or any other cells to which the abciximab could bind. In a patient treated with abciximab, there would be no unbound molecule available for removal, and a hemoconcentrator would be of no benefit.

Aggressive platelet inhibition with GPIIb/IIIa inhibitors in patients needing urgent cardiac surgery is certainly an appropriate concern. However, although anecdotal reports have suggested a risk of excessive bleeding,⁶ results from recent randomized trials have shown only a higher rate of platelet transfusions in abciximab-treated patients, and, in fact, a trend toward a decrease in death and perioperative myocardial infarction compared with results in patients receiving placebo.⁷

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Reply to the Editor:

We welcome the interest that our brief communication on abciximab (ReoPro) removal¹ has generated. Steinhubl, Moore, and Lincoff raise a number of interesting issues:

First, we did not state that "a hemoconcentrator would reduce the need for platelet transfusions and decrease the risk of bleeding...." However, we did say that hemofiltration (1) can remove free abciximab from a cardiopulmonary bypass circuit, (2) can change the purpose of platelet replacement from primarily absorbing free antibody to providing adequate hemostasis, and (3) may result in a decreased risk of bleeding during and after cardiac surgery. We make no claims to reversal of the effect of abciximab on native platelets. However, by implication from our results and the fact that abciximab binding is known to be a reversible process, hemofiltration may result in at least a partial reversal of the effect of abciximab on native platelets.²

Second, we agree that the pharmacokinetics of our study do not match the in vivo situation. However, our aim was to demonstrate that free abciximab could be removed with a