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File: ■ Turmeric (*Curcuma longa*)
■ Curcuminoids
■ Acute Myocardial Infarction

HC 051251-450

Date: June 15, 2012

RE: Study Evaluated Effects of Curcuminoids on Acute Myocardial Infarction

Wongcharoen W, Jai-aue S, Phrommintikul A, et al. Effects of curcuminoids on frequency of acute myocardial infarction after coronary artery bypass grafting. *Am J Cardiol.* April 3, 2012;[epub ahead of print]. doi: 10.1016/j.amjcard.2012.02.043.

Curcuminoids, polyphenols from turmeric (*Curcuma longa*), have anti-inflammatory, antioxidant, and membrane-stabilizing effects. These effects may be beneficial in treating cardiovascular disease. Specifically, studies show that curcuminoids decrease proinflammatory cytokines, apoptosis (programmed cell death), and necrosis (cell death) in animal models during cardiopulmonary bypass surgery and after ischemia/reperfusion injury. Hence, the purpose of this randomized, double-blind, placebo-controlled study was to evaluate the effect of curcuminoids in limiting myocardial ischemia/reperfusion injury after coronary artery bypass grafting (CABG). Specifically, the study evaluated whether curcuminoids prevent myocardial infarction (MI) after CABG compared with placebo.

The study included consecutive patients (n = 121) undergoing CABG without valve surgery from September 2009 to December 2011 at Maharaj Nakorn Chiang Mai Hospital, Chiang Mai University; Chiang Mai, Thailand. Patients were excluded if they needed emergency cardiac surgery, had an increase in creatine kinase-MB above the upper limit of the normal range at time of randomization, had cholesteric jaundice (total bilirubin higher than 2-fold the upper normal limit), or had severe liver disease (aspartate aminotransferase or alanine aminotransferase higher than 3-fold the upper normal limit).

Beginning 3 days before the scheduled surgery, patients received placebo or 4 g/day curcuminoids (provided by the Research and Development Institute, the Government Pharmaceutical Organization; Bangkok, Thailand), in addition to standard therapy. The assigned treatment was continued for 5 days after surgery. Each curcuminoid capsule (4 capsules taken 4 times/day) contained 250 mg curcuminoids, which consisted of curcumin, demethoxycurcumin, and bisdemethoxycurcumin in a ratio of 1.0:0.6:0.3. Surgical technique was at the discretion of the surgeon. Twelve-lead electrocardiograms, serial creatine kinase-MB levels, and N-terminal pro-B-type natriuretic peptide (NT-proBNP) levels were recorded. In addition, to evaluate the effects

of curcuminoids on inflammatory response and oxidative stress after surgery, C-reactive protein (CRP) and plasma malondialdehyde (MDA) were assessed preoperatively and postoperatively. The primary endpoint was the incidence of in-hospital MI.

The groups were similar at baseline. In-hospital MI was significantly higher in the placebo group (30.0%) compared with the curcuminoid group (13.1%, $P = 0.028$). The on-pump CABG surgical technique was associated with a significantly higher incidence of MI compared to off-pump surgery (35.5% vs. 6.8%, respectively, $P < 0.001$). However, after taking the surgical technique into account, curcuminoid therapy remained an independent protective factor of in-hospital MI, and on-pump CABG was the independent predictive factor of in-hospital MI. Also, the incidence of postoperative left ventricular dysfunction (left ventricular ejection fraction $< 40\%$) was significantly higher in the placebo group than in the curcuminoid group (25.9% vs. 3.3%, respectively, $P = 0.021$). The mean increase in CRP and NT-proBNP levels postoperatively compared to baseline was significantly greater in the placebo group than in the curcuminoid group ($P = 0.031$ and $P = 0.015$, respectively). Also, the plasma MDA level was increased after surgery in the placebo group but was decreased significantly after surgery in the curcuminoid group ($P < 0.001$). Incidence of drug-related adverse events was not statistically different between the curcuminoid and placebo groups.

The authors conclude that curcuminoids significantly decrease the incidence of in-hospital MI after CABG. In addition, curcuminoids attenuated postoperative NT-proBNP levels and decreased the incidence of postoperative left ventricular dysfunction. Curcuminoid-associated decreases in postoperative CRP and MDA levels demonstrate that the effects seen in this study may be due to the anti-inflammatory and antioxidative effects of curcuminoids. A limitation of this study was the small sample size. Also, the authors did not follow the patients to determine the effect of curcuminoids on the long-term outcome after CABG. These promising results need to be confirmed in larger studies with a longer patient follow-up. It would be helpful if the authors could continue the study by contacting the participants or obtaining their medical records to determine the long-term outcome.

—Heather S. Oliff, PhD

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