

# RAPS: Radial Artery Tops Saphenous Vein Graft

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FROM THE ANNUAL MEETING OF THE AMERICAN COLLEGE OF CARDIOLOGY

NEW ORLEANS – Long-term data from the Radial Artery Patency Study show that radial arteries, compared with saphenous veins, are associated with reduced rates of functional and complete graft occlusion in patients undergoing coronary artery bypass surgery.

Radial arteries also are associated with lower rates of graft disease, lead author Dr. Stephen E. Fremes said during a late-breaking trial session at the meeting.

The issue of which conduit provides the best long-term graft outcomes has been a subject of debate. Several trials have indicated that radial artery grafts are no better than saphenous vein grafts, including a Veterans Affairs study showing similar 1-year graft patency among

757 patients undergoing first-time, elective coronary artery bypass grafting (JAMA 2011;305:167-74). One-year data from the Radial Artery Patency Study (RAPS) showed that complete graft occlusion was significantly reduced in radial artery grafts compared with saphenous vein grafts (8.2% vs. 13.6%), but that partial graft occlusion was similar (12.3% vs. 14.3%) between the two conduits (N. Engl. J. Med. 2004;351:2302-9).

When Dr. Fremes was asked how to reconcile the results of RAPS with those from the VA study, he replied that the VA study was conducted almost exclusively in men (99%), vein grafts performed better than predicted, and there were very high rates of evidence-based medicine. Adherence to evidence-based medicine was good in RAPS, but the trial accrued much earlier, from November 1996 to January 2001. The mean age of the 269

## Effient® (prasugrel) tablets Brief Summary of Prescribing Information

BRIEF SUMMARY: Please see Full Prescribing Information for additional information about Effient.

### WARNING: BLEEDING RISK

Effient can cause significant, sometimes fatal, bleeding [see Warnings and Precautions (5.1 and 5.2) and Adverse Reactions (6.1)].

Do not use Effient in patients with active pathological bleeding or a history of transient ischemic attack or stroke [see Contraindications (4.1 and 4.2)].

In patients  $\geq 75$  years of age, Effient is generally not recommended, because of the increased risk of fatal and intracranial bleeding and uncertain benefit, except in high-risk situations (patients with diabetes or a history of prior MI) where its effect appears to be greater and its use may be considered [see Use in Specific Populations (8.5)].

Do not start Effient in patients likely to undergo urgent coronary artery bypass graft surgery (CABG). When possible, discontinue Effient at least 7 days prior to any surgery.

Additional risk factors for bleeding include:

- body weight  $< 60$  kg
- propensity to bleed
- concomitant use of medications that increase the risk of bleeding (e.g., warfarin, heparin, fibrinolytic therapy, chronic use of non-steroidal anti-inflammatory drugs [NSAIDs])

Suspect bleeding in any patient who is hypotensive and has recently undergone coronary angiography, percutaneous coronary intervention (PCI), CABG, or other surgical procedures in the setting of Effient.

If possible, manage bleeding without discontinuing Effient. Discontinuing Effient, particularly in the first few weeks after acute coronary syndrome, increases the risk of subsequent cardiovascular events [see Warnings and Precautions (5.3)].

## 1 INDICATIONS AND USAGE

**1.1 Acute Coronary Syndrome:** Effient® is indicated to reduce the rate of thrombotic cardiovascular (CV) events (including stent thrombosis) in patients with acute coronary syndrome (ACS) who are to be managed with percutaneous coronary intervention (PCI) as follows:

- Patients with unstable angina (UA) or non-ST-elevation myocardial infarction (NSTEMI).
- Patients with ST-elevation myocardial infarction (STEMI) when managed with primary or delayed PCI.

Effient has been shown to reduce the rate of a combined endpoint of cardiovascular death, nonfatal myocardial infarction (MI), or nonfatal stroke compared to clopidogrel. The difference between treatments was driven predominantly by MI, with no difference on strokes and little difference on CV death [see Clinical Studies (14)].

It is generally recommended that antiplatelet therapy be administered promptly in the management of ACS because many cardiovascular events occur within hours of initial presentation. In the clinical trial that established the efficacy of Effient, Effient and the control drug were not administered to UA/NSTEMI patients until coronary anatomy was established. For the small fraction of patients that required urgent CABG after treatment with Effient, the risk of significant bleeding was substantial [see Warnings and Precautions (5.2)]. Because the large majority of patients are managed without CABG, however, treatment can be considered before determining coronary anatomy if need for CABG is considered unlikely. The advantages of earlier treatment with Effient must then be balanced against the increased rate of bleeding in patients who do need to undergo urgent CABG.

## 2 DOSAGE AND ADMINISTRATION

Initiate Effient treatment as a single 60 mg oral loading dose and then continue at 10 mg orally once daily. Patients taking Effient should also take aspirin (75 mg to 325 mg) daily [see Drug Interactions (7) and Clinical Pharmacology (12.3)]. Effient may be administered with or without food [see Clinical Pharmacology (12.3) and Clinical Studies (14)].

**Dosing in Low Weight Patients:** Compared to patients weighing  $\geq 60$  kg, patients weighing  $< 60$  kg have an increased exposure to the active metabolite of prasugrel and an increased risk of bleeding on a 10 mg once daily maintenance dose. Consider lowering the maintenance dose to 5 mg in patients  $< 60$  kg. The effectiveness and safety of the 5 mg dose have not been prospectively studied.

## 4 CONTRAINDICATIONS

**4.1 Active Bleeding:** Effient is contraindicated in patients with active pathological bleeding such as peptic ulcer or intracranial hemorrhage [see Warnings and Precautions (5.1) and Adverse Reactions (6.1)].

**4.2 Prior Transient Ischemic Attack or Stroke:** Effient is contraindicated in patients with a history of prior transient ischemic attack (TIA) or stroke. In TRITON-TIMI 38 [Trial to Assess Improvement

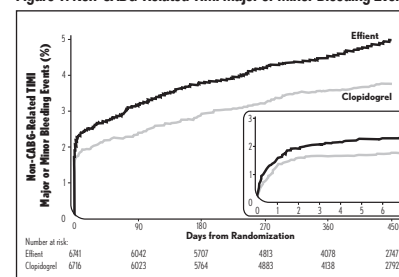
in Therapeutic Outcomes by Optimizing Platelet Inhibition with Prasugrel], patients with a history of TIA or ischemic stroke ( $> 3$  months prior to enrollment) had a higher rate of stroke on Effient (6.5%; of which 4.2% were thrombotic stroke and 2.3% were intracranial hemorrhage [ICH]) than on clopidogrel (1.2%; all thrombotic). In patients without such a history, the incidence of stroke was 0.9% (0.2% ICH) and 1.0% (0.3% ICH) with Effient and clopidogrel, respectively. Patients with a history of ischemic stroke within 3 months of screening and patients with a history of hemorrhagic stroke at any time were excluded from TRITON-TIMI 38. Patients who experience a stroke or TIA while on Effient generally should have therapy discontinued [see Adverse Reactions (6.1) and Clinical Studies (14)].

**4.3 Hypersensitivity:** Effient is contraindicated in patients with hypersensitivity (e.g., anaphylaxis) to prasugrel or any component of the product [see Adverse Reactions (6.2)].

## 5 WARNINGS AND PRECAUTIONS

**5.1 General Risk of Bleeding:** Thienopyridines, including Effient, increase the risk of bleeding. With the dosing regimens used in TRITON-TIMI 38, TIMI (Thrombolysis in Myocardial Infarction) Major (clinically overt bleeding associated with a fall in hemoglobin  $\geq 5$  g/dL, or intracranial hemorrhage) and TIMI Minor (overt bleeding associated with a fall in hemoglobin of  $\geq 3$  g/dL, but  $< 5$  g/dL) bleeding events were more common on Effient than on clopidogrel [see Adverse Reactions (6.1)]. The bleeding risk is highest initially, as shown in Figure 1 (events through 450 days; inset shows events through 7 days).

Figure 1: Non-CABG-Related TIMI Major or Minor Bleeding Events



Suspect bleeding in any patient who is hypotensive and has recently undergone coronary angiography, PCI, CABG, or other surgical procedures even if the patient does not have overt signs of bleeding.

Do not use Effient in patients with active bleeding, prior TIA or stroke [see Contraindications (4.1 and 4.2)].

Other risk factors for bleeding are:

- Age  $\geq 75$  years. Because of the risk of bleeding (including fatal bleeding) and uncertain effectiveness in patients  $\geq 75$  years of age, use of Effient is generally not recommended in these patients, except in high-risk situations (patients with diabetes or history of myocardial infarction) where its effect appears to be greater and its use may be considered [see Adverse Reactions (6.1), Use in Specific Populations (8.5), Clinical Pharmacology (12.3), and Clinical Studies (14)].
- CABG or other surgical procedure [see Warnings and Precautions (5.2)].
- Body weight  $< 60$  kg. Consider a lower (5 mg) maintenance dose [see Dosage and Administration (2), Adverse Reactions (6.1), Use in Specific Populations (8.6)].
- Propensity to bleed (e.g., recent trauma, recent surgery, recent or recurrent gastrointestinal (GI) bleeding, active peptic ulcer disease, or severe hepatic impairment) [see Adverse Reactions (6.1) and Use in Specific Populations (8.8)].
- Medications that increase the risk of bleeding (e.g., oral anticoagulants, chronic use of non-steroidal anti-inflammatory drugs [NSAIDs], and fibrinolytic agents). Aspirin and heparin were commonly used in TRITON-TIMI 38 [see Drug Interactions (7), Clinical Studies (14)].

Thienopyridines inhibit platelet aggregation for the lifetime of the platelet (7-10 days), so withholding a dose will not be useful in managing a bleeding event or the risk of bleeding associated with an invasive procedure. Because the half-life of prasugrel's active metabolite is short relative to the lifetime of the platelet, it may be possible to restore hemostasis by administering exogenous platelets; however, platelet transfusions within 6 hours of the loading dose or 4 hours of the maintenance dose may be less effective.

**5.2 Coronary Artery Bypass Graft Surgery-Related Bleeding:** The risk of bleeding is increased in patients receiving Effient who undergo CABG. If possible, Effient should be discontinued at least 7 days prior to CABG.

Of the 437 patients who underwent CABG during TRITON-TIMI 38, the rates of CABG-related TIMI Major or Minor bleeding were 14.1% in the Effient group and 4.5% in the clopidogrel group [see Adverse Reactions (6.1)]. The higher risk for bleeding events in patients treated

with Effient persisted up to 7 days from the most recent dose of study drug. For patients receiving a thienopyridine within 3 days prior to CABG, the frequencies of TIMI Major or Minor bleeding were 26.7% (12 of 45 patients) in the Effient group, compared with 5.0% (3 of 60 patients) in the clopidogrel group. For patients who received their last dose of thienopyridine within 4 to 7 days prior to CABG, the frequencies decreased to 11.3% (9 of 80 patients) in the prasugrel group and 3.4% (3 of 89 patients) in the clopidogrel group.

Do not start Effient in patients likely to undergo urgent CABG. CABG-related bleeding may be treated with transfusion of blood products, including packed red blood cells and platelets; however, platelet transfusions within 6 hours of the loading dose or 4 hours of the maintenance dose may be less effective.

**5.3 Discontinuation of Effient:** Discontinue thienopyridines, including Effient, for active bleeding, elective surgery, stroke, or TIA. The optimal duration of thienopyridine therapy is unknown. In patients who are managed with PCI and stent placement, premature discontinuation of any antiplatelet medication, including thienopyridines, conveys an increased risk of stent thrombosis, myocardial infarction, and death. Patients who require premature discontinuation of a thienopyridine will be at increased risk for cardiac events. Lapses in therapy should be avoided, and if thienopyridines must be temporarily discontinued because of an adverse event(s), they should be restarted as soon as possible [see Contraindications (4.1 and 4.2) and Warnings and Precautions (5.1)].

**5.4 Thrombotic Thrombocytopenic Purpura:** Thrombotic thrombocytopenic purpura (TTP) has been reported with the use of Effient. TTP can occur after a brief exposure ( $< 2$  weeks). TTP is a serious condition that can be fatal and requires urgent treatment, including plasmapheresis (plasma exchange). TTP is characterized by thrombocytopenia, microangiopathic hemolytic anemia (schistocytes [fragment red blood cells] seen on peripheral smear), neurological findings, renal dysfunction, and fever [see Adverse Reactions (6.2)].

## 6 ADVERSE REACTIONS

**6.1 Clinical Trials Experience:** The following serious adverse reactions are also discussed elsewhere in the labeling:

- Bleeding [see Boxed Warning and Warnings and Precautions (5.1, 5.2)]
- Thrombotic thrombocytopenic purpura [see Warnings and Precautions (5.4)]

Safety in patients with ACS undergoing PCI was evaluated in a clopidogrel-controlled study, TRITON-TIMI 38, in which 6741 patients were treated with Effient (60 mg loading dose and 10 mg once daily) for a median of 14.5 months (5802 patients were treated for over 6 months; 4136 patients were treated for more than 1 year). The population treated with Effient was 27 to 96 years of age, 25% female, and 92% Caucasian. All patients in the TRITON-TIMI 38 study were to receive aspirin. The dose of clopidogrel in this study was a 300 mg loading dose and 75 mg once daily.

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials cannot be directly compared with the rates observed in other clinical trials of another drug and may not reflect the rates observed in practice.

**Drug Discontinuation:** The rate of study drug discontinuation because of adverse reactions was 7.2% for Effient and 6.3% for clopidogrel. Bleeding was the most common adverse reaction leading to study drug discontinuation for both drugs (2.5% for Effient and 1.4% for clopidogrel).

**Bleeding: Bleeding Unrelated to CABG Surgery -** In TRITON-TIMI 38, overall rates of TIMI Major or Minor bleeding adverse reactions unrelated to coronary artery bypass graft surgery (CABG) were significantly higher on Effient than on clopidogrel, as shown in Table 1.

Table 1: Non-CABG-Related Bleeding\* (TRITON-TIMI 38)

	Effient (%) (N=6741)	Clopidogrel (%) (N=6716)	p-value
TIMI Major or Minor bleeding	4.5	3.4	p=0.002
TIMI Major bleeding <sup>b</sup>	2.2	1.7	p=0.029
Life-threatening	1.3	0.8	p=0.015
Fatal	0.3	0.1	
Symptomatic intracranial hemorrhage (ICH)	0.3	0.3	
Requiring inotropes	0.3	0.1	
Requiring surgical intervention	0.3	0.3	
Requiring transfusion ( $\geq 4$ units)	0.7	0.5	
TIMI Minor bleeding <sup>c</sup>	2.4	1.9	p=0.022

\* Patients may be counted in more than one row.

<sup>b</sup> See 5.1 for definition.

Figure 1 demonstrates non-CABG related TIMI Major or Minor bleeding. The bleeding rate is highest initially, as shown in Figure 1 (inset: Days 0 to 7) [see Warnings and Precautions (5.1)].

**Major Finding:** Functional graft occlusion at 5 years was 12% in radial artery grafts and nearly 19% in saphenous vein grafts.

**Data Source:** Multicenter, randomized Radial Artery Patency Study in 269 patients.

**Disclosures:** The Canadian Institutes of Health Research funded the study. Dr. Fremes reported no conflicts.

patients in the current analysis was 60 years, and 15% were women.

RAPS enrolled 561 patients with isolated triple-vessel disease and a left ventricular fraction of more than 35% from 12 Canadian centers and 1 in New

Zealand. Randomization was unique in that it was performed within patients and not between patients, said Dr. Fremes, head of the cardiovascular surgery division at Sunnybrook Health Sciences Centre and research director at

the Schulich Heart Centre at Sunnybrook, Toronto. Patients were randomized to receive either a radial artery to the right coronary territory and a saphenous vein to the circumflex territory or a saphenous vein to the right coronary territory and a radial artery to the circumflex territory.

Late angiography was performed on 440 patients at 1 year and on 269 patients at a mean of 7.6 years after surgery. Grafts were considered occluded if they had a TIMI (Thrombolysis in Myocardial Infarction) score of 0-2, and were considered patent with a TIMI score of 3.

Bleeding rates in patients with the risk factors of age  $\geq 75$  years and weight  $< 60$  kg are shown in Table 2.

**Table 2: Bleeding Rates for Non-CABG-Related Bleeding by Weight and Age (TRITON-TIMI 38)**

	Major/Minor		Fatal	
	Effient (%)	Clopidogrel (%)	Effient (%)	Clopidogrel (%)
Weight $< 60$ kg (N=308 Effient, N=356 clopidogrel)	10.1	6.5	0.0	0.3
Weight $\geq 60$ kg (N=6373 Effient, N=6299 clopidogrel)	4.2	3.3	0.3	0.1
Age $< 75$ years (N=5850 Effient, N=5822 clopidogrel)	3.8	2.9	0.2	0.1
Age $\geq 75$ years (N=891 Effient, N=894 clopidogrel)	9.0	6.9	1.0	0.1

**Bleeding Related to CABG** - In TRITON-TIMI 38, 437 patients who received a thienopyridine underwent CABG during the course of the study. The rate of CABG-related TIMI Major or Minor bleeding was 14.1% for the Effient group and 4.5% in the clopidogrel group (Table 3). The higher risk for bleeding adverse reactions in patients treated with Effient persisted up to 7 days from the most recent dose of study drug.

**Table 3: CABG-Related Bleeding\* (TRITON-TIMI 38)**

	Effient (%) (N=213)	Clopidogrel (%) (N=224)
TIMI Major or Minor bleeding	14.1	4.5
TIMI Major bleeding	11.3	3.6
Fatal	0.9	0
Reoperation	3.8	0.5
Transfusion of $\geq 5$ units	6.6	2.2
Intracranial hemorrhage	0	0
TIMI Minor bleeding	2.8	0.9

\* Patients may be counted in more than one row.

**Bleeding Reported as Adverse Reactions** - Hemorrhagic events reported as adverse reactions in TRITON-TIMI 38 were, for Effient and clopidogrel, respectively: epistaxis (6.2%, 3.3%), gastrointestinal hemorrhage (1.5%, 1.0%), hemoptysis (0.6%, 0.5%), subcutaneous hematoma (0.5%, 0.2%), post-procedural hemorrhage (0.5%, 0.2%), retroperitoneal hemorrhage (0.3%, 0.2%), pericardial effusion/hemorrhage/tamponade (0.3%, 0.2%), and retinal hemorrhage (0.0%, 0.1%).

**Malignancies:** During TRITON-TIMI 38, newly diagnosed malignancies were reported in 1.6% and 1.2% of patients treated with prasugrel and clopidogrel, respectively. The sites contributing to the differences were primarily colon and lung. It is unclear if these observations are causally-related or are random occurrences.

**Other Adverse Events:** In TRITON-TIMI 38, common and other important non-hemorrhagic adverse events were, for Effient and clopidogrel, respectively: severe thrombocytopenia (0.06%, 0.04%), anemia (2.2%, 2.0%), abnormal hepatic function (0.22%, 0.27%), allergic reactions (0.36%, 0.36%), and angioedema (0.06%, 0.04%). Table 4 summarizes the adverse events reported by at least 2.5% of patients.

**Table 4: Non-Hemorrhagic Treatment Emergent Adverse Events Reported by at Least 2.5% of Patients in Either Group**

	Effient (%) (N=6741)	Clopidogrel (%) (N=6716)
Hypertension	7.5	7.1
Hypercholesterolemia/Hyperlipidemia	7.0	7.4
Headache	5.5	5.3
Back pain	5.0	4.5
Dyspnea	4.9	4.5
Nausea	4.6	4.3
Dizziness	4.1	4.6
Cough	3.9	4.1
Hypotension	3.9	3.8
Fatigue	3.7	4.8
Non-cardiac chest pain	3.1	3.5
Atrial fibrillation	2.9	3.1
Bradycardia	2.9	2.4
Leukopenia ( $< 4 \times 10^9$ WBC/L)	2.8	3.5
Rash	2.8	2.4
Pyrexia	2.7	2.2
Peripheral edema	2.7	3.0
Pain in extremity	2.6	2.6
Diarrhea	2.3	2.6

**6.2 Postmarketing Experience:** The following adverse reactions have been identified during post approval use of Effient. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible

to reliably estimate their frequency or establish a causal relationship to drug exposure.

**Blood and lymphatic system disorders** - Thrombocytopenia, Thrombotic thrombocytopenic purpura (TTP) [see Warnings and Precautions (5.4) and Patient Counseling Information (17.3)]

**Immune system disorders** - Hypersensitivity reactions including anaphylaxis [see Contraindications (4.3)]

#### 7 DRUG INTERACTIONS

**7.1 Warfarin:** Coadministration of Effient and warfarin increases the risk of bleeding [see Warnings and Precautions (5.1) and Clinical Pharmacology (12.3)].

**7.2 Non-Steroidal Anti-Inflammatory Drugs:** Coadministration of Effient and NSAIDs (used chronically) may increase the risk of bleeding [see Warnings and Precautions (5.1)].

**7.3 Other Concomitant Medications:** Effient can be administered with drugs that are inducers or inhibitors of cytochrome P450 enzymes [see Clinical Pharmacology (12.3)].

Effient can be administered with aspirin (75 mg to 325 mg per day), heparin, GPIIb/IIIa inhibitors, statins, digoxin, and drugs that elevate gastric pH, including proton pump inhibitors and H<sub>2</sub> blockers [see Clinical Pharmacology (12.3)].

#### 8 USE IN SPECIFIC POPULATIONS

**8.1 Pregnancy:** Pregnancy Category B - There are no adequate and well controlled studies of Effient use in pregnant women. Reproductive and developmental toxicology studies in rats and rabbits at doses of up to 30 times the recommended therapeutic exposures in humans (based on plasma exposures to the major circulating human metabolite) revealed no evidence of fetal harm; however, animal studies are not always predictive of a human response. Effient should be used during pregnancy only if the potential benefit to the mother justifies the potential risk to the fetus.

In embryo fetal developmental toxicology studies, pregnant rats and rabbits received prasugrel at maternally toxic oral doses equivalent to more than 40 times the human exposure. A slight decrease in pup body weight was observed; but, there were no structural malformations in either species. In prenatal and postnatal rat studies, maternal treatment with prasugrel had no effect on the behavioral or reproductive development of the offspring at doses greater than 150 times the human exposure [see Nonclinical Toxicology (13.1)].

**8.3 Nursing Mothers:** It is not known whether Effient is excreted in human milk; however, metabolites of Effient were found in rat milk. Because many drugs are excreted in human milk, prasugrel should be used during nursing only if the potential benefit to the mother justifies the potential risk to the nursing infant.

**8.4 Pediatric Use:** Safety and effectiveness in pediatric patients have not been established [see Clinical Pharmacology (12.3)].

**8.5 Geriatric Use:** In TRITON-TIMI 38, 38.5% of patients were  $\geq 65$  years of age and 13.2% were  $\geq 75$  years of age. The risk of bleeding increased with advancing age in both treatment groups, although the relative risk of bleeding (Effient compared with clopidogrel) was similar across age groups.

Patients  $\geq 75$  years of age who received Effient had an increased risk of fatal bleeding events (1.0%) compared to patients who received clopidogrel (0.1%). In patients  $\geq 75$  years of age, symptomatic intracranial hemorrhage occurred in 7 patients (0.8%) who received Effient and in 3 patients (0.3%) who received clopidogrel. Because of the risk of bleeding, and because effectiveness is uncertain in patients  $\geq 75$  years of age [see Clinical Studies (14)], use of Effient is generally not recommended in these patients, except in high-risk situations (diabetes and past history of myocardial infarction) where its effect appears to be greater and its use may be considered [see Warnings and Precautions (5.1), Clinical Pharmacology (12.3), and Clinical Studies (14)].

**8.6 Low Body Weight:** In TRITON-TIMI 38, 4.6% of patients treated with Effient had body weight  $< 60$  kg. Individuals with body weight  $< 60$  kg had an increased risk of bleeding and an increased exposure to the active metabolite of prasugrel [see Dosage and Administration (2), Warnings and Precautions (5.1), and Clinical Pharmacology (12.3)]. Consider lowering the maintenance dose to 5 mg in patients  $< 60$  kg. The effectiveness and safety of the 5 mg dose have not been prospectively studied.

**8.7 Renal Impairment:** No dosage adjustment is necessary for patients with renal impairment. There is limited experience in patients with end-stage renal disease [see Clinical Pharmacology (12.3)].

**8.8 Hepatic Impairment:** No dosage adjustment is necessary in patients with mild to moderate hepatic impairment (Child-Pugh Class A and B). The pharmacokinetics and pharmacodynamics of prasugrel in patients with severe hepatic disease have not been studied, but such patients are generally at higher risk of bleeding [see Warnings and Precautions (5.1) and Clinical Pharmacology (12.3)].

**8.9 Metabolic Status:** In healthy subjects, patients with stable atherosclerosis, and patients with ACS receiving prasugrel, there was

no relevant effect of genetic variation in CYP2B6, CYP2C9, CYP2C19, or CYP3A5 on the pharmacokinetics of prasugrel's active metabolite or its inhibition of platelet aggregation.

#### 10 OVERDOSAGE

**10.1 Signs and Symptoms:** Platelet inhibition by prasugrel is rapid and irreversible, lasting for the life of the platelet, and is unlikely to be increased in the event of an overdose. In rats, lethality was observed after administration of 2000 mg/kg. Symptoms of acute toxicity in dogs included emesis, increased serum alkaline phosphatase, and hepatocellular atrophy. Symptoms of acute toxicity in rats included mydriasis, irregular respiration, decreased locomotor activity, ptosis, staggering gait, and lacrimation.

**10.2 Recommendations about Specific Treatment:** Platelet transfusion may restore clotting ability. The prasugrel active metabolite is not likely to be removed by dialysis.

#### 13 NONCLINICAL TOXICOLOGY

**13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility: Carcinogenesis** - No compound-related tumors were observed in a 2-year rat study with prasugrel at oral doses up to 100 mg/kg/day ( $> 100$  times the recommended therapeutic exposures in humans (based on plasma exposures to the major circulating human metabolite). There was an increased incidence of tumors (hepatocellular adenomas) in mice exposed for 2 years to high doses ( $> 250$  times the human metabolite exposure).

**Mutagenesis** - Prasugrel was not genotoxic in two *in vitro* tests (Ames bacterial gene mutation test, clastogenicity assay in Chinese hamster fibroblasts) and in one *in vivo* test (micronucleus test by intraperitoneal route in mice).

**Impairment of Fertility** - Prasugrel had no effect on fertility of male and female rats at oral doses up to 300 mg/kg/day (80 times the human major metabolite exposure at daily dose of 10 mg prasugrel).

#### 17 PATIENT COUNSELING INFORMATION

See Medication Guide

##### 17.1 Benefits and Risks

- Summarize the effectiveness features and potential side effects of Effient.
- Tell patients to take Effient exactly as prescribed.
- Remind patients not to discontinue Effient without first discussing it with the physician who prescribed Effient.
- Recommend that patients read the Medication Guide.

##### 17.2 Bleeding:

- Inform patients that they:
- will bruise and bleed more easily.
  - will take longer than usual to stop bleeding.
  - should report any unanticipated, prolonged, or excessive bleeding, or blood in their stool or urine.

##### 17.3 Other Signs and Symptoms Requiring Medical Attention

- Inform patients that TTP is a rare but serious condition that has been reported with Effient.
- Instruct patients to get prompt medical attention if they experience any of the following symptoms that cannot otherwise be explained: fever, weakness, extreme skin paleness, purple skin patches, yellowing of the skin or eyes, or neurological changes.

##### 17.4 Invasive Procedures:

- inform physicians and dentists that they are taking Effient before any invasive procedure is scheduled.
- tell the doctor performing the invasive procedure to talk to the prescribing health care professional before stopping Effient.

**17.5 Concomitant Medications:** Ask patients to list all prescription medications, over-the-counter medications, or dietary supplements they are taking or plan to take so the physician knows about other treatments that may affect bleeding risk (e.g., warfarin and NSAIDs).

Literature revised: December 6, 2010

Manufactured by Eli Lilly and Company, Indianapolis, IN, 46285

Marketed by Daiichi Sankyo, Inc. and Eli Lilly and Company

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At 5 years, the primary end point of functional graft occlusion was significantly decreased in radial artery grafts at 12%, compared with saphenous vein grafts at 18.8% (odds ratio, 0.64), Dr. Fremes said. Significantly fewer radial artery grafts also became completely occluded at 9%, compared with saphenous-vein grafts at 18% (OR, 0.50).

Among 164 patients who had completely patent grafts at follow-up, graft stenosis was similar for both conduits for proximal and distal anastomotic lesions. There were fewer graft-body lesions at 6.7% in radial arteries, vs. saphenous veins at 15.2% (OR, 0.42). Consequently, radial artery grafts were significantly less likely to be either stenotic or completely occluded at 22%, compared with saphenous vein grafts at 34% (OR, 0.58), he said.

Target vessel stenosis, an important risk factor for graft occlusion at 1 year, was evaluated in a subgroup analysis. Target vessels with stenosis were classified a priori as those with 70%-89% narrowing and those with at least 90% narrowing. Although graft occlusion was reduced almost 50% for either graft in target vessels with at least 90% narrowing, radial artery grafts had much lower functional (8.8%) and complete (6.3%) occlusion rates, as did saphenous vein grafts (14.6% and 14.5%, respectively), in the more severely narrowed vessels.

The incidence of cardiac death beyond 1 year was 5%, of nonfatal myocardial infarction was 1.5%, and of major adverse cardiac events was 15%. Dr. Fremes pointed out that the clinical event findings were descriptive rather than explanatory since each patient received both graft types.

Overall survival in the entire cohort was 96% at 5 years, 91% at 7.5 years, and 78% at 10 years. Event-free survival was 95%, 90%, and 78%, respectively.

"This [study] lends credence to utilizing the radial artery, with obvious caveats that it is important to place it in highly obstructed vessels so there is not competitive flow and to maintain patency for the longest period of time," Dr. James McClurken, professor and vice-chair of surgery at Temple University, Philadelphia, said in a panel discussion. "This is not quite as good as internal mammary artery patency data, but certainly better than vein-graft data."

Fellow discussant Dr. Steven Bolling, a thoracic surgeon at the University of Michigan, Ann Arbor, said he expects the data will shift practice and increase utilization of the radial artery graft.

When asked about this point at a press conference, Dr. Fremes said that radial artery utilization varies by jurisdiction at about 20%, compared with more than 95% for the internal mammary artery. He noted that the evidence to date on radial artery grafts has been mixed and comes mainly from observational studies.

"The study we presented is the first multi-institutional, longitudinal, randomized comparison, so this is fairly unique data," he said. "Hopefully, it will be persuasive."