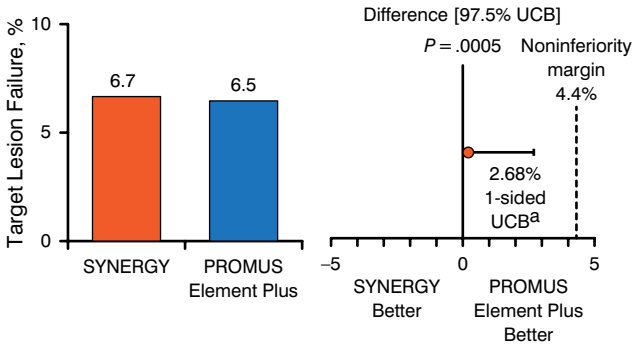
Figure 1. Primary End Point in the Intention-to-Treat Population



[a]One-sided 97.5% Farrington-Manning upper confidence bound.
UCB, upper confidence bound.
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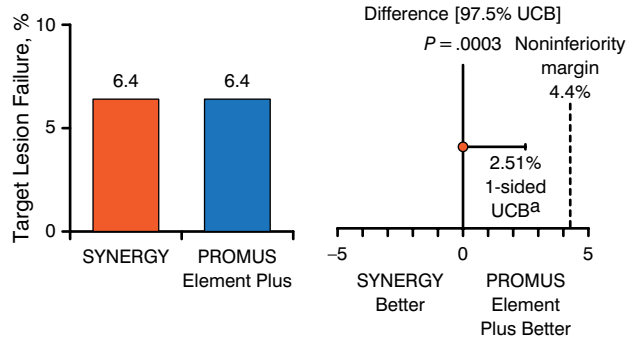
Figure 2. Primary End Point in the Per-Protocol Population



[a]One-sided 97.5% Farrington-Manning upper confidence bound.
UCB, upper confidence bound.
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in the intention-to-treat and per-protocol populations respectively occurred in 6.7% and 6.5% of patients receiving the SYNERGY or DP-DES, respectively, and 6.4% and 6.4% of those receiving the SYNERGY or DP-DES, respectively. Thus, noninferiority was proven to a high level of significance between the 2 stents (Figures 1 and 2).

In addition, 12-month rates of revascularization, stent-related thrombosis, cardiac death, target vessel-related MI, and clinically indicated target lesion revascularization were similar between stents. Two definite and 3 probable cases of ST occurred with the DP-DES. The SYNERGY stent was associated with 2 definite cases and 1 probable case of ST.

The data demonstrate the noninferiority of the SYNERGY stent compared with the PROMUS Element Plus DP-DES for target lesion failure at 1 year. Longer-term efficacy and safety analyses are currently ongoing.

AVOID: Oxygen Use Damaging in STEMI

Written by Brian Hoyle

The findings from the Air Versus Oxygen in Myocardial Infarction [AVOID; Stub D et al. *Am Heart J.* 2012] study were presented by Dion Stub, MBBS, Baker IDI Heart & Diabetes Institute, Melbourne, Australia.

The use of oxygen in the initial treatment of patients with suspected myocardial infarction (MI) dates back over a century. However, there is scant evidence for the benefit of oxygen in patients without hypoxia [Cabello JB et al. *Cochrane Database Syst Rev.* 2010]. In fact, as little as 15 minutes of supplemental oxygen via a face mask may result in hyperoxemia, resulting in diminished coronary blood flow and increased coronary vascular resistance and reperfusion injury.

The multicenter controlled AVOID trial compared routine supplemental oxygen with no supplemental oxygen on myocardial infarct size in normoxic (≥94%) patients with STEMI. In the trial, 638 patients were assessed by paramedics for symptoms of STEMI and randomized 1:1 to receive oxygen at the rate of 8 L/min delivered through a face mask (n=318) or no oxygen (n=320). At hospital arrival, STEMI was confirmed in 218 patients receiving oxygen and 223 patients not receiving oxygen, and the randomized conditions were continued until the end of the primary percutaneous coronary intervention. In the no-oxygen arm, if saturation dropped <94%, supplemental oxygen was added and titrated to a goal of 94%. As expected, the oxygen saturation level was consistently higher in oxygenated STEMI patients before hospital arrival and ≤4 hours after arrival. Cardiac enzymes were monitored for 72 hours, with cardiac magnetic resonance imaging (MRI) and clinical follow-up for ≤6 months.

The co–primary end point was myocardial infarct size based on mean peak levels of creatine kinase and troponin I and areas under the curve for these biomarkers. Clinical secondary end points included ST segment resolution, survival to hospital discharge, major adverse cardiac and cerebrovascular events (MACCEs; death, MI, revascularization, stroke at 6 months), and myocardial infarct size determined at 6 months by cardiac MRI.

Baseline characteristics, including the prevalence of cardiac arrest and cardiogenic shock, were comparable in the oxygen and no-oxygen arms. Procedural details were also similar between the groups (Table 1).

The use of oxygen was associated with a significant 26% increase in mean peak creating kinase, as well as an increase in area under the curve, suggestive of oxygen-related cardiac damage (Figure 1). The trend for troponin

Table 1. AVOID Study Procedural Details

	Oxygen (n = 218)	No Oxygen (n = 223)
Radial access	33.2	33.3
Stent implanted	92.7	90.1
Drug-eluting stent	51.4	51.1
Glycoprotein IIb/IIIa inhibitor	44.5	40.4
Thrombus aspiration	49.1	47.1
Intra-aortic balloon pump	3.2	5.4
Coronary artery bypass graft	2.3	4.0
No revascularization	5.0	5.9
Symptom to intervention time, min	150.5 (125.0, 213.8)	162.0 (130.0, 240.0)
Door to intervention time, min	54.0 (39.0, 66.3)	56.0 (42.0, 70.8)

Values are given in percentages or median (interquartile range).
AVOID, Air Versus Oxygen in Myocardial Infarction.
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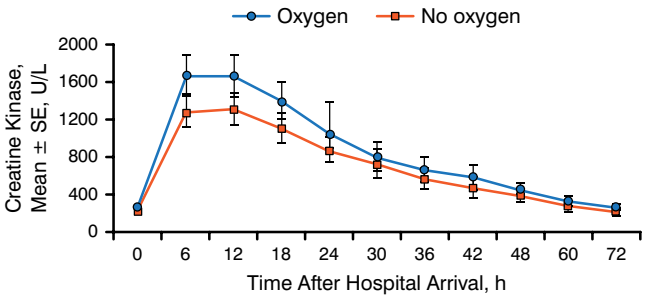
Figure 1. Creatine Kinase Values in the Study Groups

Creatine kinase, U/L	Oxygen (n = 217)	No oxygen (n = 222)	Ratio of means (oxygen/ no oxygen)	*P* Value
Geometric mean peak (95% CI)	1948 (1721 to 2205)	1543 (1341 to 1776)	1.26 (1.05 to 1.52)	.01
Median peak (IQR)	2073 (1065, 3753)	1727 (737, 3598)		.04



Area under the curve, *P* = .04.
IQR, interquartile range.
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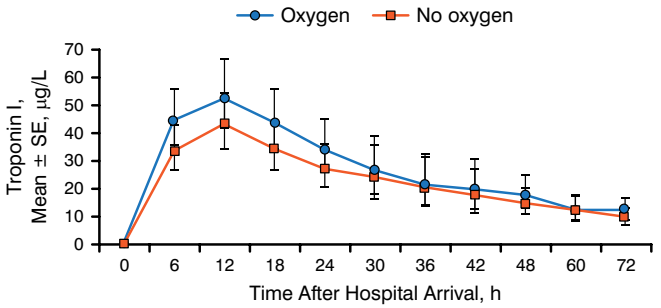
was similar, but the groups were not significantly different (Figure 2).

MRI was conducted at 6 months in 65 patients who had received oxygen and 74 patients who had received no oxygen. This revealed a trend toward increased cardiac infarct size as a proportion of left ventricle mass, indicative of scarring, between the oxygen and no-oxygen arms (12.6%; 6.7 to 19.2% vs 9.0%; 4.1 to 16.3%; *P* = .08).

The trial was underpowered to assess clinical end points; thus, all findings are considered exploratory.

Figure 2. Troponin Values in the Study Groups

Troponin I, µg/L	Oxygen (n = 200)	No oxygen (n = 205)	Ratio of means (oxygen/no oxygen)	*P* Value
Geometric mean peak (95% CI)	57.4 (48.0 to 68.6)	48.0 (39.6 to 58.1)	1.20 (0.92 to 1.55)	.18
Median peak (IQR)	65.7 (30.1, 145.1)	62.1 (19.2, 144.0)		.17



Area under the curve, *P* = .12.
IQR, interquartile range.
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Supplemental oxygen use was associated with recurrent MI at hospital discharge (5.5% vs 0.9%). The trend continued to 6 months, although the result was less impressive (7.6% vs 3.6%). There was an association between MACCEs at 6 months in the oxygen arm (21.9% vs 15.4%). Mortality was low in both the oxygen and no-oxygen arms (3.8% vs 5.9% at 6 months).

The use of oxygen in STEMI patients was associated with greater myocardial injury, as assessed by creatine kinase (but not troponin), with a suggestion of increased recurrent MI and major cardiac arrhythmia and larger myocardial infarct size at 6 months. The findings question the current practice of supplying oxygen to all patients with MI.

PARADIGM-HF: Disease Progression Slowed With Novel Drug

Written by Mary Mosley

The first-in-class angiotensin receptor neprilysin inhibitor LCZ696—compared with the gold standard treatment of enalapril—significantly reduced the composite primary outcome of cardiovascular (CV) death or heart failure (HF) hospitalization in patients with HF and reduced ejection fraction in the prospective trial Efficacy and Safety of LCZ696 Compared With Enalapril on Morbidity and Mortality of Patients With Chronic Heart Failure [PARADIGM-HF; McMurray JJ