BCIA

British Cardiovascular Industry Association
c/o BCOS Ltd., P O Box 20710, London E5 5UE
Email: BCIA@Bcos.demon.co.uk
www: bcia.uk.com
[redacted]

Mr Andrew Dillon CBE,
Chief Executive,
The National Institute for Health and Clinical Excellence,
MidCity Place,
71 High Holborn,
London
WC1V 6NA.

07 April 2006.

Dear Mr Dillon,

NICETAR 04/42 – Addendum to version 03 – Industry Concerns

We have received the above document and write to express our surprise and disappointment at both the tone and content of this addendum.

The revision by the Liverpool Review Group fails to address all of the areas that it was requested to do so by NICE after the committee meeting on 1 February. The methodological flaws in the LRG approach were comprehensively identified at the time of their first report and they have based their argumentation in this latest report principally on the same data source used in the original. Where published evidence contradicts their hypothesis they have either ignored it or discounted it, using calculations to justify this that are far from transparent.

The original NICE guidance of September 2003 relating to DES was a balanced assessment that allowed for the sustainable uptake of this beneficial technology and made a contribution to the achievement of the revascularisation targets of the National Service Framework on Coronary Heart Disease. The broad recommendations of this guidance have been influential in healthcare systems across the world, and have been substantiated by subsequent clinical trials and registries that have shown the sustained benefit of the use of DES in identified high-risk groups, from both a patient and economic perspective.

We urge you to take a direct interest in this process and seek reassurance that this review is being conducted in an objective and equitable way. It would be a profound shame if the benefits of this clinically-proven technology were to be diluted or even lost due to a flawed and potentially biased analysis.

We would welcome your views relating to these concerns and would be delighted to meet up with you to discuss these further.

Yours sincerely,
Pp Beverley Charters, on behalf of
British Cardiovascular Industry Association

List of BCIA Members

Abbott Vascular Devices	[redacted]	UK Sales Manager
ACIST Europe BV	[redacted]	Country Manager, UK
Apex Medical Devices Ltd	[redacted]	Managing Director
Biotronik UK Ltd	[redacted]	Manager Vascular Intervention
Boston Scientific Corporation	[redacted]	UK Marketing Manager - Interventional Cardiology
Bristol-Myers Squibb Pharmaceuticals Ltd	[redacted]	Cardiovascular Medical Education Manager
Bristol-Myers Squibb Medical Imaging	[redacted]	Senior Product Manager, Europe
Cardinal InHealth Ltd.	[redacted]	Business Development Manager
Cardiologic Ltd	[redacted]	Sales Director
Cordis (A Johnson & Johnson Company),	[redacted]	Group Marketing Manager
Datascope Medical Co Ltd	[redacted]	UK Sales Manager
Eli Lilly	[redacted]	National Therapeutic Advisor
Glaxo Smith Kline	[redacted]	Healthcare Development Manager, UK
Guidant Ltd	[redacted]	UK Country Manager, Vascular Intervention
InterMedical	[redacted]	Managing Director
Kimal Scientific Products Ltd.	[redacted]	Marketing Manager
Kiwimed Ltd.	[redacted]	General Manager
Medcon UK	[redacted]	General Manager
Medtronic	[redacted]	Vascular Business Manager, UK & Ireland
Merck Sharp & Dohme	[redacted]	Sales & Marketing, Aggrastat
NMT Medical Inc	[redacted]	Sales & Marketing, UK
Nycomed UK Ltd	[redacted]	Marketing
Pyramed Marketing Ltd	[redacted]	Managing Director
RADI Medical Systems	[redacted]	UK Manager
Sanofi-Aventis	[redacted]	Senior Product Manager – Atherothrombosis
St. Jude Medical	[redacted]	National Sales Manager
Terumo UK	[redacted]	UK Sales Manager
UK Medical	[redacted]	Managing Director
W L Gore & Associates (UK) Ltd	[redacted]	New Ventures s Manager

[redacted]

BCIA Response to LRiG Addendum Report for Review of Guidance No. 71.

Executive Summary

- **LRiG have understated the difference in effectiveness between BMS and DES by:**
- Failing to report several important studies that identify longer lesions, small vessels and diabetes as independent risk factors for repeat revascularisation.
- Failing to accurately represent absolute repeat revascularisation rates in BMS. In answer to the Committee's specific question, the rate was **13%** for the general population in the Scottish registry for the year 2000/2001.
- Continuing to use Total Revascularisation rates, which can only be estimated using a number of poorly defined correction factors that introduce unnecessary complications and uncertainty into cost effectiveness estimates.
- Continued dependence upon the CTC dataset that the Committee have already judged as not representative of repeat revascularisation.
- Understating the reduction in repeat revascularisation conferred by DES.
- **As a result of this approach, LRiG's additional analyses are still unrepresentative of the cost effectiveness of DES.**
- **Long lesions and small vessels have been reconfirmed (and now accepted by LRiG on page 35 of the Addendum) as placing patients at increased risk of repeat revascularisation. With no evidence to suggest that the treatment effect of DES has diminished since the original Guidance was issued, it follows that there is no reason to change the existing Guidance in this respect.**
- **In fact, as diabetes has been established as an independent predictor of repeat revascularisation, this Review should also recommend the use of DES for all diabetic patients undergoing PCI.**

Introduction

- The deliberations from the first Committee meeting identified a number of potential issues for the addendum to consider. We suggest that the key issues driving cost effectiveness and thus requiring consideration are:
    - The independent risk factors for repeat revascularisation – consistently shown in the literature to be small vessels, longer lesions and diabetes.
    - The absolute risk of revascularisation with bare metal stents (BMS) – 13% for an unselected population from the Scottish registry.
    - The risk reduction gained from DES.

Our response below considers these issues in turn.

Risk Factors for Repeat Revascularisation

- The reason for continuing to present separate analyses for elective and non-elective patients is not explained. In the absence of any stated scientific rationale, the reason appears to be to maintain consistency with the Bagust paper (Bagust *et al*, 2005). This paper in itself does not provide any argument for the separation of elective and non-elective patients.

- LRiG undertake further work in Figure A3 (page 30) to show that diabetes is not a risk factor for repeat revascularisation. They do this using a risk model developed from the CTC database. As the Committee have already concluded that the CTC database is not representative of repeat revascularisation rates, this additional analysis is flawed because the CTC database is underpowered to answer the Committee's question.

- Estimates from the Bagust paper and the AR Addendum show that the CTC dataset has only about 25% power to detect a difference in revascularisation rates between diabetics (~11%) and non-diabetics (~9%) in the total CTC population. The CTC database is simply underpowered and a wider perspective from the literature is required.

- LRiG have presented in Table A6.2, a more wide-ranging (but not complete) review of the literature pertaining to risk factors for repeat revascularisation than in either the AR or the Bagust paper. As a result, they now acknowledge that long lesions and small vessels are commonly occurring risk factors in the literature. Thus, the original guidance recommending DES for use in lesions >15mm length and vessels <3mm diameter is supported.

- The Committee should note that Table A6.2 *"Summary of risk model factors in reviewed papers"* does not present the results of a further 7 risk models. Curiously, 5 out of these 7 identify diabetes as an independent risk factor for repeat revascularisation. Table 1 below reproduces LRiG's Table A6.2 to include data highlighted in earlier industry submissions.

- Overall, LRiG's interpretation and representation of the extensive published literature pertaining to previous risk factor studies is extremely concerning and at worst, selective. The literature has been dismissed as being based on 'beliefs' and 'perceptions', implying that only LRiG have seriously studied this question (page 31):

  "The success of the LRiG formulations to outperform other possibilities is not surprising since they were developed to provide 'best fit' to these data. However, it is notable that none of the additional variables ***widely believed*** *to be most influential by the clinical community (and therefore factored into trial designs) showed any indication of independent effect, or acted to modify the LRiG factors to any serious extent. This suggests that* ***common perceptions*** *about the genesis of restenosis may be misconceived".*

- We would draw the Committee's attention to the recent paper by Gotschall *et al* (2006) in which the authors state: *"Indeed, prediction of restenosis after PCI is one of the most studied topics in interventional cardiology".*

- The manner in which such a body of evidence can be easily dismissed when it does not appear to fit with LRiG's own findings is disconcerting. They are happy to defer to the 'weight of prior evidence' when it does fit their message. For example, in reviewing the evidence for AMI and mortality (*for which we make no claim*), the report concludes on page 23: *"The* ***weight of prior evidence is sufficiently strong*** *that a very compelling body of new information would be necessary to alter the current consensus that PCIs provide symptomatic relief but do not alter life expectancy…".*

	Sources cited by LRiG							Sources not cited by LRiG						
Risk Factor	SCRR (Pell *et al* 2001)	Toulouse (Elbaz *et al* 2002)	Netherlands (Agema *et al* 2004)	Cleveland (Ellis *et al* 2004)	Washington (Wu *et al* 2004)	LRiG elective	LRiG non-elective	Kastrati et al 1997^	Singh *et al* 2005§	Iakovou *et al* 2003^	Kornowski *et al* 1999^	Nikolsky *et al* 2005	Jilaihawi et al 2005^	Gotschall *et al* 2006^
3 vessel disease	√			√	√	√								
Previous MI			√		√					√				
Ostial location				√					√					
Unstable angina				√			(√)		√		√			
Restenotic				√		√√								
Saphenous graft				√										
LAD				√					√					
Stable angina (vs. none)					√									
Creatinine					√									
Lesion length			√	√	√				√			√		√
Small vessel		√√	√√	√			√√	√√		√	√	√		√
Diabetes			√~		√#			√	√	√	√		√*	
Previous CABG							√√		√					
Calcification						√√								
Angulation						√								
Multiple stents								√√						
Age									√					
Smoker									√					
Hypertension									√					
Number of lesions									√					
Use of rotablator									√					
Previous PCI										√√	√			
Body mass index												√√		
Acute coronary syndromes														√√

Table 1: Clinical and procedural factors independently predictive of repeat revascularisation after coronary stenting with BMS.

√ = p < 0.05 & RR, hazard ratio or odds ratio < 1.6. √√ = RR, hazard ratio or odds ratio >= 1.9.

√~ Netherlands: Diabetes predictive of TVR in the publication (RR 1.52, 0.99-2.32). Excluded by LRiG because univariate predictors with p < 0.10 were entered into the multivariate regression model. ***LRiG appear to have made an error in excluding this study because p < 0.10 is the standard criterion for entry into a backwards stepwise regression model.***

√# Washington: Diabetes excluded by LRiG because it was predictive of repeat revascularisation by CABG only (HR 1.52, 1.03-2.23). Revascularisation by CABG is still revascularisation!

√* UK data (Dr H Jilaihawi, personal communication). RR = 1.8, p = 0.05.

^ 5 out of 7 Risk models not cited by LRiG were developed from clinical databases without mandated angiographic follow up.

$ PRESTO study – ischaemia-driven TVR required presence of ischaemic signs & symptoms.

- Small vessels, long lesions and diabetes are the most commonly occurring factors when all risk models are considered.
- Diabetes occurs in 5 out of 7 of the risk models not presented by LRiG in the Addendum – non of these 5 included mandated angiographic follow up.

- Two risk models (Toulouse and Kastrati) identified post-procedural minimum lumen diameter (MLD) <3mm as being a predictor of repeat revascularisation. LRiG state on page 33 that *"since this factor cannot be known when the choice of stent is made it is of no immediate value in assessing sub-groups with the highest risk of subsequent revascularisation"*. This assertion is not true. Trials consistently show that MLD after stenting is smaller than the reference vessel diameter. Thus, if DES are implanted in vessels <3mm diameter, the post-procedural MLD will invariably be <3mm.

- The relative risk for TLR with an MLD <3mm was 2.09 (95% CI 1.42-3.07, P = 0.0002) in the Toulouse study (Elbaz *et al* 2002). The odds ratio for TLR with an MLD <3mm was 2.05 (95% CI 1.77-2.34) in the Kastrati study (Kastrati *et al* 1997). These two studies showing MLD <3mm as predictive of repeat revascularisation are highly relevant and clearly demonstrate that this strongly predictive factor should be retained in the new guidance.

- Gotschall *et al* (2006) did not find that diabetes reached formal statistical significance as an independent predictor of 1-year TVR (OR 1.62, 0.85-3.06, p = 0.14), but in testing three different risk models, they concluded:
    - *"The results demonstrate that the model that most appropriately fit the data included the reference vessel diameter, lesion length and diabetes mellitus (Hosmer-Lemeshow goodness-of-fit statistic = 2.339; p = 0.969)."*
    - *"Indeed, the variables included in this (risk) score (reference vessel diameter, lesion length and diabetes mellitus) have also been consistently associated with outcomes in several clinical and experimental studies."*
    - *"The clinical implications of this study relate to the prediction of a new TVR after coronary stenting based on pre-procedural characteristics, which can aid to the decision to implant a drug-eluting or a bare metal stent."*

- Table 2 summarises the additional independent risk for repeat revascularisation posed by diabetes based on the studies in Table 1.

Study	Diabetes Risk Statistic (95% CI)
Agema et al 2004 (TVR)	RR = 1.52 (0.99-2.32)
Wu et al 2004 (first repeat revasc)	HR = 1.52 (1.03-2.23)
Kastrati et al 1997 (TLR)	OR = 1.45 (1.11-1.80)
Singh et al 2005 (TVR)	OR = 1.42 (1.08-1.87)
Iakovou et al 2003 (TLR)	OR = 1.00 (1.00-1.01)
Kornowski et al 1999 (TLR)	OR = 1.48 (1.12-1.82)
Jilaihawi et al 2005 (TLR)	RR = 1.8

Table 2. Risk of repeat revascularisation posed by diabetes as an independent risk factor. *Risk statistics are raw data as reported in each study, RR = relative risk, HR =hazard ratio, OR = odds ratio.*

Summary of Risk Factors for Repeat Revascularisation

- Long lesions, small vessels and diabetes are the most commonly occurring independent predictors of repeat revascularisation in BMS across many studies.
- LRiG have failed to present several important studies detailing predictors of repeat revascularisation both in the AR and the Addendum.
- The studies omitted by LRiG commonly find diabetes to be in independent predictor of repeat revascularisation.

Absolute Risk of Repeat Revascularisation in BMS

It is useful to recap the origin of the debate around the absolute risk of repeat revascularisation in BMS.

- LRiG asserted in the Bagust paper that protocol-mandated follow up angiograms in the randomised trials inflate repeat revascularisation rates beyond those that would have been observed in routine practice without mandated angiographic follow up.
- LRiG also asserted that corrections for this effect by reporting clinically-driven rates were still over-estimates because this definition still included revascularisations based on *"an in-lesion diameter stenosis >70% in the absence of ischaemic signs and symptoms.."*
- LRiG therefore sought data that reported lower rates from other sources including the CTC BCIS and Leicester databases.
- The Committee concluded that the CTC and Leicester registries were not reliable sources of repeat revascularisation rates and felt that the Scottish registry and the BASKET trial (Switzerland) may be more representative.
- LRiG looked at these and other data, attempting to make adjustments to estimate total revascularisation rates, 100% BMS usage and 12m rates.

We have a number of concerns with the new analysis undertaken by LRiG. These are first listed, then explained below:

- Failure of LRiG to clearly address the Committee's question of the absolute risk of revascularisation of BMS taken from the Scottish registry data
- Continued use of Total Revascularisations
- Conversion rate used for baseline data – converting to 100% BMS usage
- Conversation of data to 12 month outcomes

Absolute Risk of Repeat Revascularisation from the Scottish Registry

- LRiG dismiss the Scottish 2003/04 report as being *"out of line with the published paper from the same source"* (page 26). The basis of this comment is unclear as the Scottish publication (Pell *et al* 2001) gives a rate of 17.1% and the Scottish 2003/04 report gives a rate of 14.7%. These two figures are not out of line with each other.

- Scottish registry data for the specific year 2000/01, in which the stent usage was >80% (Pell and Slack 2004), show the repeat revascularisation rate to be **13%** (Figure 1 below). This figure, requested by the Committee, probably represents the most reliable estimation of repeat revascularisation rates in a general population from UK registry data but still may not capture events as completely as randomised trials. Higher risk groups of small vessels, longer lesions and diabetics will have higher rates.

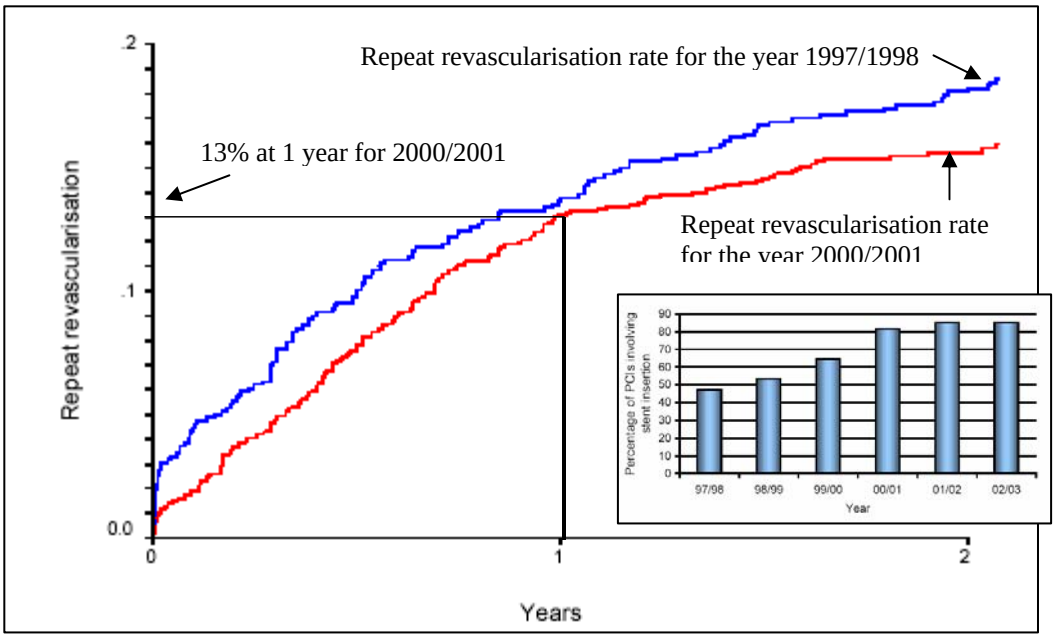


Figure 1. **Repeat revascularisation rates and stent usage from Scottish Revascularisation Register (Pell and Slack 2004).** *The 12m rate in 2000/2001 (prior to the introduction of DES) was 13%. Inset shows use of stents over time, ~ 47% in 1997/1998 and ~82% in 2000/2001. Repeat revascularisation rates are approximately the same for both years despite increased BMS usage, probably reflecting more complex case mix in the later year.*

Continued use of Total Revascularisations (Total Rev)

- The dependence of LRiG on this end-point is most likely driven by the fact that the CTC data are unable to differentiate between TLR, TVR and Total Rev in some cases (Original Assessment Report, 8.2.3), hence they cannot reliably model cost effectiveness based on TVR or TLR.

- LRiG attempt to convert TLR and TVR data from 6 other sources (Table 5.1 p 28) to Total Rev to maintain consistency with the CTC data. This estimation uses conversion factors derived from the CTC data. As the CTC data has already been judged unreliable, these conversions are also unreliable and introduce further errors into LRiG's results.

- TLR or TVR capture all of the additional costs and disutility of repeat revascularisation relevant to DES. The added complication of manipulating data to Total Rev is unnecessary clinically, introduces additional statistical uncertainty and relies on further unclear estimations of the risk reduction DES confer on Total Rev.

- The risk reductions DES confer on BMS TLR and TVR rates are known, transparent and subject to far less uncertainty than the multitude of corrections and estimates LRiG rely on in their continued use of Total Rev.

- In attempting to convert the BCIS and Leicester data to Total Rev, LRiG have neglected to account for repeat revascularisation by CABG. The Leicester (Glenfield) data only include TLR by PCI and the BCIS data only accounts for PCI for restenosis (Ludman 2004).

Conversion Rate Used for Baseline Data – converting to 100% BMS usage

- The BCIS data used to convert 'unstented' patients to 'stented' in Table 5.1 of the Addendum is recognised by the Committee as unreliable. Adjustments based on these data will also be unreliable and introduce yet more errors into LRiGs results.

- Even accepting the BCIS data, the calculation methods for this conversion are unclear. Converting the Scottish data (Table 5.1, Row 1, Pell-SCRR), an adjustment of 0.49 has been applied to adjust the data to account for 49% of patients receiving POBA (no stent). This reduces the TOTAL revascularisation rate in that population by half. What that means is that the relative risk of revascularisation in **POBA is three times higher than with a BMS**[1]. This magnitude of benefit was not observed during the original review of bare metal stents compared with POBA, TA no 4, May 2000. LRiG's estimates appear to be flawed.

Conversion of Data to 12-month Outcomes

- LRiG do not state what objective criteria they use to define the results of their data adjustments as acceptable not. LRiG appear happy to accept the results of their adjustments when the answers are low, yet dismiss the adjustment when the results are above an arbitrary threshold – P 26, pt 6:

  "For converting from 9 to 12 months follow-up we have applied a multiplier derived from the CTC revascularisation time profile. However, we found that adopting a similar approach to move from 6 to 12 months suggested unrealistically large adjusted rates."

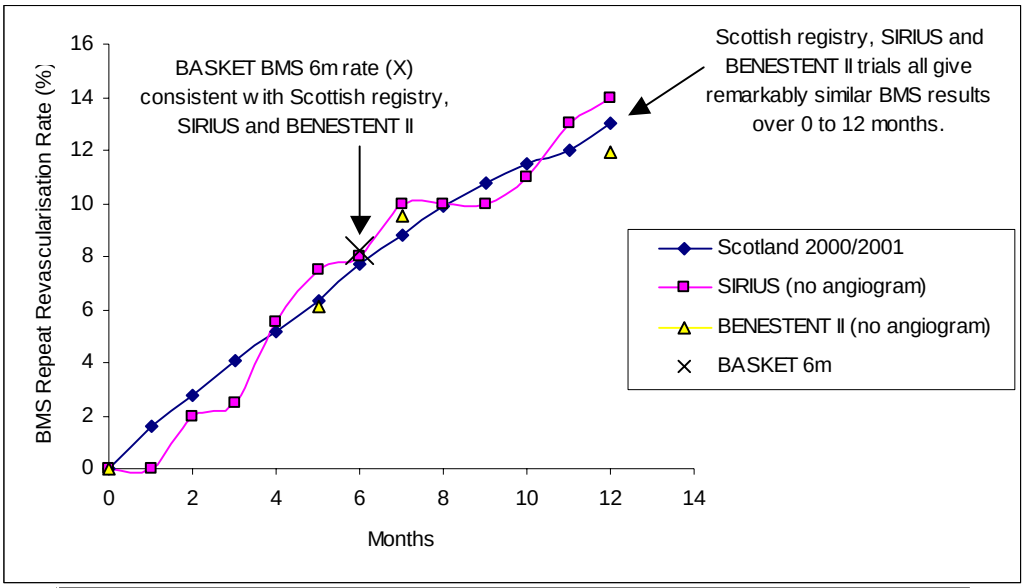
- Realistic estimates of increases in revascularisation rates from 6 to 12 months can be obtained from a number of sources; the Scottish 2000/2001 registry (Pell and Slack 2004), the SIRIUS trial BMS arm (patients without angiographic follow up, Holmes *et al* 2004) and the BENESTENT II trial BMS arm (patients without angiographic follow up, van Hout *et al* 2005) These data are shown in Figure 2 below.

- Figure 2 shows that LRiG's 6m to 12m conversion factor of 1.3 (Table 5.1) is unrealistically small and not consistent with the available evidence. This is not surprising as they describe their factor to be *"without specific evidence to support it"* (page 26).

- The true 6m to 12m conversion factor is in the order of **1.65**. Applying this to the BASKET trial 6m outcomes results in an estimate of **13.6% for 12m TVR** for an unselected 'base case' population.

- The rates LRiG dismiss as *"unrealistically large adjusted rates"* are actually in line with the Scottish registry, BASKET and many other published rates previously brought to the Committee's attention in our submission and response to the original Assessment Report. LRiG's systematic exclusion of these rates is perverse and not scientifically robust.

[1] For the adjusted risk of 8.4% to be correct, the contribution to the orginal rate of 17.1% from BMS patients must be 8.4%/2=4.2% (~50% population receiving BMS). Therefore, rate in original population due to POBA = 17.1%-4.2% = 12.9%. Relative difference 3 fold!



	6m rate (%)	12m rate (%)	6m-12m multipying factor
Scotland 2000/2001	7.7%	13.0%	1.69
SIRIUS BMS (no angio)	8.0%	14.0%	1.75
BENESTENT II BMS (no angio)	7.8%	11.9%	1.53
Mean 6m to 12m multiplying factor			1.65

Figure 2. Estimates of factors for converting 6m repeat revascularisation rates to 12m rates. *Scotland 2000/2001 = Scottish registry, SIRIUS = BMS rates from patients in the SIRIUS trial who did not have a protocol-mandated follow up angiogram, BENESTENT II = BMS rates from patients in the BENESTENT II trial who did not have a protocol-mandated follow up angiogram BASKET = actual 6m BMS result from BASKET study.*

- It should be noted from Figure 2 that the 12m rates from the randomised trials without the effect of the follow up angiogram are remarkably consistent with the Scottish registry data.

Summary of Absolute Risk of Repeat Revascularisation

- The repeat revascularisation rate from the Scottish registry prior to the introduction of DES (2000/2001) is **13%** for the general population.
- The estimated 12m overall TVR rate for the BASKET trial is **13.6%**.
- BCIA's previous submissions estimated a rate of **12%** from a range of sources that did not included a protocol-mandated angiogram.
- **The 12m BMS repeat revascularisation rate in an unselected population is therefore 12% to 14% when all data sources are considered and realistic adjustments from 6m to 12m are made.**
- UK and non-UK sources yield very similar results.

The Risk Reduction Gained from DES

- In Table A6.3 (page 38), LRiG present further cost effectiveness results for small vessels, diabetes and long lesions. These results are misleading because the Committee, in the specification of additional work, requested that a 12m timeline should be adopted. Instead, LRiG have used the 41% **6m relative risk reduction.**

- The randomised controlled trials of DES show that the risk reduction associated with DES increases between 6 and 12 months. The use of a 6m-risk reduction in LRiG's new analyses is inconsistent with the Committee's specification of additional work, will under-estimate the DES treatment effect at 12m and substantially over-estimate the ICER.

Overall Conclusions

- Long lesions and small vessels have been reconfirmed (and now accepted by LRiG on page 35 of the Addendum) as placing patients at increased risk of repeat revascularisation.

- Diabetes is also an independent predictor of repeat revascularisation.

- The absolute risk of repeat revascularisation in BMS is 13% for a general population in the Scottish registry and will be higher for long lesions, small vessels and diabetic patients.

- LRiG have under-estimated the risk reduction (treatment effect) conferred by DES.

- In under-estimating both the absolute risk of repeat revascularisation and the DES treatment effect, LRiG's cost effectiveness estimates are not representative of the benefit of DES in UK clinical practice.

- The current guidance correctly identifies patients with lesions >15mm length or vessels <3mm diameter as being at increased risk of repeat revascularisation. With no evidence to suggest that the treatment effect of DES has diminished since the original Guidance was issued, it follows that there is no reason to change the existing Guidance in this respect.

- In fact, as diabetes has been established as an independent predictor of repeat revascularisation, this Review should also recommend the use of DES for all diabetic patients undergoing PCI.

References

Agema WR, Monraats PS, Zwinderman AH, De Winter RJ, Tio RA, Doevendans PA, Waltenberger J, De Maat MP, Frants RR, Atsma DE, Van Der Laarse A, Van Der Wall EE, Jukema JW (2004). Current PTCA practice and clinical outcomes in The Netherlands: the real world in the pre-drug-eluting stent era. *Eur Heart J* 25(13):1163-1170.

Bagust A, Grayson AD, Palmer ND, Perry RA, Walley T (2005). Cost-effectiveness of drug-eluting coronary artery stenting in a UK setting: cost-utility study. *Heart* Apr 14; [Epub ahead of print].

Elbaz M, El Mokhtar E, Fourcade J, Mourali S, Hobeika R, Carrie D, Puel J (2002). Does stent design affect the long-term outcome after coronary stenting? *Catheterization & Cardiovascular Interventions* 56(305-311).

Ellis SG, Bajzer CT, Bhatt DL, Brener SJ, Whitlow PL, Lincoff AM, Moliterno DJ, Raymond RE, Tuzcu EM, Franco I, Dushman-Ellis S, Lander KJ, Schneider JP, Topol EJ (2004). Real-world bare metal stenting: identification of patients at low or very low risk of 9-month coronary revascularization. *Catheterization & Cardiovascular Interventions* 63(2):135-40.

Gottschall CAM, Quadros AS, MD, Sarmento-Leite R (2006). Predictive score for target vessel revascularization after bare metal coronary stenting. *J Inv Cardiol 18(1):22-26*.

Holmes DR, Leon MB, Moses, MD JW, Popma JJ, Cutlip D, Fitzgerald PJ, Brown C, Fischell T, Wong SC, Midei M, Snead D, Kuntz RE (2004). Analysis of 1-year clinical outcomes in the SIRIUS trial: a randomized trial of a sirolimus-eluting stent versus a standard stent in patients at high risk for coronary restenosis. *Circulation* 109:634-640.

Iakovou I, Mintz GS, Dangas G, Abizaid A, Mehran R, Lansky AJ, Kobayashi Y, Hirose M, Ashby DT, Stone GW, Moses JW, Leon MB (2003). Optimal final lumen area and predictors of target lesion revascularisation after stent implantation in small coronary arteries. *Am J Cardiol.* **92**(10):1171-1176.

Jilaihawi H, Khan S, Kovac J (2005). Low incidence of revascularisation of bare stents in the era of drug-eluting stents: a single tertiary centre experience. *Heart* **91** (Suppl 1):A5.

Kastrati A, Schömig A, Elezei S, Schulen H, Dirschinger J, Hadamitzky , Wehinger A, Hausleiter J, Walter H, Neumann F-J (1997). Predictive factors of restenosis after coronary stent placement. *JACC* **30**(6):1428-1436.

Kornowski R, Mehran R, Satler L, Pichard AD, Kent KM, Greenburg A, Mintz GS, Hong MH, Leon MB (1999). Procedural results and late outcomes following Multivessel coronary stenting. *J Am Coll Cardiology* **33**:420-426.

Ludman P (2004). BCIS audit returns adult interventional procedures 2003. www.bcis.org.uk/resources/audit/audit2003. Accessed 18th May, 2005.

Nikolsky E, Kosinski E, Mishkel GJ, Kimmelstiel C, McGarry TF Jr., Mehran R, Leon MB, Russell ME, Ellis SG, Stone GW (2005). Impact of obesity on revascularisation and restenosis rates after bare-metal and drug-eluting stent implantation (from the TAXUS-IV trial). *Am J Cardiol* **95**:709–715.

Pell J, Slack R (2004). The Scottish revascularisation Register: time trends 1997-2003. Greater Glasgow NHS Board.

Pell JP, Walsh D, Norrie J, Berg G, Colquhoun AD, Davidson K, Eteiba H, Faichney A, Flapan A, Hogg KJ, Jeffrey RR, Jennings K, McArthur J, Mankad P, Oldroyd K, Pell ACH, Starkey IR (2001). Outcomes following coronary bypass grafing and percutaneous transluminal coronary angioplasty in the sent era: a prospective study of 9890 consecutive patients operate on in Scotland over a two year period. *Heart* 85:662-666.

Singh M, Gersh BJ, McClelland RL, Ho KK, Willerson JT, Penny WF, Holmes DR Jr (2005). Predictive factors for ischemic target vessel revascularisation in the Prevention of Restenosis with Tranilast and its Outcomes (PRESTO) trial. *J Am Coll Cardiol.* **45**(2):198-203.

van Hout BA, Serruys PW, Lemos PA, van den Brand MJBM, van Es G-A, Lindeboom WK, Morice MC (2005). One year cost effectiveness of sirolimus eluting stents compared with bare metal stents in the treatment of single native de novo coronary lesions: An analysis from the RAVEL trial. *Heart* 91:507-512.

Wu AH, Goss JR, Maynard C, Stewart DK, Zhao XQ (2004). Predictors of repeat revascularisation after nonemergent, first percutaneous coronary intervention in the community. *Am Heart J* **147**(1):146-150.