# Drug-eluting Stents in Complex Lesion

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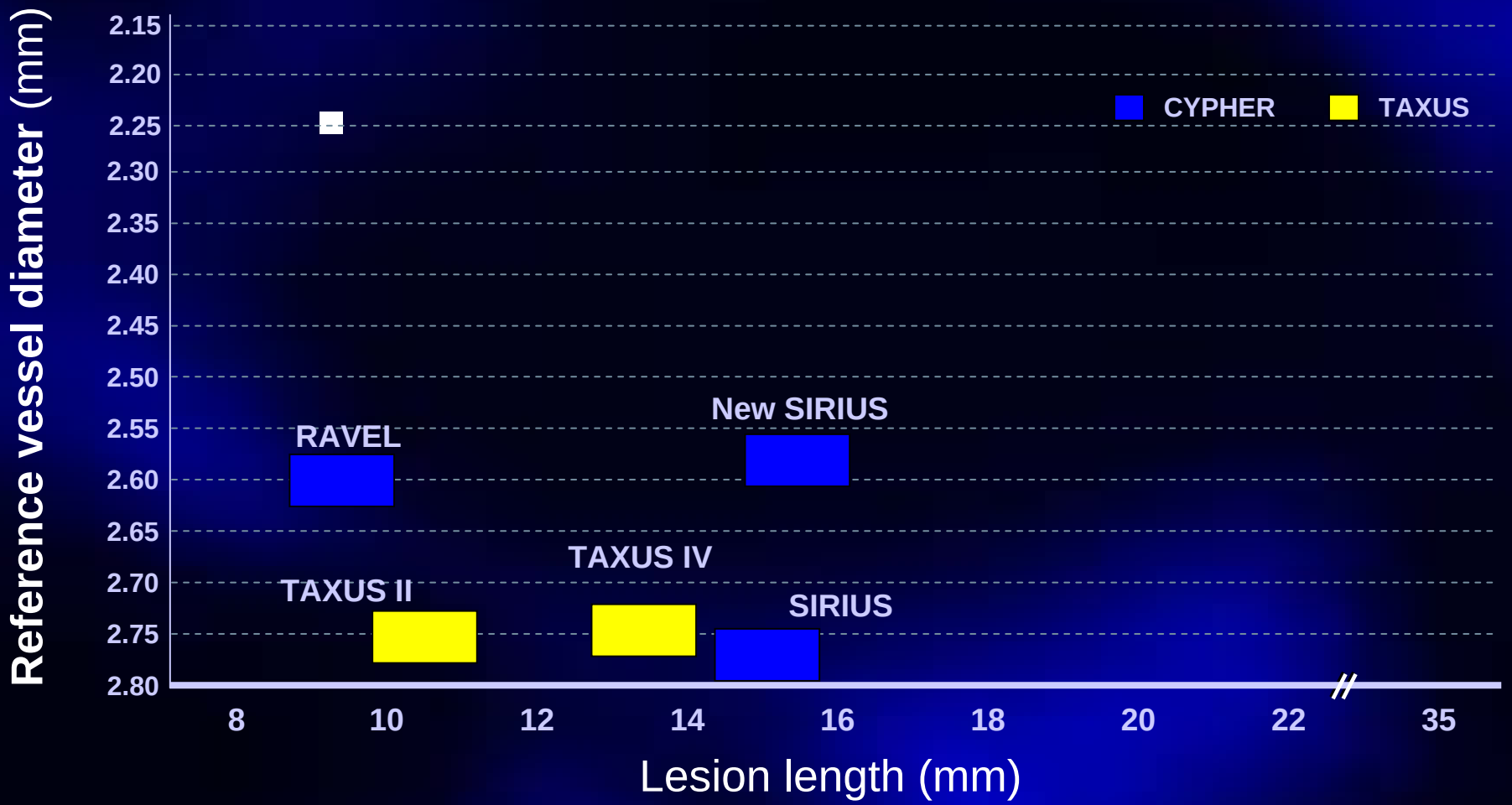
# 2003 추계 순환기학회

## Drug-Eluting Stent for All ?

## DEFAULT THERAPY?

YES!!!!

# Drug-eluting Stents
## Summary of Clinical Trial

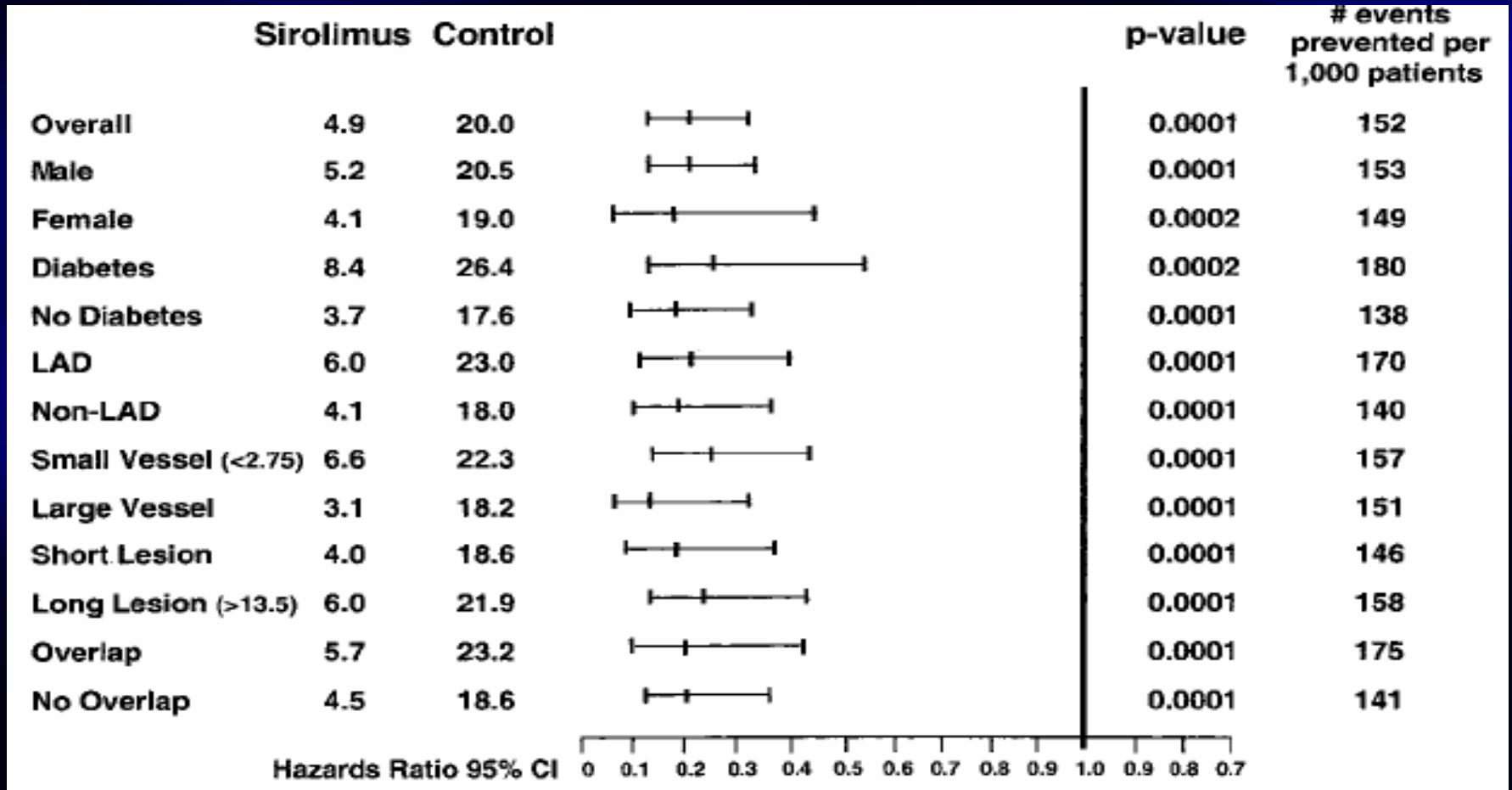


# Summary of Clinical trials with Drug-eluting Stent

| | RAVEL | SIRIUS (Inst/Inseg) | New-SIRIUS (Inst/Inseg) | TAXUS-I | TAXUS-II | TAXUS-IV (Inst/Inseg) |
|---|---|---|---|---|---|---|
| N | 238 | 1058 | 452 | 61 | 536 | 1326 |
| Late Loss, mm | -0.01 | 0.17/ 0.24 | 0.18/ 0.17 | 0.35 | - | 0.39/ 0.23 |
| Restenosis Rate, % | 0 | 3.2/8.9 | 3.1/5.1 | 0 | 6 | 5.5/7.9 |
| TLR | 0% (6Ms) | 4.1% (9Ms) | 4.0% (9Ms) | 3% | 3.1% | 3.0% |

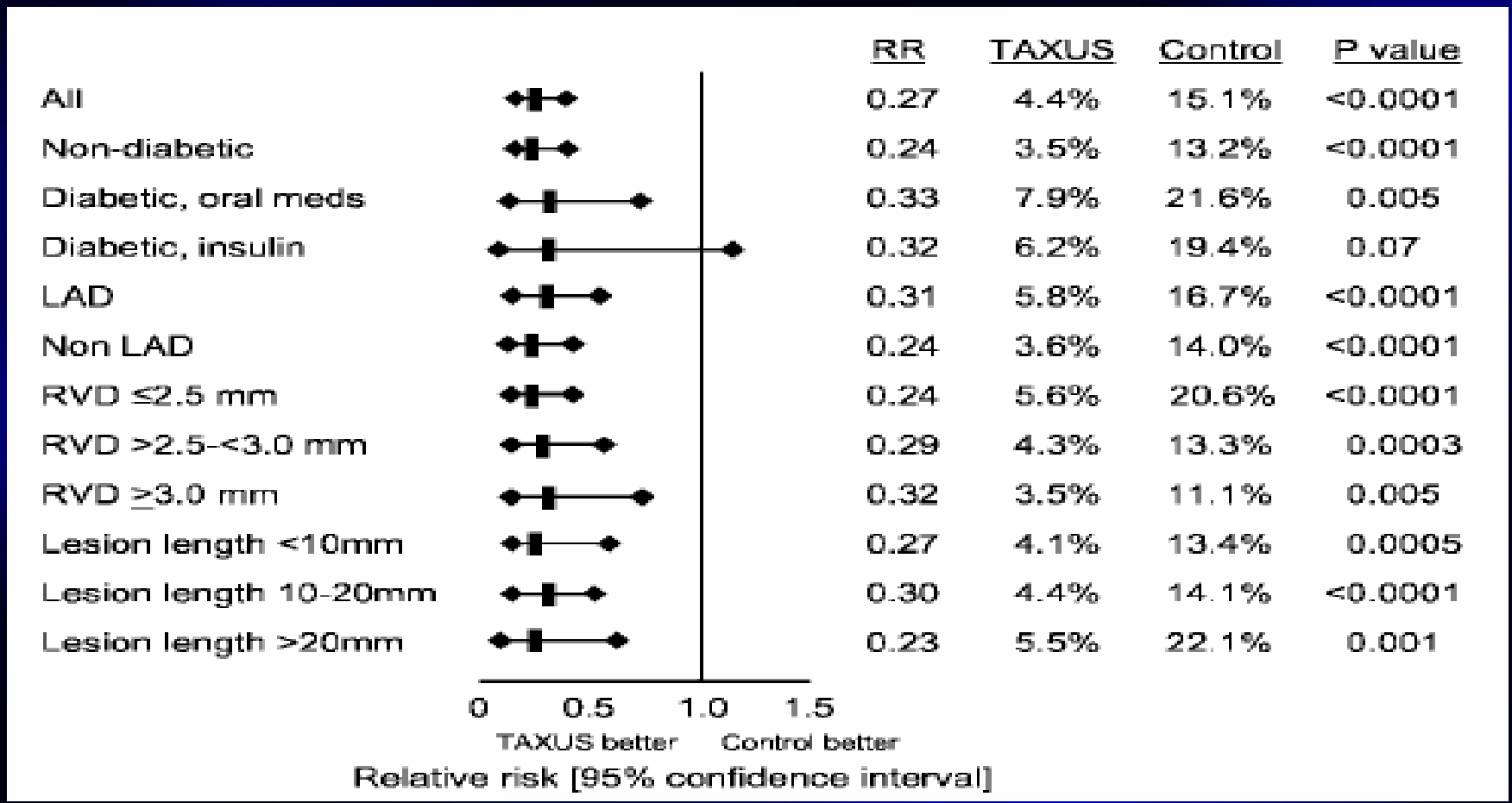
Inst/Inseg = In-stent/In-segment

# SIRIUS
## 1 Year TLR




Holmes et al. *Circulation* 2004;109:634-640

# TAXUS IV
## 1 Year TLR




Stone et al. *Circulation*. 2004;109:1942-1947

# RESEARCH Reg

(Enrollment April 2002 – Ja

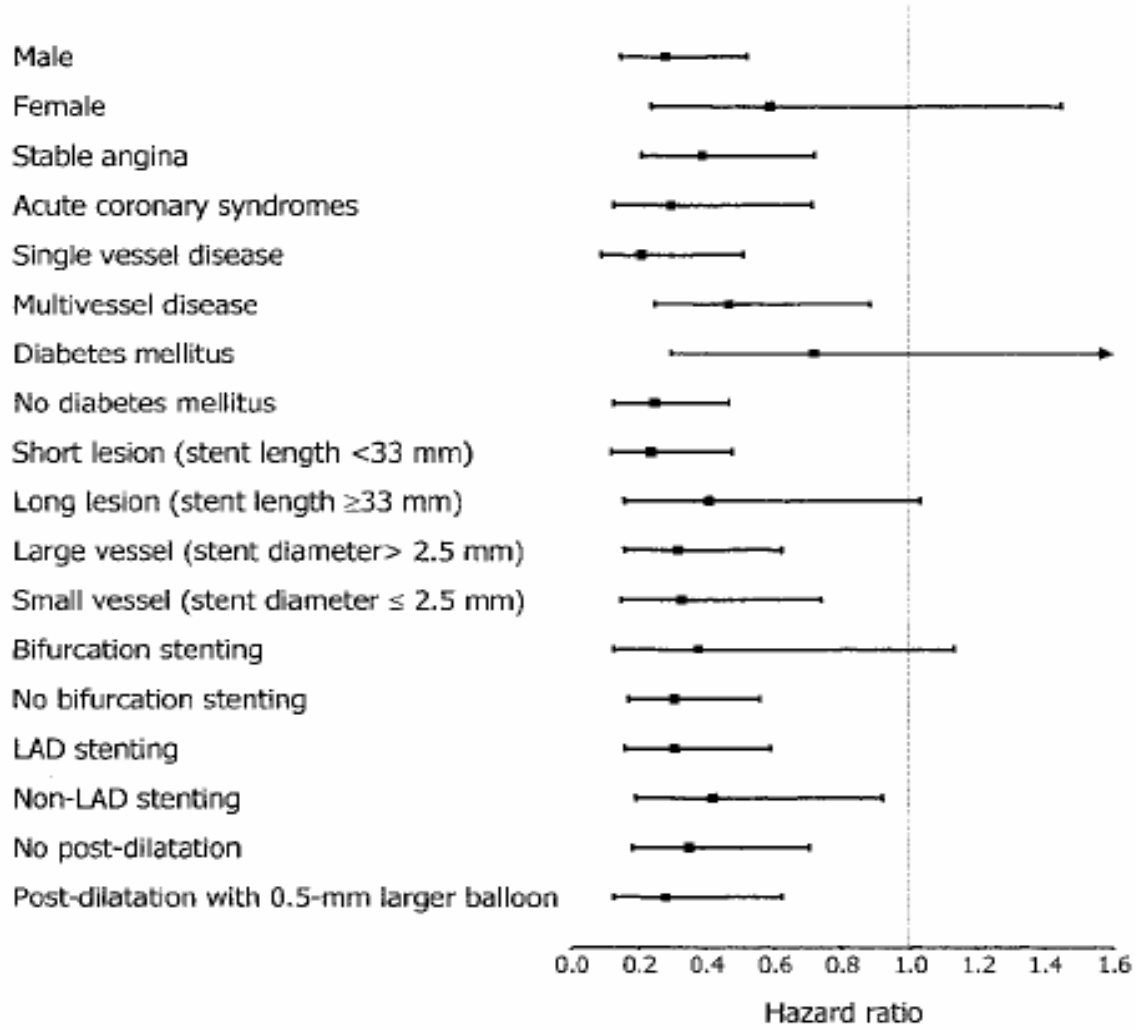
68% of patients would have been excluded from RCTs.

- Patients treated with at least 1 CYPHER Stent
- Number of CYPHER Stents per patient .2 ± 1.4

| | pts | (%) |
|---|---|---|
| **Age >75 years** | 153 | **(14%)** |
| **Multivessel dilatation** | 332 | **(31%)** |
| **Stent diameter = 2.25 mm** | 178 | **(16%)** |
| **Bifurcation stenting (stent + stent)** | 192 | **(18%)** |
| **Chronic total occlusion** | 119 | **(11%)** |
| **In-stent restenosis** | 97 | **( 9%)** |
| **Total stented length >48 mm/patient** | 346 | **(32%)** |
| **Left main coronary** | 47 | **( 4%)** |
| **Acute MI** | 189 | **(17%)** |

Modified from Serruys PW. RESEARCH Registry

# RESEARCH Registry




| | HR | 95% CI | p-value |
|---|---|---|---|
| Male | 0.28 | 0.15 - 0.52 | <0.001 |
| Female | 0.59 | 0.24 - 1.45 | 0.25 |
| Stable angina | 0.39 | 0.21 - 0.72 | 0.003 |
| Acute coronary syndromes | 0.30 | 0.13 - 0.71 | 0.006 |
| Single vessel disease | 0.21 | 0.09 - 0.51 | 0.001 |
| Multivessel disease | 0.47 | 0.25 - 0.88 | 0.02 |
| Diabetes mellitus | 0.72 | 0.30 - 1.77 | 0.50 |
| No diabetes mellitus | 0.25 | 0.13 - 0.47 | <0.001 |
| Short lesion (stent length <33 mm) | 0.24 | 0.12 - 0.48 | <0.001 |
| Long lesion (stent length ≥33 mm) | 0.41 | 0.16 - 1.03 | 0.06 |
| Large vessel (stent diameter> 2.5 mm) | 0.32 | 0.16 - 0.62 | 0.001 |
| Small vessel (stent diameter ≤ 2.5 mm) | 0.33 | 0.15 - 0.74 | 0.007 |
| Bifurcation stenting | 0.38 | 0.13 - 1.13 | 0.08 |
| No bifurcation stenting | 0.31 | 0.17 - 0.56 | <0.001 |
| LAD stenting | 0.31 | 0.16 - 0.59 | <0.001 |
| Non-LAD stenting | 0.42 | 0.19 - 0.92 | 0.03 |
| No post-dilatation | 0.35 | 0.18 - 0.70 | 0.003 |
| Post-dilatation with 0.5-mm larger balloon | 0.28 | 0.13 - 0.62 | 0.002 |

*Lemos PA et al. Circulation* 2004;109:190-195

# Wonju Profiles of DES Application

## Baseline Characteristics

| | Total | Cypher | TAXUS |
|---|---|---|---|
| Patient, n | 716 | 529 | 187 |
| Male, % | 60 | 61.1 | 57.4 |
| Age, yrs | 62.3±10 | 61.9±10.4 | 63.4±8.9 |
| Hypertension, % | 44.8 | 43.7 | 47.5 |
| DM, % | 29.9 | 28.0 | 34.3 |
| Smoking, % | 30.9 | 32.8 | 26.2 |
| Hyperlipidemia, % | 62.8 | 62.0 | 64.8 |
| Previous PCI, % | 16.7 | 17.4 | 16 |

# Wonju Profiles of DES Application

## Baseline Characteristics

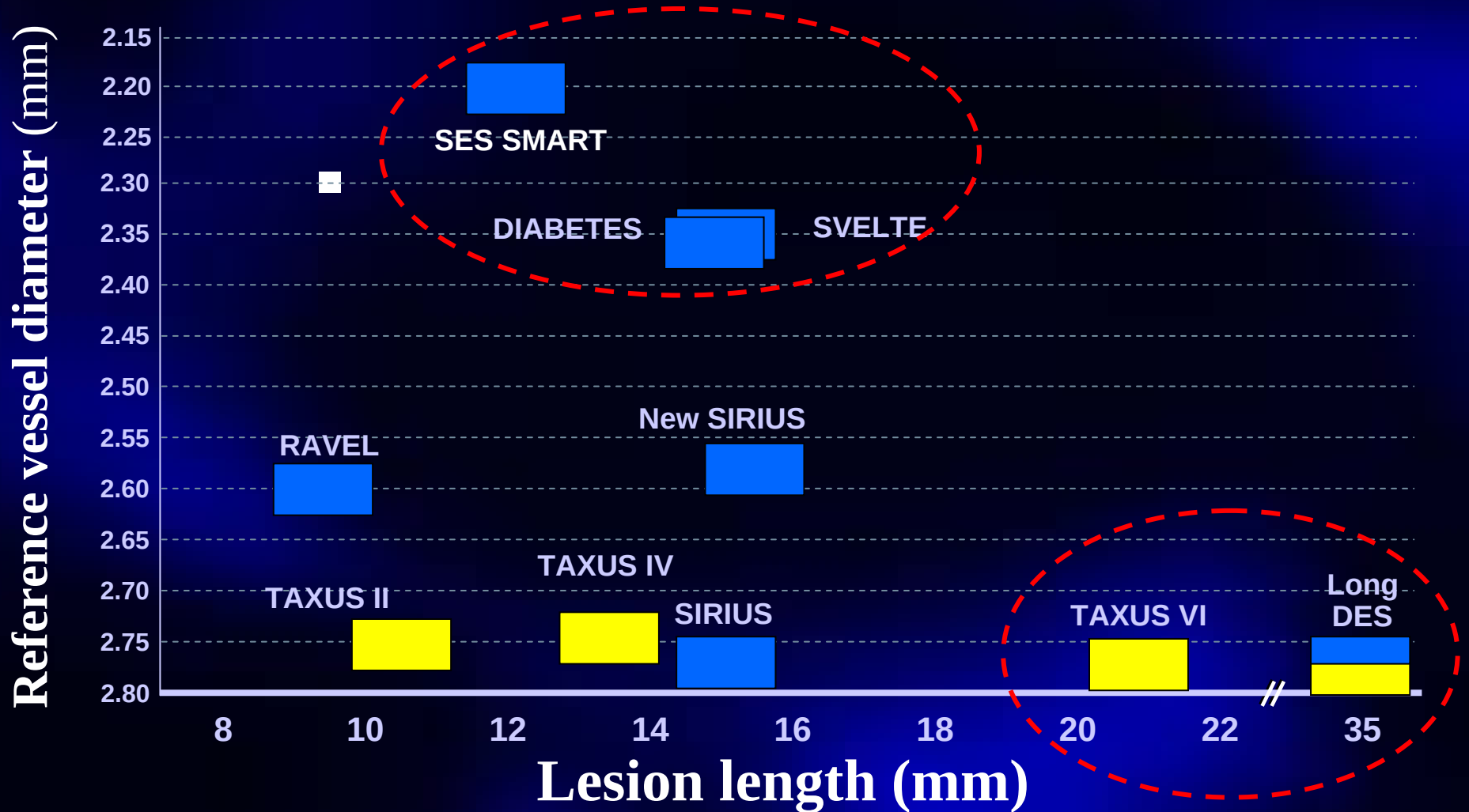
| Clinical diagnosis | Cypher | TAXUS |
|---|---|---|
| Vessel dz: 1/2/3 VD, % | 46.2/36.5/17.4 | 42.1/33.7/24.2 |
| Multivessel disease, % | 53.9 | 57.9 |
| Clinical diagnosis, % | | |
| Stable angina | 20.9 | 23.8 |
| Unstable angina | 31.7 | 41.0 |
| Variant angina | 1.1 | 0.4 |
| STEMI | 22.4 | 20.7 |
| Recent MI | 8.8 | 5.7 |
| NSTEMI | 8.0 | 4.2 |

# Wonju Profiles of DES Application

## Angiographic Data

| | Total (n=913) | Cypher (n=654) | TAXUS (n=259) |
|---|---|---|---|
| Lesion length, mm | 17.9±10 | 18.1±9.7 | 17.5±10.7 |
| Stent length, mm | 24.7±6.2 | 25.2±6.3 | 23.4±5.8 |
| Ostial lesion, % | 13.4 | 13.5 | 13.1 |
| Lt main, % | 3.9 | 4.0 | 3.8 |
| Bifurcation lesion, % | 16.2 | 14.8 | 20.0 |
| B2 / C lesion, % | 32.9 / 33.6 | 32.4 / 33.6 | 34.1 / 33.6 |
| Focal (<10mm), % | 18.0 | 17.7 | 18.6 |
| Long, diffuse (>20mm), % | 32.1 | 33.8 | 27.7 |
| CTO, % | 5.9 | 6.3 | 5.0 |

# DES Trials
## Lesion length and RVD



# What would be issues in DES for complex lesion?

- **Maintaining the benefit of DES in complex lesion?**
- **Safety profile?**
- **Technical difficulty in complex lesions ??**

# Drug-eluting Stents: Trial Results

- **Initial Randomized study**
  - **RAVEL, SIRIUS, New-SIRIUS**
  - **TAXUS-II, TAXUS-IV**
- **DES in Patients at High Risk of Restenosis**
  - **DM: SIRUS, New-SIRIUS, TAXUS-IV, DIABETES, ISAR-DIABETES, Registries, TAXUS VI**
  - **AMI and SVG: RESEARCH registry, Observational studies**
- **DES in Complex Lesions**
  - **Small Vessels: SIRUS, New-SIRIUS, TAXUS-IV, SVELTE, SES-SMART, TAXUS-V**
  - **Long Lesions: SIRUS, New-SIRIUS, TAXUS-IV, Park-Long study, TAXUS-V, TAXUS-VI**
  - **In-stent Restenosis: ISAR-DESIRE, TROPICAL, e-Cypher registry**
  - **Bifurcation: Colombo study**
  - **Chronic Total Occlusions:**

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# TAXUS VI: Stent thrombosis

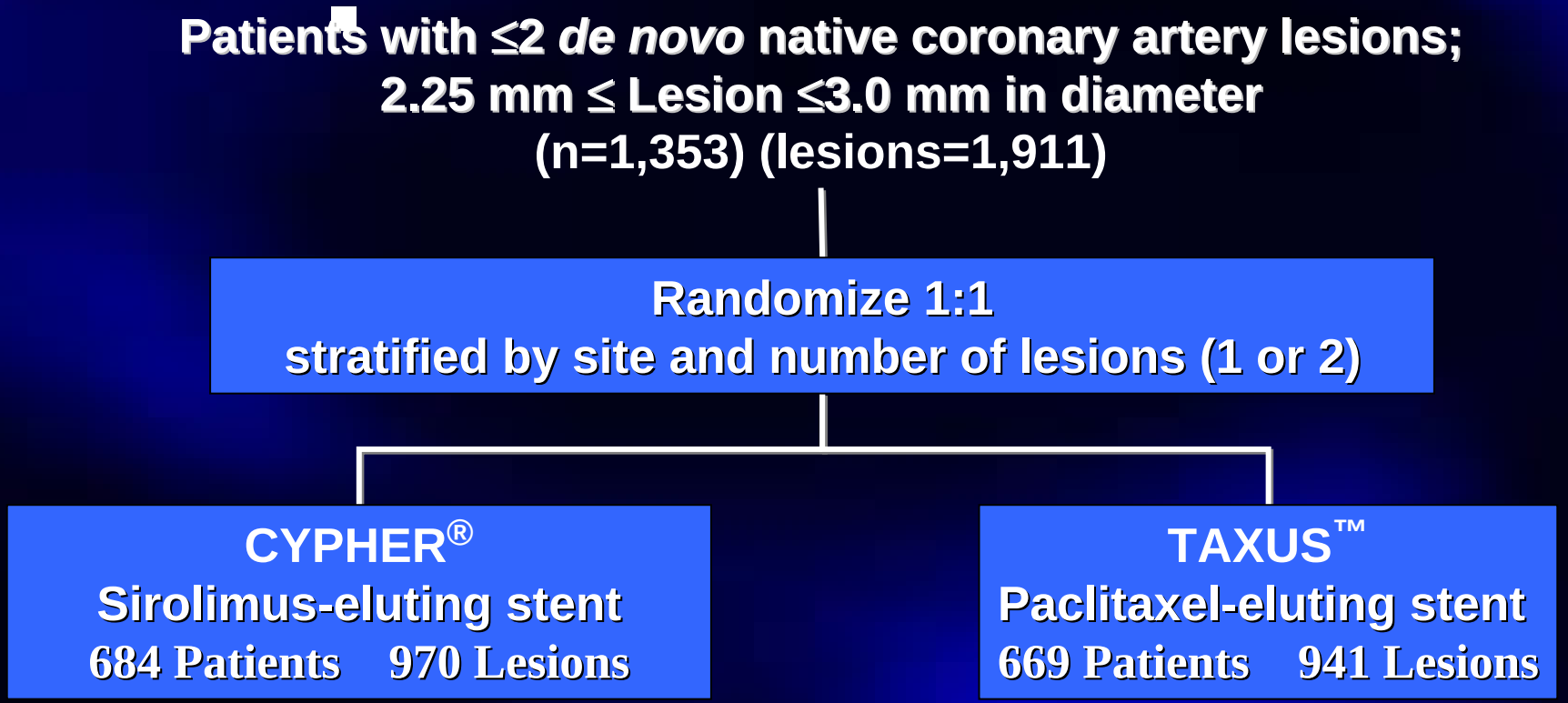
| | Control N=227 | TAXUS MR N=219 | P value |
|---|---|---|---|
| In Hospital | 1 (0.4 %) | 0 | 1.00 |
| Hospital to 30 days | 2 (0.9 %) | 1 (0.5 %) | 1.00 |
| 31-180 days | 0 | 0 | N/A |
| *cessation of clopidogrel* | | | |
| 181-300 days | 0 | 0 | N/A |

Taxus= Taxus™ Paclitaxel Eluting Stent  Control= Bare Metal Stent

Modified from Grube E.

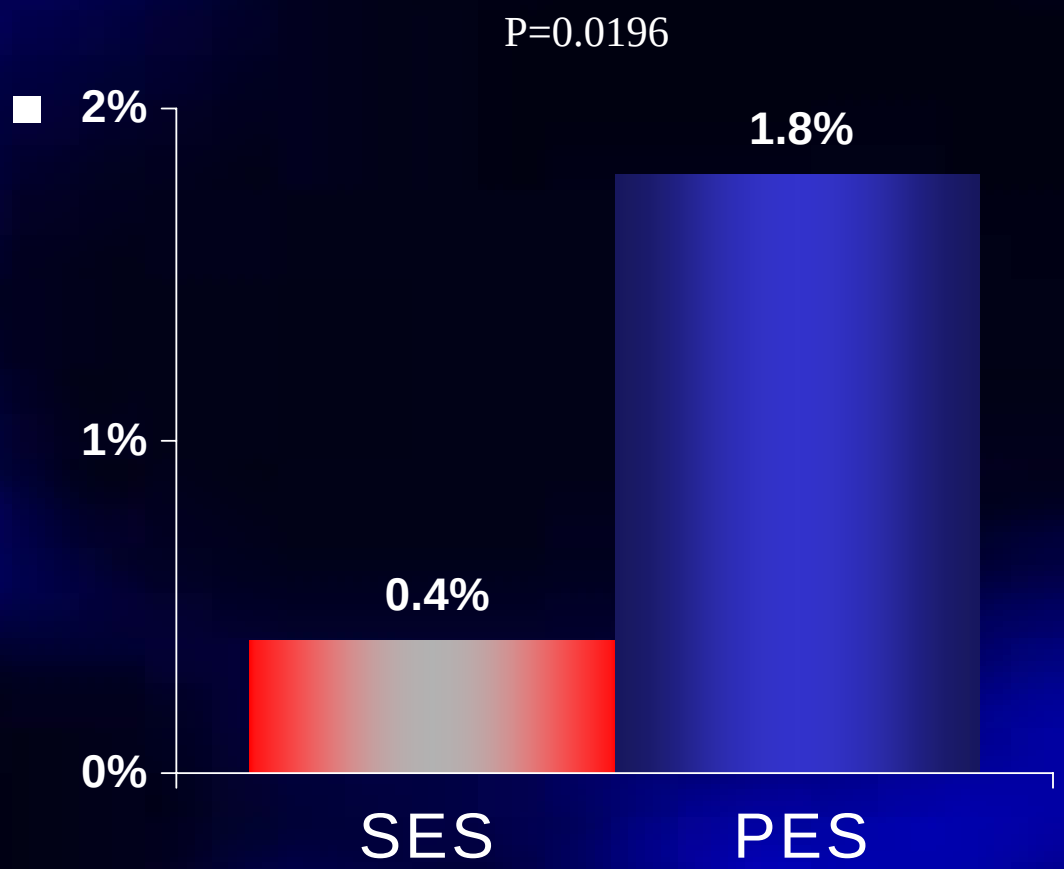
# REALITY

## A prospective, randomised, multi-center comparison study of the Sirolimus-eluting and Paclitaxel-eluting stent system Study Design




Marie-Claude Morice, ACC 2005

# REALITY: Stent Thrombosis

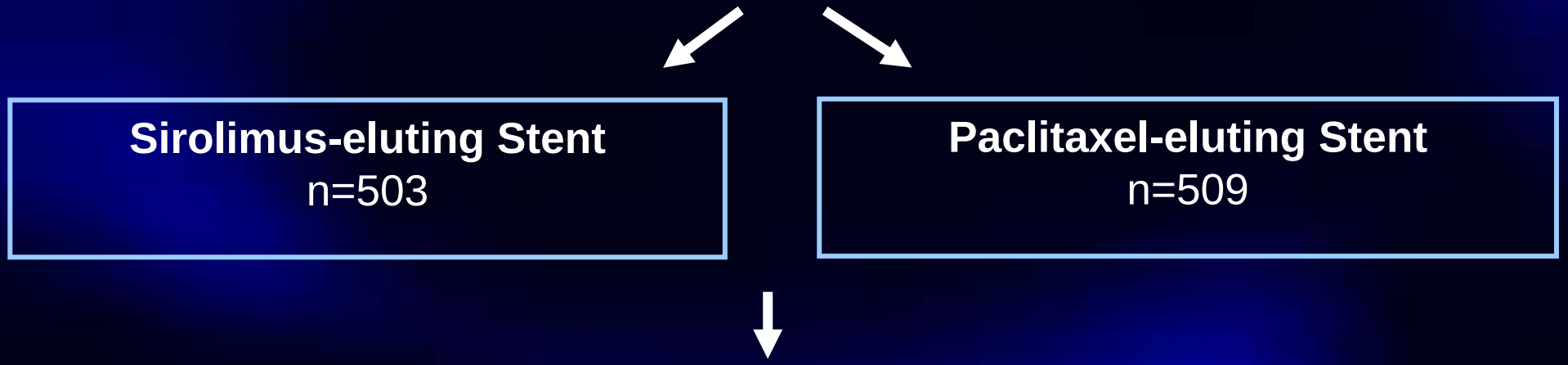



Marie-Claude Morice, ACC 2005

# SIRTAX Trial

1012 patients with symptomatic coronary artery disease, presence of at least one lesion covered with one or multiple stents of ≥50% stenosis, and anatomy suitable for coronary stenting

Randomized, single center

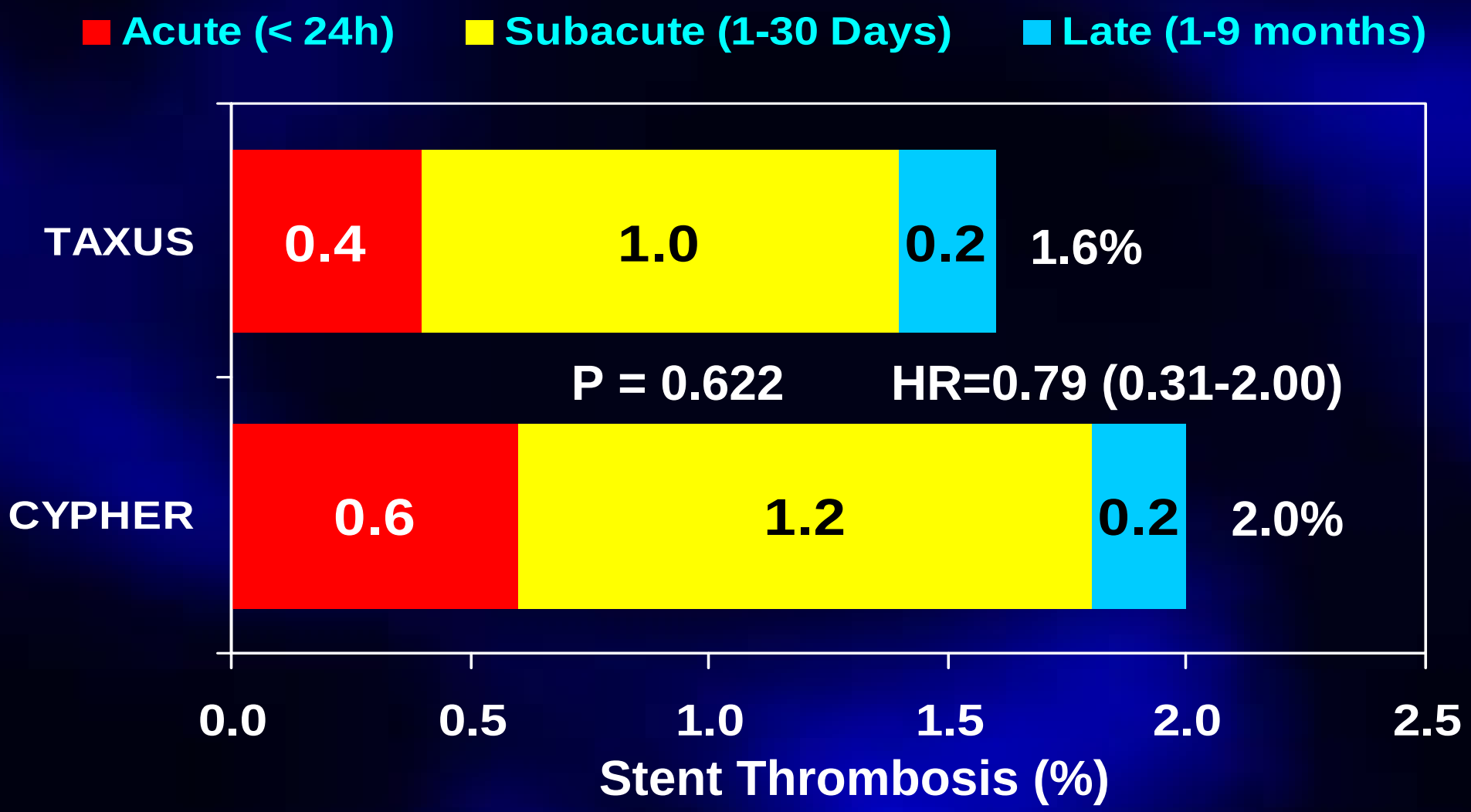



Endpoints (9 months):

MACE: Cardiac death, myocardial infarction (MI), or target lesion revascularization

***Presented at ACC 2005***

# SIRTAX: Stent Thrombosis




Windecker S., et al., ACC 2005

# What would be issues in DES for complex lesion?

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# *SIRTAX*
# Procedural Outcome

| ■ | CYPHER (n = 693) | TAXUS (n = 708) | P |
|---|---|---|---|
| Device Success (%) | 99.0 | 98.6 | 0.63 |
| Lesion Success (%) | 99.4 | 99.0 | 0.55 |
| Device Crossover (%) | 0.7 | 0.6 | 0.75 |
| Intraprocedural complications (%) | 2.0 | 2.0 | 0.95 |

Windecker S., et al., ACC 2005

# Conclusions

- In real world, we are treating more complex lesions.
- DES including The CYPHER stent and TAXUS stent have demonstrated unsurpassed efficacy across the board in randomized controlled clinical trials and “real world” registries in terms of efficacy and safety.
- Reduced late loss appears to confer improved clinical outcomes in more complex lesions and high risk patients.
- Based on limited data, stent thrombosis seems to be increased in some studies.
- Need an improved stent platform and polymer to improve the deliverability of DES in tortuous, calcified lesion and reduce the stent thrombosis