2024 MID-ATLANTIC CONFERENCE

12th ANNUAL CURRENT CONCEPTS IN

VASCULAR THERAPIES

2024

Hilton Virginia Beach Oceanfront
Virginia Beach, Virginia

APRIL 18-20

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Non-Cardiac Surgery and Percutaneous Coronary Intervention

Presented by:

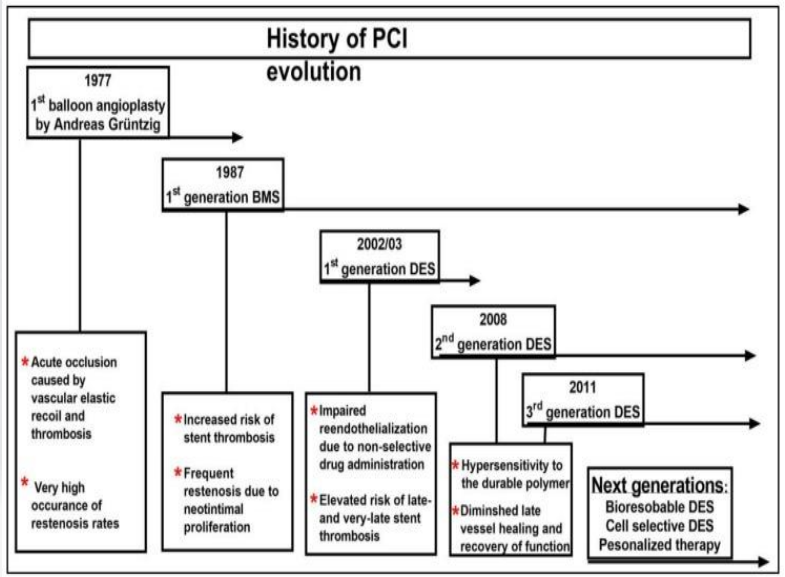
Vanessa Obas, MD, FACC, FSCAI

Outline

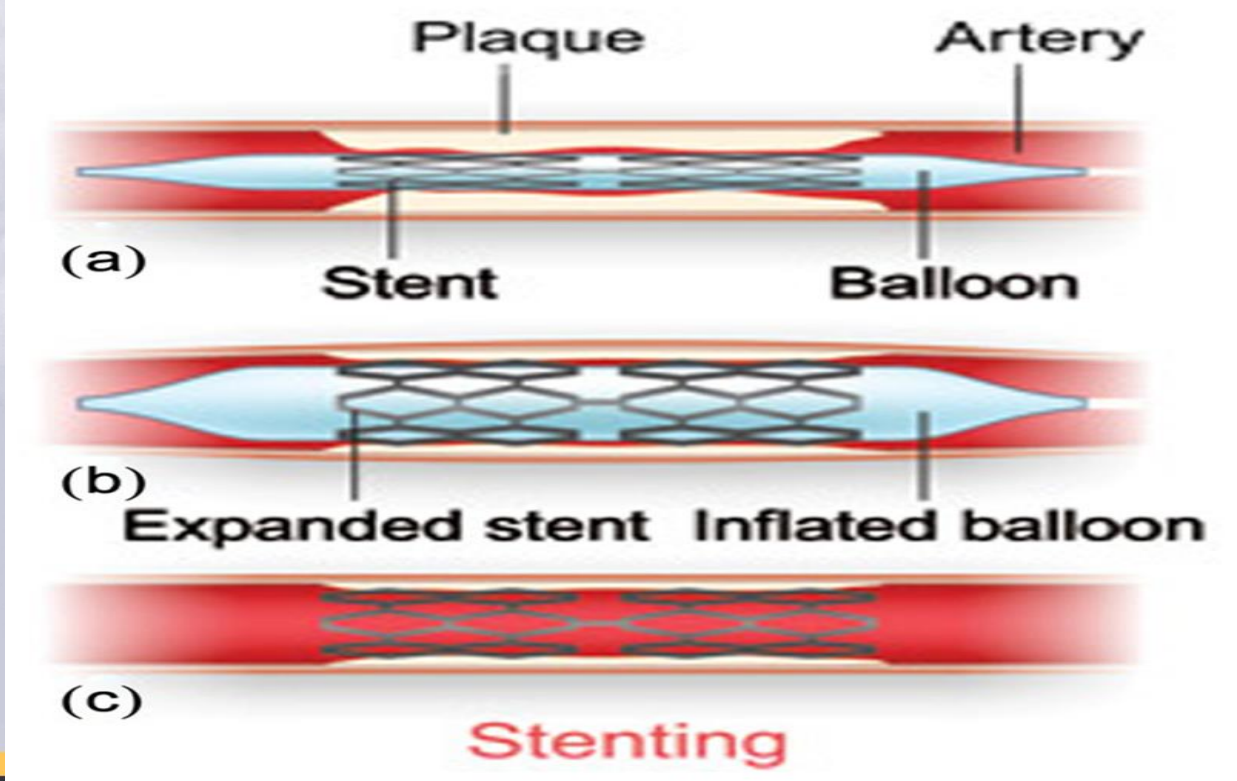
- Landscape of PCI
- Pre-operative cardiac evaluation
- Timing of Non-cardiac surgery
- Peri-operative management of CV patients

Adolph Bachmann

- In 1772, the term “angina pectoris” was introduced by William Heberden to describe the sensation of “strangling and anxiety” in the chest
- September 16, 1977: 38 year-old male with angina who underwent the first balloon angioplasty by Andreas Gruntzig



Percutaneous Coronary Intervention



Livingston, V., & Iqbal, A. (2016). Coating Techniques and Release Kinetics of Drug-Eluting Stents. *Journal of medical devices, 10 1*.

Landscape of Stents

- ~~BMS~~
- DES
  - stent properties to inhibit recoil and negative remodeling
  - drugs that inhibit neointimal proliferation

Recommendation for Choice of Stent Type
Referenced studies that support the recommendation are summarized in Online Data Supplement 24.

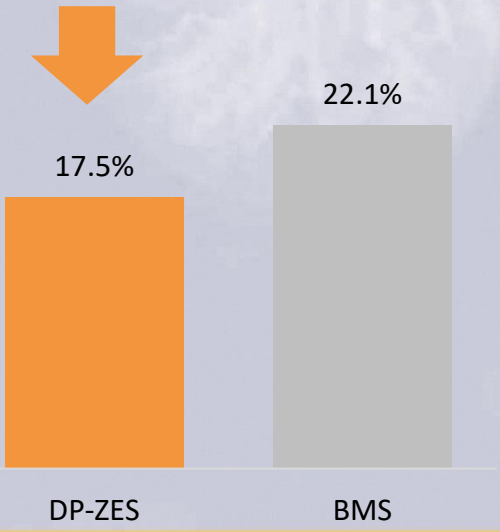
COR	LOE	Recommendation
1	A	1. In patients undergoing PCI, DES should be used in preference to BMS to prevent restenosis, MI, or acute stent thrombosis.[1-4]

What about BMS?

E-ZES: ZEUS

Uncertain DES candidates with 1-mo DAPT

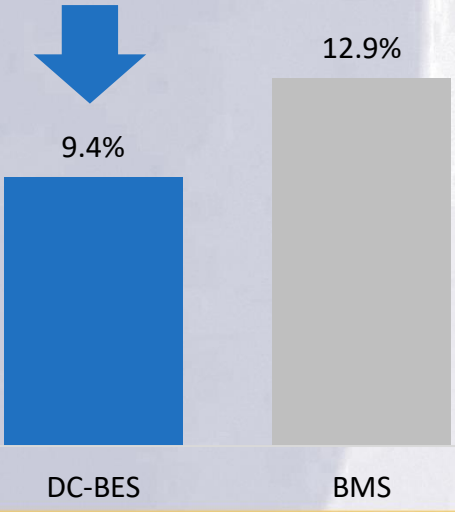
Death/MI/TVR at 1 year



DC-BES: LEADERS FREE

HBR patients with 1-mo DAPT

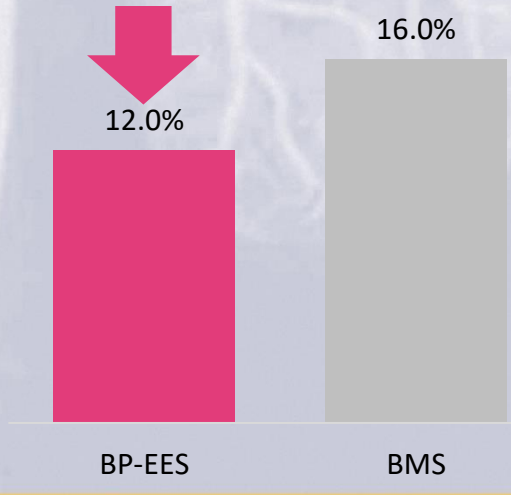
CD, MI or ST at 1 year



BP-EES: SENIOR

≥75 years patients with 1-6 mo DAPT

D/MI/Stroke/TLR at 1 year



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Landscape of Stents

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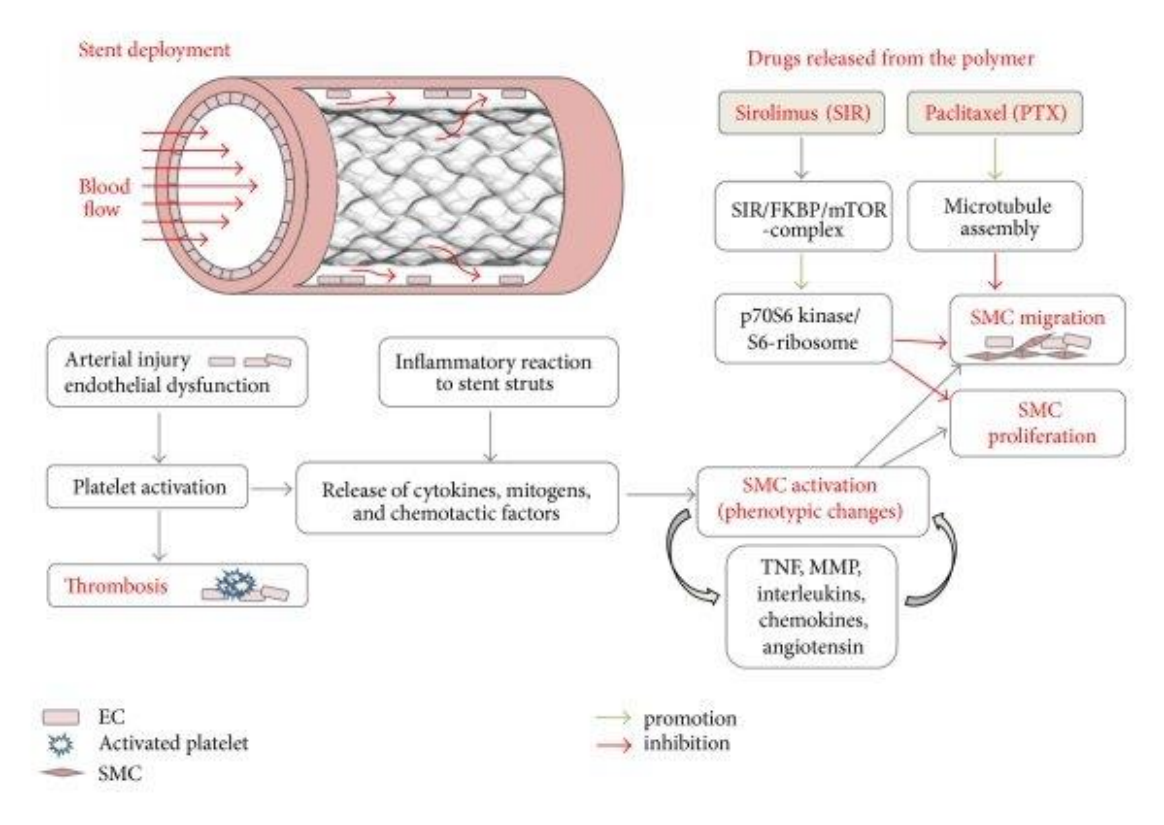
Landscape of Stents

Drug Eluting Stents



Strohbach, Anne & Busch, Raila. (2015). Polymers for Cardiovascular Stent Coatings. International Journal of Polymer Science. 10.1155/2015/782652.

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Outline

- Landscape of PCI
- **Pre-operative cardiac evaluation**
- Timing of Non-cardiac surgery
- Peri-operative management of CV patients

2016 ACC/AHA Guideline Focused Update on Duration of Dual Antiplatelet Therapy in Patients With Coronary Artery Disease

Developed in Collaboration with American Association for Thoracic Surgery, American Society of Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Anesthesiologists, and Society of Thoracic Surgeons

Endorsed by Preventive Cardiovascular Nurses Association and Society for Vascular Surgery

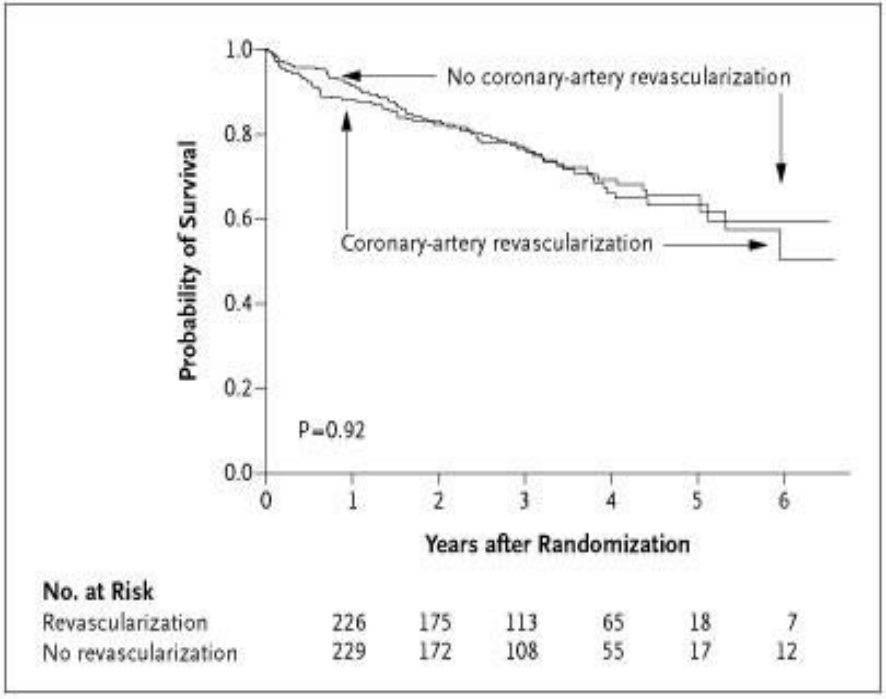
Pre-operative Cardiac Evaluation

Patients with significant CAD who are undergoing high-risk surgery, such as vascular surgery, have an increased incidence of perioperative cardiovascular events.

Routine Revascularization before Vascular Surgery

- Coronary Artery Revascularization Prophylaxis (CARP) Trial

- Randomized 510 asymptomatic patients with ≥1 significant coronary lesion to revascularization with PCI or CABG or to medical therapy and found no difference in 30-day and 1-year rates of death or MI.



Pre-operative evaluation for Non-Cardiac Surgery

Recommendation for Revascularization in Patients Before Noncardiac Surgery
Referenced studies that support the recommendation are summarized in Online Data Supplement 20.

COR	LOE	Recommendation
3: No benefit	B-R	1. In patients with non–left main or noncomplex CAD who are undergoing noncardiac surgery, routine coronary revascularization is not recommended solely to reduce perioperative cardiovascular events.[1]

Routine prophylactic revascularization does not reduce the risk of death or cardiovascular events.

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2022 European Society of Cardiology Guidelines on cardiovascular assessment and management of patients undergoing non-cardiac surgery

<65 years of age, with no CV risk factors:

- No cardiac testing is recommended before low-risk or intermediate-risk NCS.
- **Electrocardiogram (ECG) and biomarkers are recommended only for high-risk NCS, if age ≥45 (Class IIa).**
- ECG plus transthoracic echocardiography (TTE) are recommended with family history of genetic cardiomyopathy (Class I).

2022 ESC Guidelines

≥65 years of age, or with CV risk factors:

- No cardiac testing is recommended before low-risk surgery.
- **ECG and biomarkers are recommended for intermediate- and high-risk NCS (Class I).**
- **Functional capacity assessment is recommended for intermediate- and high-risk NCS (Class IIa).**

2022 ESC Guidelines

Unspecified age, with established CV disease (CVD):

- No cardiac testing is recommended before low-risk surgery.
- ECG and biomarkers are recommended for intermediate- and high-risk NCS (Class I).
- Functional capacity assessment is recommended for intermediate- and high-risk NCS (Class IIa).
- **Cardiology consultation plus multidisciplinary discussion are recommended in high-risk surgery.**

2022 ESC Guidelines: Symptomatic Patient

1. For newly detected chest pain suggestive of undetected coronary artery disease:
    1. Further CV workup is recommended prior to elective NCS (Class I, LOE C).
    2. Multidisciplinary assessment is recommended prior to urgent NCS (Class I, LOE C).

Summarizing the Pre-operative evaluation

- Patient-specific risk factors identified and optimized
- Stratification of surgical risk as low, intermediate, or high
- Role of revascularization prior to Non-Cardiac Surgery

Outline

- Landscape of PCI
- Pre-operative cardiac evaluation
- **Timing of Non-cardiac surgery**
- Peri-operative management of CV patients

2022 ESC Guidelines: Elective NCS

- Elective NCS after elective percutaneous coronary intervention (PCI) or acute coronary syndrome (ACS) should be delayed
  - 6 months after elective PCI
  - 12 months after ACS (Class I, LOE A).
- Time-sensitive NCS after elective PCI should be delayed until a minimum of 1 month of dual antiplatelet therapy (DAPT) has been given (Class I, Level of Evidence B).

Perioperative Management–Timing of Elective Noncardiac Surgery in Patients Treated With PCI and DAPT

COR	LOE	Recommendations
I	B-NR	Elective noncardiac surgery should be delayed 30 days after BMS implantation and optimally 6 months after DES implantation.
I	C-EO	In patients treated with DAPT after coronary stent implantation who must undergo surgical procedures that mandate the discontinuation of $P2Y_{12}$ inhibitor therapy, it is recommended that aspirin be continued if possible and the $P2Y_{12}$ platelet receptor inhibitor be restarted as soon as possible after surgery.
IIa	C-EO	When noncardiac surgery is required in patients currently taking a $P2Y_{12}$ inhibitor, a consensus decision among treating clinicians as to the relative risks of surgery and discontinuation or continuation of antiplatelet therapy can be useful.

2022 ESC Guidelines: Time-sensitive NCS

- For patients receiving recent PCI treatment for ACS, who require time-sensitive NCS:
  - uninterrupted DAPT for at least 3 months should be considered (Class IIa, LOE C).
- Time-sensitive NCS after elective PCI :
  - uninterrupted DAPT for at least 1 month

Perioperative Management–Timing of Elective Noncardiac Surgery in Patients Treated With PCI and DAPT (cont'd)

COR	LOE	Recommendations
IIb	C-EO	Elective noncardiac surgery after DES implantation in patients for whom $P2Y_{12}$ inhibitor therapy will need to be discontinued may be considered after 3 months if the risk of further delay of surgery is greater than the expected risks of stent thrombosis.
III: Harm	B-NR	Elective noncardiac surgery should not be performed within 30 days after BMS implantation or within 3 months after DES implantation in patients in whom DAPT will need to be discontinued perioperatively.

Outline

- Landscape of PCI
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- Timing of Non-cardiac surgery
- **Peri-operative management of CV patients**

DAPT

- DAPT with aspirin and oral P2Y12 inhibitors remains the cornerstone of therapy for the prevention of thrombotic complications with PCI.
- The contemporary oral P2Y12 inhibitors used in PCI include clopidogrel, ticagrelor, and prasugrel.

P2Y12 Receptor Inhibitors

$P2Y_{12}$ receptor inhibitors for use in non-ST-segment elevation acute coronary syndrome patients

	Oral administration			**i.v. administration**
	Clopidogrel	**Prasugrel**	**Ticagrelor**	**Cangrelor**
Drug class	Thienopyridine	Thienopyridine	Cyclopentyl-triazolopyrimidine	Adenosine triphosphate analogue
Reversibility	Irreversible	Irreversible	Reversible	Reversible
Bioactivation	Yes (pro-drug, CYP dependent, 2 steps)	Yes (pro-drug, CYP dependent, 1 step)	No[a]	No
(Pretreatment)-Dose	600 mg LD, 75 mg MD	60 mg LD, 10 (5) mg MD	180 mg LD, 2 × 90 (60) mg MD	30 µg/kg i.v. bolus, 4 µg/kg/min i.v. infusion for PCI
Onset of effect	Delayed: 2–6 h	Rapid: 0.5–4 h	Rapid: 0.5–2 h	Immediate: 2 min
Offset of effect	3–10 days	5–10 days	3–4 days	30–60 min
Delay to surgery	5 days	7 days	5 days	No significant delay
Kidney failure	No dose adjustment	No dose adjustment	No dose adjustment	No dose adjustment
Dialysis or CrCl <15 mL/min	Limited data	Limited data	Limited data	Limited data

CrCl = creatine clearance; CYP = cytochrome P450; i.v. = intravenous; LD = loading dose, MD = maintenance dose, PCI = percutaneous coronary intervention.

a Following intestinal absorption, ticagrelor does not need to be metabolized to inhibit platelets. Of note, a metabolite (AR-C124910XX) of ticagrelor is also active.

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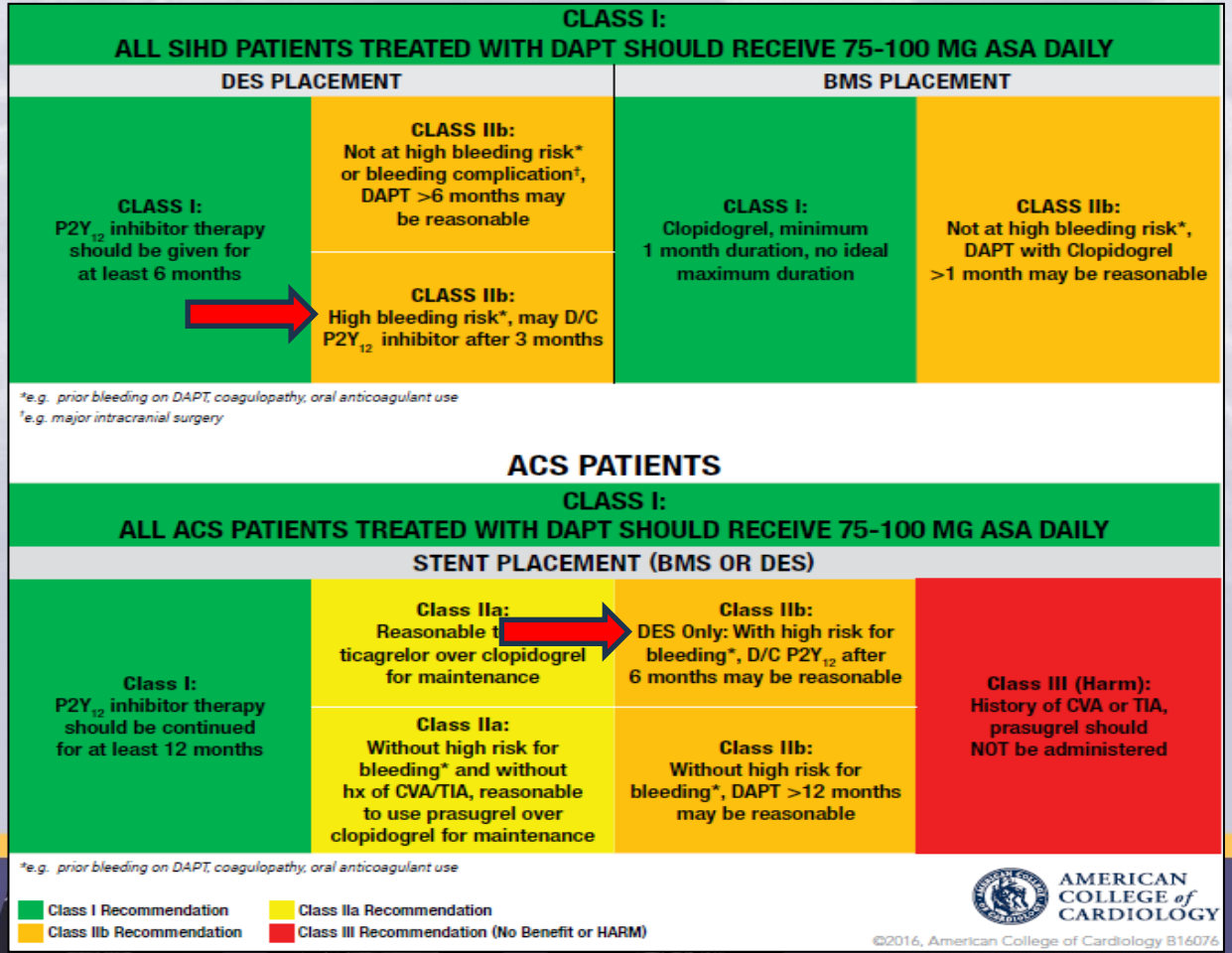
Duration of DAPT after PCI: 2016 ACC/AHA Guidelines



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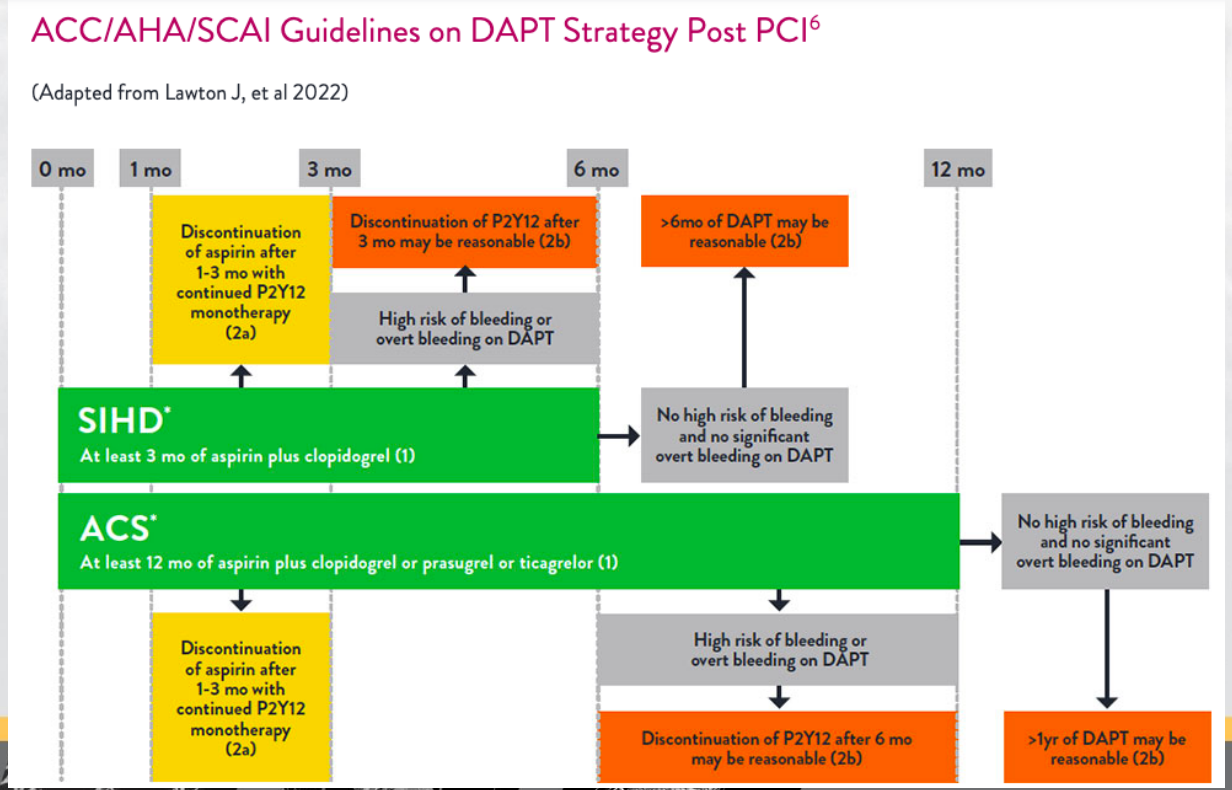
Guidelines on Peri-Operative Cardiovascular Management



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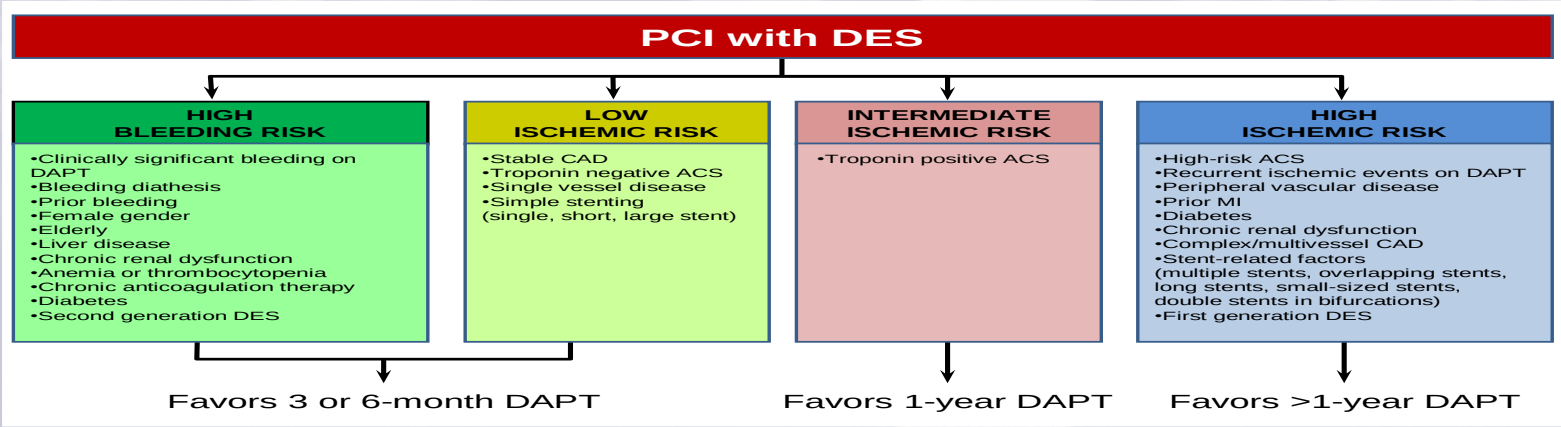
DAPT Duration



When assessing ischemic risk, clinical presentation (ACS vs stable CAD) and disease/PCI complexity are two of the most important factors to consider

Palmerini T Eur Heart J 2016;37:353-64

Anti-platelet therapy

- Time interval for P2Y12 inhibitor discontinuation, if necessary for surgery should be 3-5 days for ticagrelor, 5 days for clopidogrel, and 7 days for prasugrel (Class I, LOE B).

- In patients whose antiplatelet medication was interrupted prior to surgery, the medication should be restarted within 48 hours, or as soon as it is safe to do so from the standpoint of surgical hemostasis (Class I, LOE C).

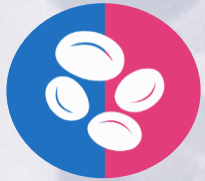
Short DAPT duration


Age


Renal disease


Liver disease


Active cancer


Anemia


Low platelet


Stroke, ICH, bAVM


Bleeding diathesis


Prior bleeding or transfusion


OACs


NSAIDs, steroids


Planned surgery on DAPT, recent trauma or surgery

Major criterion

Minor criterion

Urban P, et al. Circulation. 2019;140:240-261

Consideration of Short DAPT duration

- Advances in stent design
  - Thinner struts, biocompatible, use of ‘limus family anti-restenotic drug
- Bleeding is associated with worse outcomes (death and MI)
  - Shorter DAPT is associated with less bleeding
- More awareness of the HBR population
  - May comprise up to 15% of patients undergoing PCI
  - Generally excluded from stent trials
  - Historically have been treated with BMS and 4 weeks DAPT

Ticagrelor Monotherapy Therapy 3 months After PCI: TWILIGHT

TWILIGHT

Ticagrelor +/- Aspirin in High-Risk Patients After Coronary Intervention

Randomized, double-blind, phase 4 study
Enrollment: Up to 9000 patients at the time of their index PCI
Duration: Additional 12 months after ≥ 3 months DAPT

***Inclusion Criteria*:**

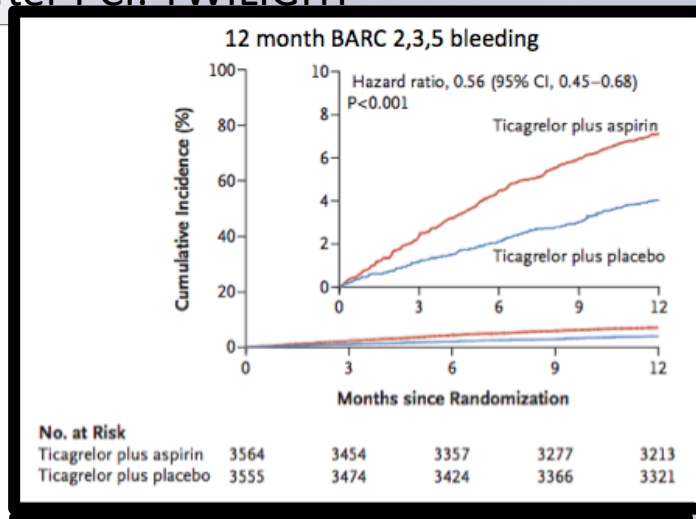
- Adults ≥ 18 years of age
- High-risk patients after successful elective/urgent PCI with ≥ 1 DES; discharged on DAPT with aspirin and ticagrelor of ≥ 3 months intended duration

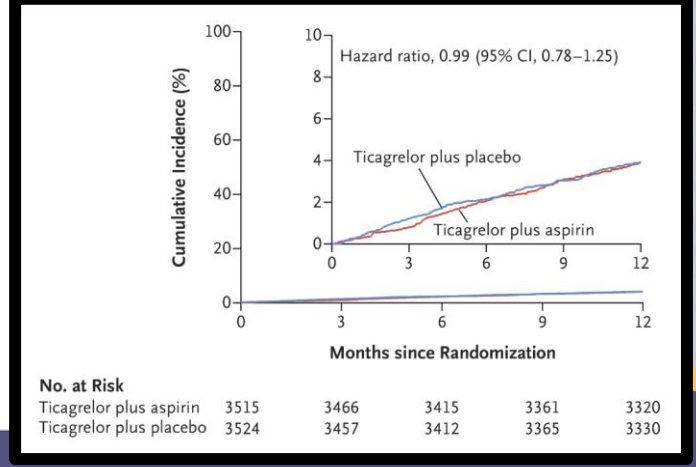
Ticagrelor + Placebo | **Ticagrelor + Aspirin**

Primary outcome: time to first occurrence of clinically relevant bleeding (BARC Type 2, 3, or 5)

Secondary outcome: time to first occurrence of confirmed CV death, non-fatal MI, ischemic stroke or ischemia-driven revascularization

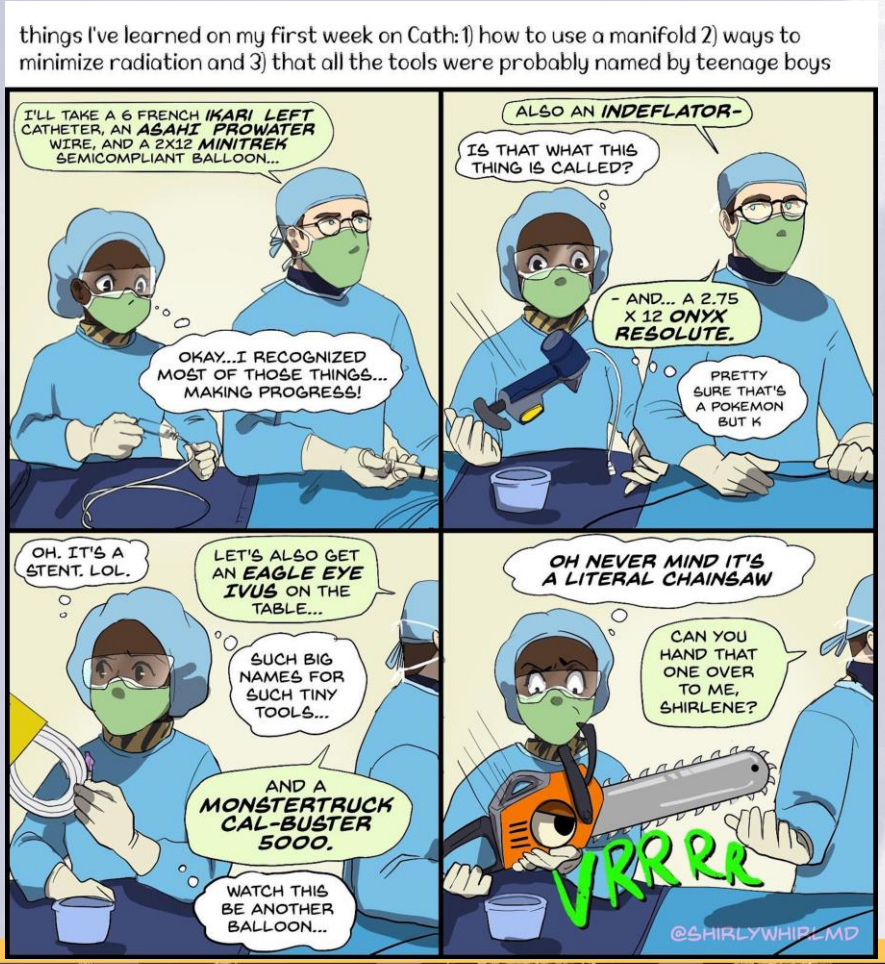
Clinicaltrials.gov.[19]





Closing Points

- Landscape of PCI
- Timing of Non-Cardiac Surgery
- Peri-operative management of patients with history of PCI


things I've learned on my first week on Cath: 1) how to use a manifold 2) ways to minimize radiation and 3) that all the tools were probably named by teenage boys
I'LL TAKE A 6 FRENCH IKARI LEFT CATHETER, AN ASAHI PROWATER WIRE, AND A 2X12 MINITREK SEMICOMPLIANT BALLOON...
OKAY...I RECOGNIZED MOST OF THOSE THINGS... MAKING PROGRESS!
ALSO AN INDEFLATOR-
IS THAT WHAT THIS THING IS CALLED?
- AND... A 2.75 X 12 ONYX RESOLUTE.
PRETTY SURE THAT'S A POKEMON BUT K
OH. IT'S A STENT. LOL.
LET'S ALSO GET AN EAGLE EYE IVUS ON THE TABLE...
SUCH BIG NAMES FOR SUCH TINY TOOLS...
AND A MONSTERTRUCK CAL-BUSTER 5000.
WATCH THIS BE ANOTHER BALLOON...
OH NEVER MIND IT'S A LITERAL CHAINSAW
CAN YOU HAND THAT ONE OVER TO ME, SHIRLENE?
VRRRRR
@SHIRLYWHIRLMD

Thank You

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