Valvular Heart Disease & Hypertension

Management tips for the Primary Care

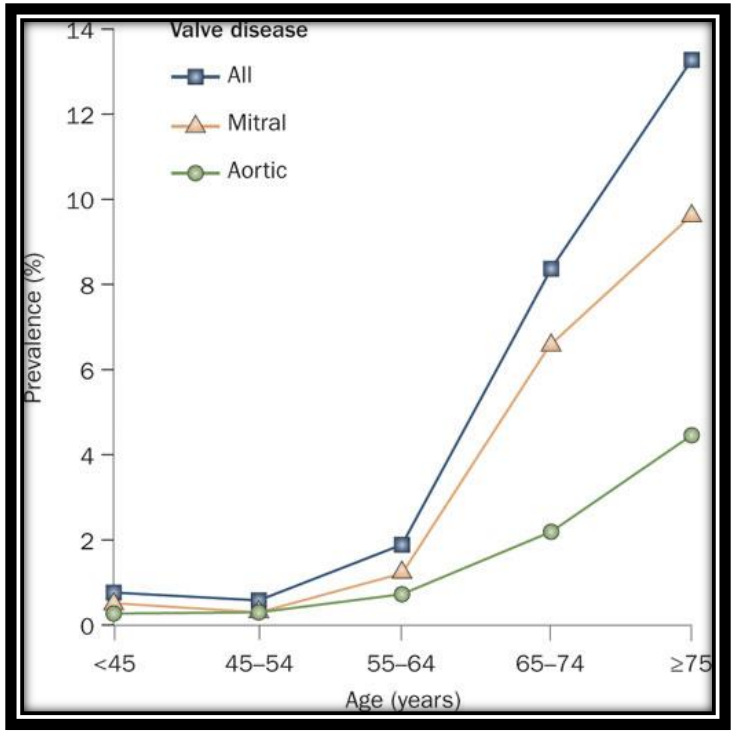
Dr. Peter Ting

Snr Consultant Cardiologist

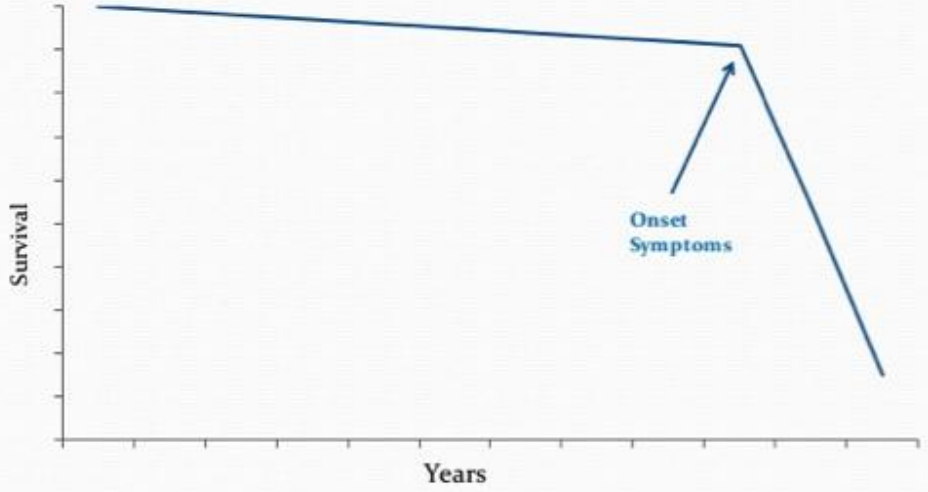
THE HARLEY STREET HEART & CANCER CENTRE

Often unheard but not uncommon condition

- Prevalence in U.S of moderate or greater VHD is **~2.5%,** MR > AR > AR > MS
- Prevalence increases with age, in 65-74, 4-8%, in ≥75, ~12%.
  - » (Circ 2015;131:e29-322)
- Prevalence in Singapore?
  - Unknown
  - ~ 1 in 10 by 75?

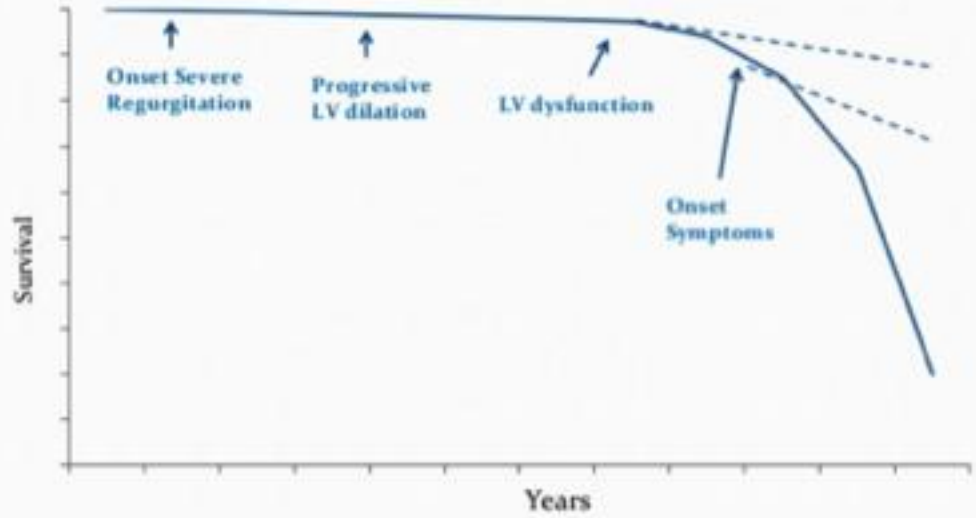


Natural History of Aortic Stenosis



Often asymptomatic until late stages - Exertional dyspnea, palpitations and chest pain

Natural History of Regurgitant Lesions



Adapted Mayo Clinic Concise Textbook 2013

When to suspect VHD?

- Often just an incidental murmur
- ***Physical exam*** can be quite specific for AS/AR but is ***often insensitive***
- Just as often no or subtle murmur
- ECG and CXR signs are usually late
  - ECG – LVH, RVH, LA/RA enlargement
  - CXR – cardiomegaly, valvular calcification, pulmonary vasculature

New murmur? Pathologic versus benign

- **Sound** - Auscultatory findings:
  - Loud (Grade 3 or more)
  - Long in duration (mid or late peaking or holosystolic)
  - Prominent radiation to axilla or neck
  - Change intensity during physiologic maneuvers (Valsalva, squatting)
  - A/w diastolic murmur
  - Abnormal heart sounds (Loud S1, wide fixed or paradoxical split S2, loud A2, or P2 or S4 or S3 gallops, mid-systolic click, aortic or pulmonic ejection sounds, opening snap, pericardial knock
- **Other** -
  - Abnormal JVP, elevated mean venous pressure, Large A or V waves
- **Pulse** - Abnormal arterial pulse / blood pressure
  - Wide pulse pressure
  - Pulsus alternans
  - Pulsus paradoxus
  - Brisk rapid rising pulse
  - Small weak or slow-rising pulse
  - Cardiac arrhythmias (AF)
- **Apex** - Abnormal precordial movements
  - Sustained LV apical or RV parasternal lift or heave (hypertrophy)
  - Diffuse, infero-laterally displaced impulses (LV enlargement)
  - Bifid LV apical impulse

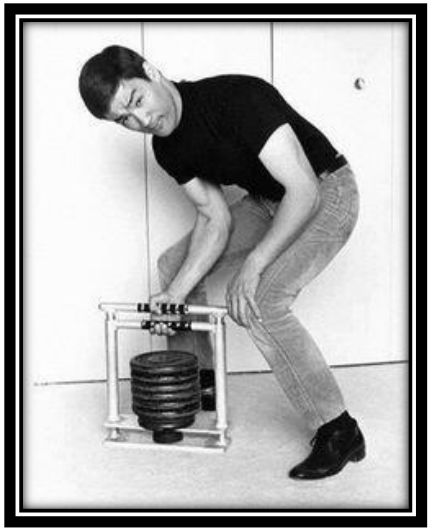
Echo most important assessment

- For initial evaluation of known or suspected VHD
  - For diagnosis, etiology, severity, prognosis, and evaluate timing of intervention
- Known VHD with change in symptoms or P/E findings
- Routine FU of known VHD

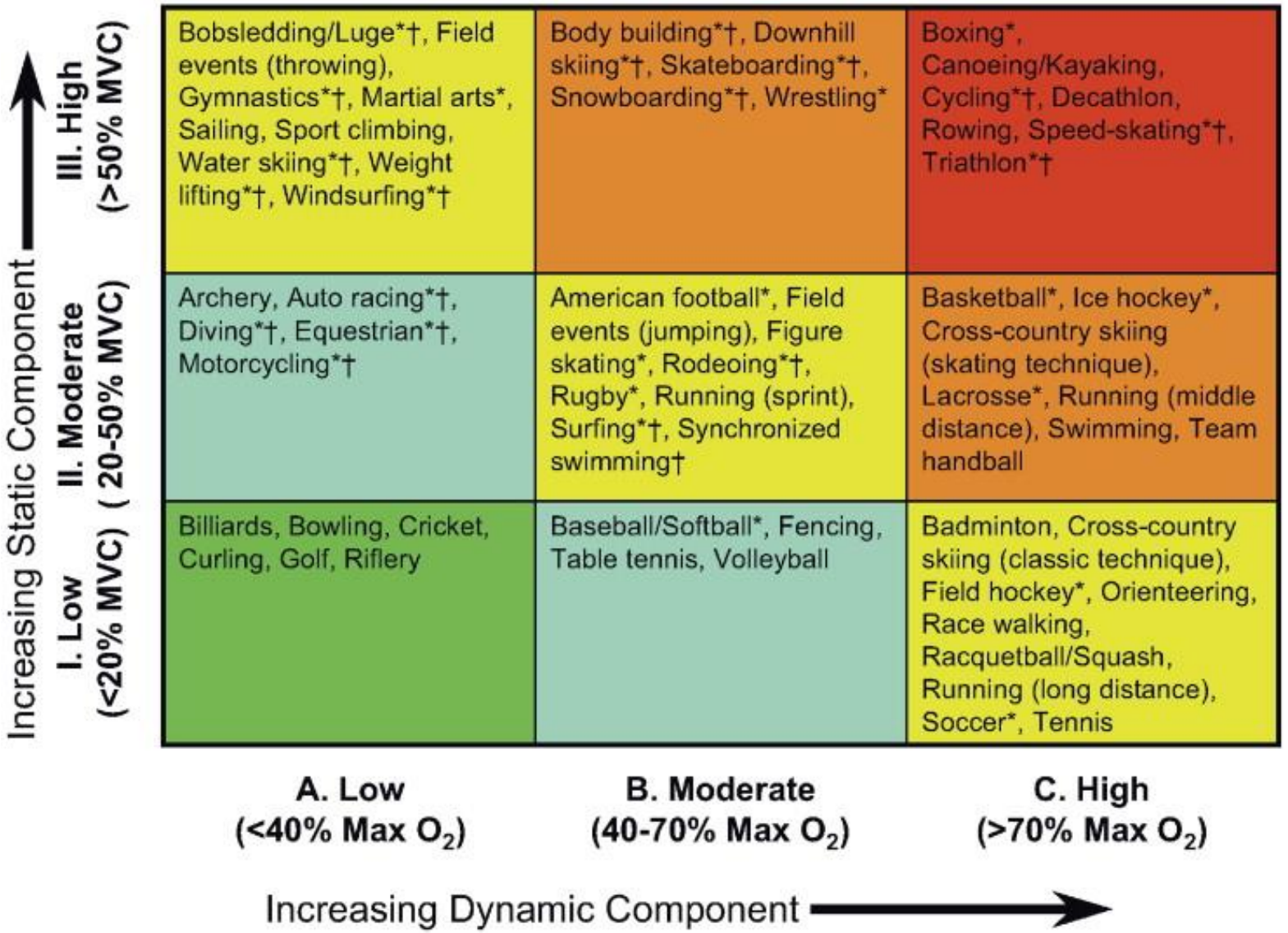
Stage	Aortic Stenosis	Aortic Regurgitation	Mitral Stenosis	Mitral Regurgitation
Progressive (B)	**Mild** Every 3-5 years	**Mild** Every 3-5 years	**Mild** Every 3-5 years	**Mild** Every 3-5 year
	Moderate Every 1-2 years	**Moderate** Every 1-2 years	**Moderate** Every 1-2 years	**Moderate** Every 1-2 years
Severe (C)	**Severe** Every 6-12 mo	**Severe** Every 6-12 mo Dilating LV: more frequently	**Severe** Every year	**Severe** Every 6-12 mo Dilating LV: more frequently

Exercise for VHD patient

- Exercise is good…..but is it safe?
- Regular aerobic exercise is recommended to maintain cardiorespiratory fitness
- Heavy isometric training will increase afterload of LV and is discouraged



How to classify sports



Sports with AR/MR

- In general, exercise causes no change or slight reduction in regurgitant fraction (decrease SVR)
- Generally more tolerant of physical activity
- BUT, elevated HR or BP and cause increased regurgitation

AR

Patient group	Recommendation
Mild to moderate AR with normal LV size	No restrictions
Mild to moderate AR with moderate LV enlargement	Low/moderate static and low/moderate/high dynamic sports *if tested
Severe AR	No competitive sports
Dilated aortic root (> 4.5 cm)	IA sports only

MR

Patient group	Recommendation
Mild to moderate MR with normal LV size	No restrictions
Mild to moderate MR with increased LV size	Low/moderate static and low/moderate/high dynamic sports
Severe MR and LV enlargement, LV dysfunction or pulmonary HTN	No competitive sports

Competitive Sports with MS

- Exercise may increase pulmonary capillary and pulmonary artery systolic pressure which may result in acute pulmonary edema
- AS patients in competitive sports need annual evaluation

Patient group	Recommendation
Mild AS	No restrictions
Moderate AS	IA sports IB and IIA sports in selected patients
Severe AS	No competitive sports

AS

Patient group	Recommendation
Mild MS (with exercise PASP < 50 mm Hg)	No restrictions
Moderate MS (and PASP < 50 mm Hg)	Low/moderate static and low/moderate dynamic sports
Severe MS (or any with exercise PASP > 50 mm Hg)	No competitive sports

*Patients with anticoagulation should avoid sports with risk of bodily collision

MS

Sports with Bicuspid Aortic Valve/ Prosthetic valves

- BiAOV there is increased risk of aortic

Patient group	Recommendation
No significant AS/AR and aortic root < 4.0 cm	No restrictions
Aortic root 4.0-4.5 cm	Low/moderate static and low/moderate dynamic sports *Avoid collision sports
Dilated aortic root (> 4.5 cm)	IA sports only

- Insufficient long term data on exercise effects

Patient group	Recommendation
Bioprosthetic mitral valve	Low/moderate static and low/moderate dynamic sports
Bioprosthetic or mechanical aortic valve	Low/moderate static and low/moderate dynamic sports *if tested

In general when advising exercise, you need to know…

- 1) **Valves involved & abnormality** (stenosis or regurgitation) and etiology
- 2) **Severity of the valvular lesion** based on echocardiographic and clinical features
- 3) Presence of **adverse secondary features** such as left ventricular systolic dysfunction, chamber dilatation, exercise induced pulmonary hypertension on echo, or exercise induced hypotension or syncope
- 4) Evidence of concurrent **significant arrhythmias**
- 5) **Presence of symptoms**, in particular dyspnea, syncope, palpations or angina

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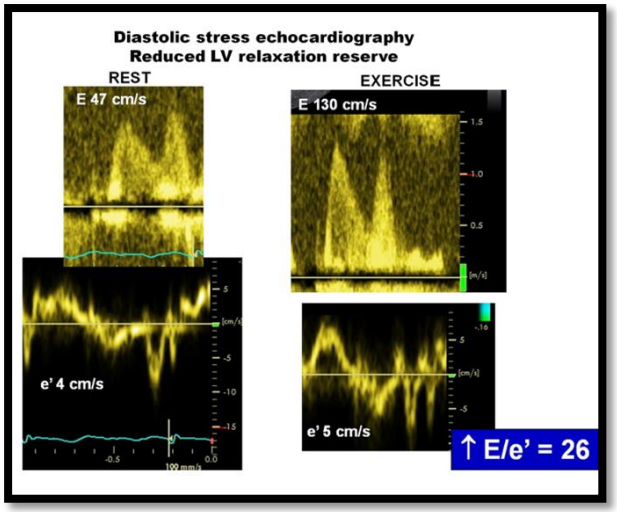
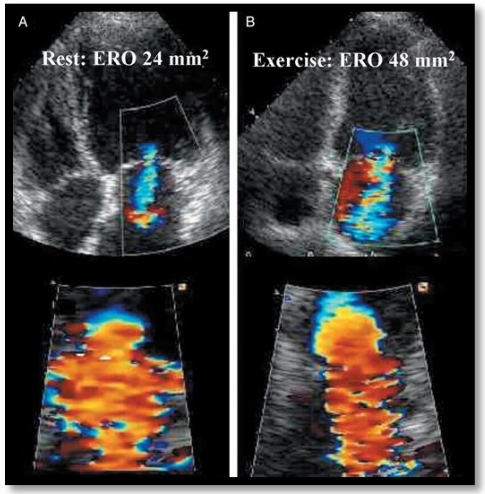
Exercise testing in VHD – Stress echo/CPET

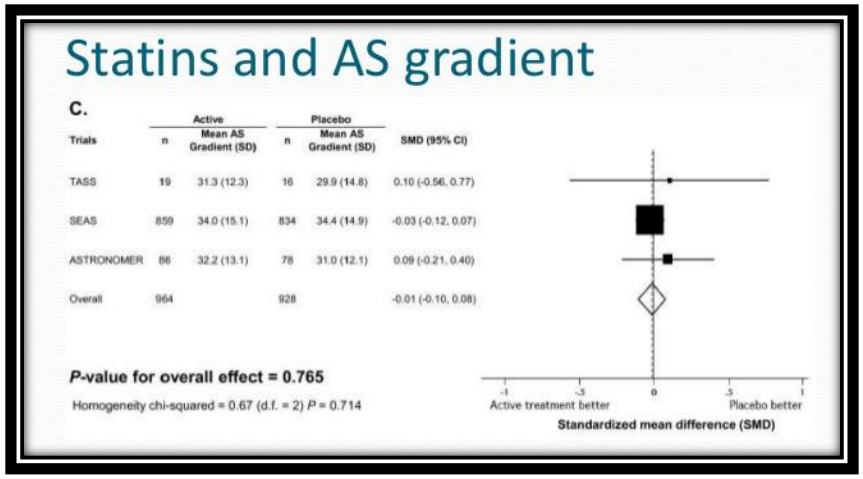
- Assessing presence of symptoms
- Functional status, suitability for participation in competitive sports
- Assess dynamic nature of VHD (severity)
- Help determine timing for surgery





Aortic stenosis Rx

- **Medical:**
  - Class I
    - Treat hypertension as per normal
    - No specific antihypt, but start with low dose and titrate upwards (risk of hypotension, beware of sudden BP drops)
      - If HF present ACE/ARB, B blockers preferred
  - Class III
    - Statin Rx Not indicated for Rx AS progression!



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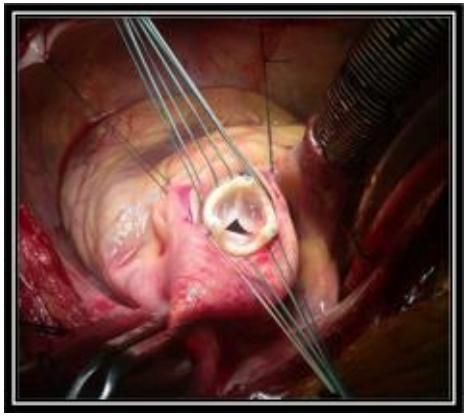
AVR for AS

- Severe AS +
  - Symptomatic (HF, syncope, SOBOE, angina, presyncope)
  - Asymptomatic but LVEF < 50% or undergoing other cardiac surgery



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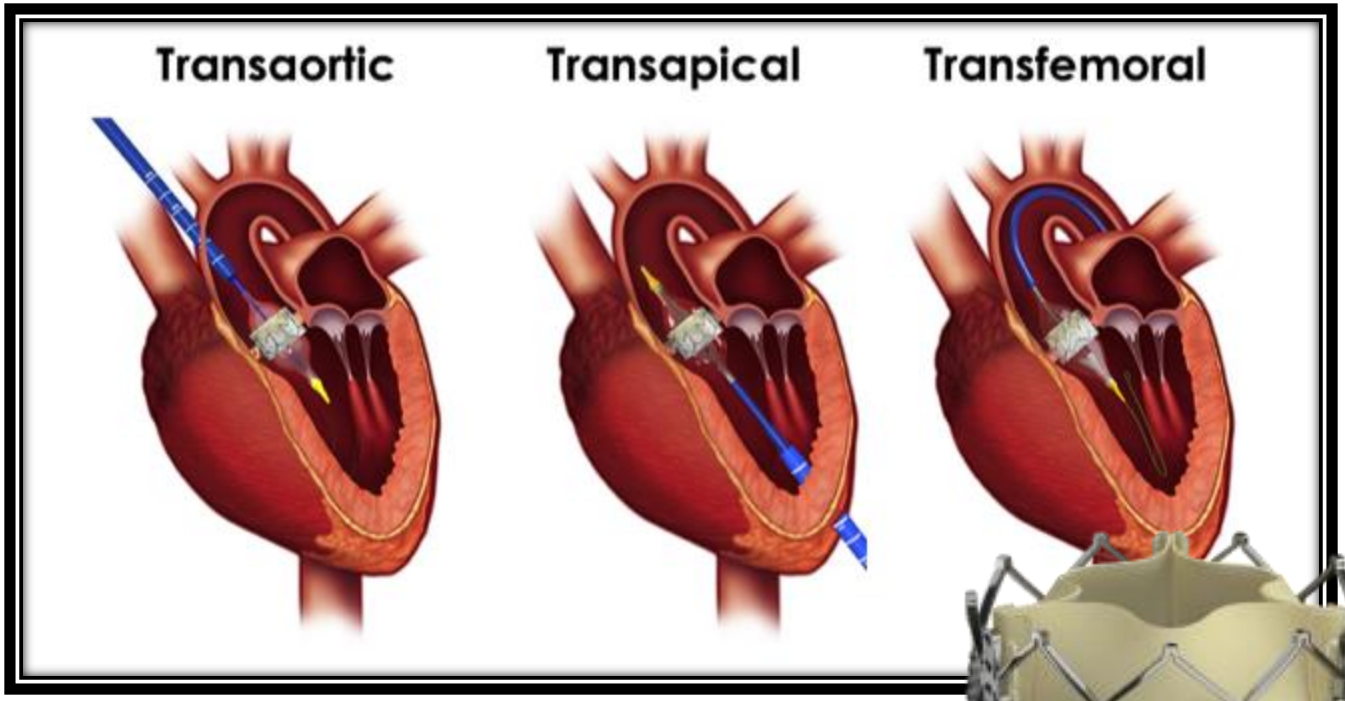
TAVR for AS

Currently indicated in elderly high risk cases on non operable AS (usually old and frail). Promising data on intermediate risk group as well. Longer term durability > 5years not known



Aortic Regurgitation

- Class I: Medical Therapy
  - Treat hypertension
  - DHP CCBs and ACE/ARB are preferred
  - 2 RCTs have not conclusively shown benefit for vasodilators
  - Retrospective studies show reduction in combined AVR/hospitalization for HF/death with ACE/ARB and improved survival with beta blockers

- Class I: Surgery AVR for AR
  - Symptomatic severe AR
  - Asymptomatic severe AR LVEF<50%
  - Severe AR undergoing other cardiac surgery
  - Asymptomatic severe AR showing LV dilatation

Biscupid Aortic Valves

- Most common congenital Heart defect
- 0.5-2% prevalence
- Male:Female 3:1
- May co-exist with coarcation
  - 50-75% of coarctation patients have bicuspid valves
- Also a/w Williams syndrome (supravalvular stenosis), Shone's syndrome (multiple left sided lesions of inflow and outflow) and Turner syndrome (with coarctation)

FIGURE 1

Normal Aortic Valve (3 leaflets)

Bicuspid Aortic Valve (2 leaflets)

Surgically removed Bicuspid Aortic Valve

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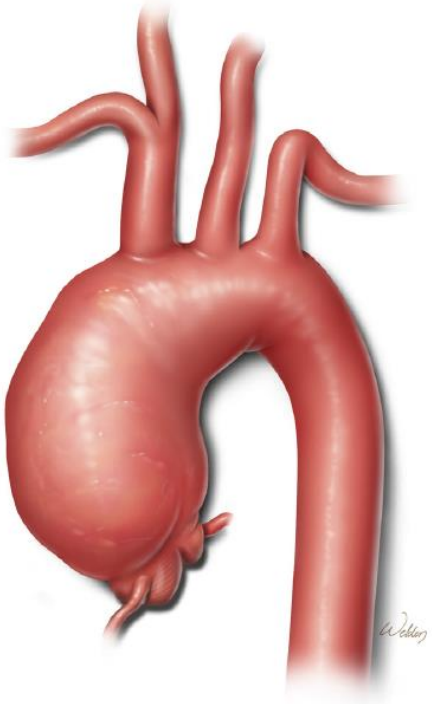
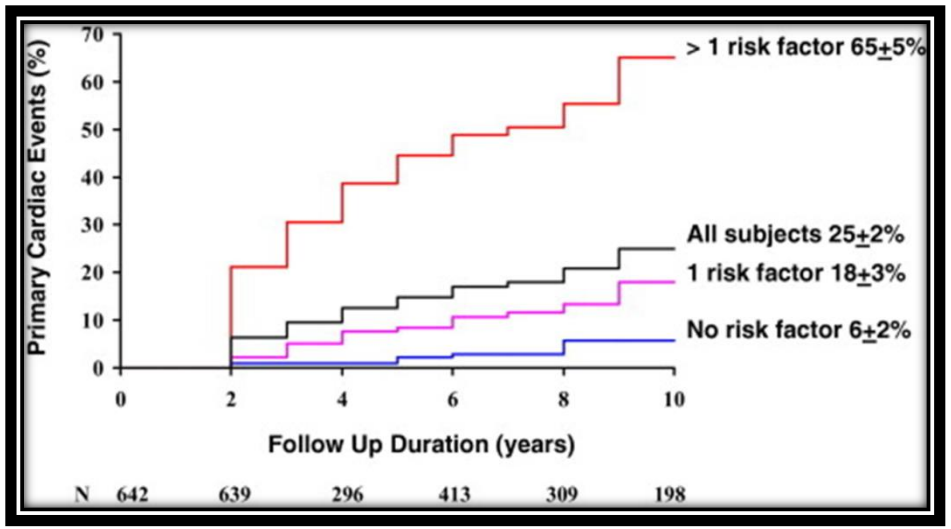
Biscupid Aortic Valves

- Bicuspid aortic valves ***associated with aortopathy*** (aortic dilation, coarctation, dissection)
- 20-30% BiAOV have family members with bicuspid valve disease and/or aortopathy
  - ***Screening of 1st degree relatives*** generally recommended





Outcomes of BIAOV

Risk factors: Age>30, presence of mod/sev AR or AS

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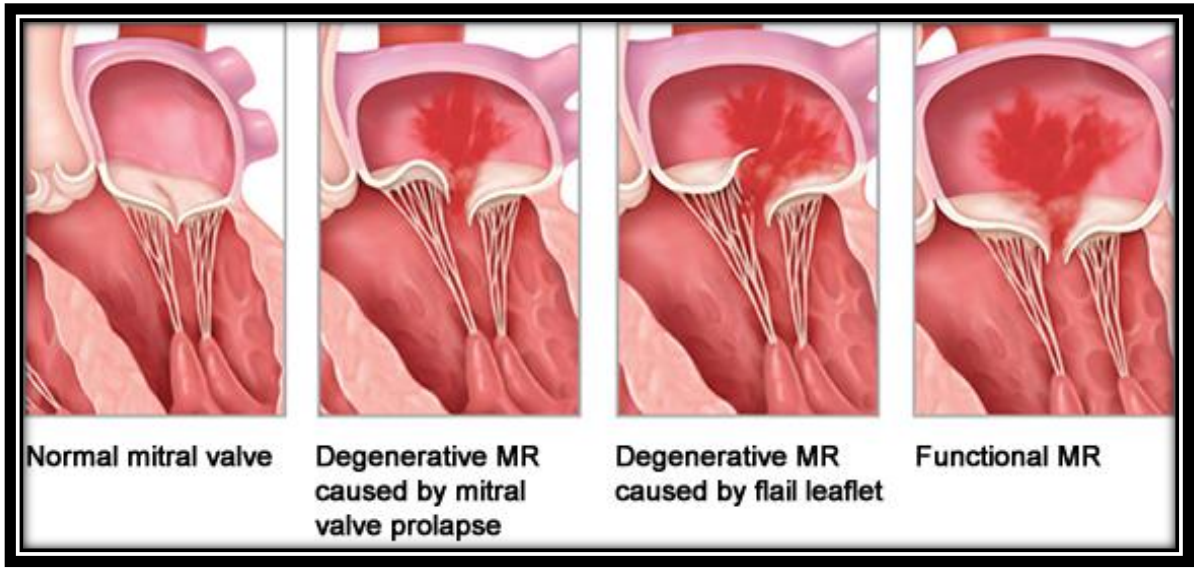
Bicuspid Aortic Valve management

- No need antibiotic prophylaxis for IE
- Ensure hypertension is well managed
  - Beta blocker and ARB useful with Marfan's to ***slow aortopathy progression***
  - Possibly helpful in other groups as well
- Routine echo and/or other imaging

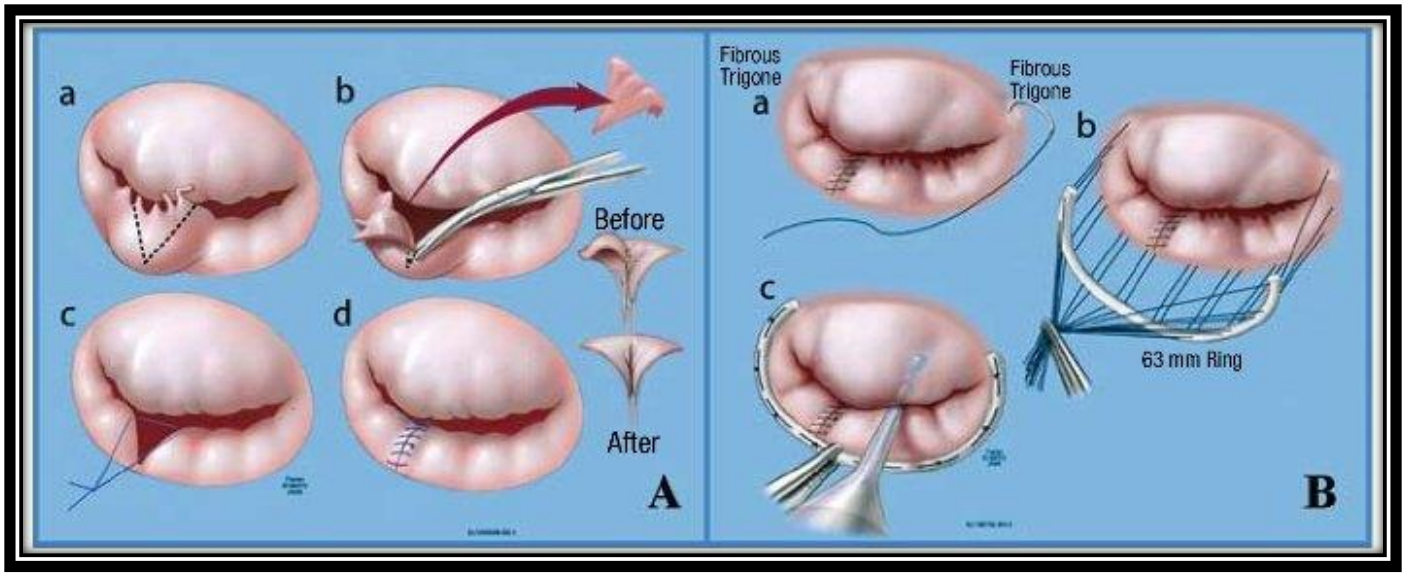
Chronic Mitral Regurgitation

- Primary (degenerative) MR
  - Related to pathology of the valves (leaflet, chordae, papillary muscles, annulus)
  - Most common is MVP
- Secondary (functional) MR
  - Valve is normal but LV dilatation causes papillary muscle displacement and leaflet tethering (prevents coaptation)

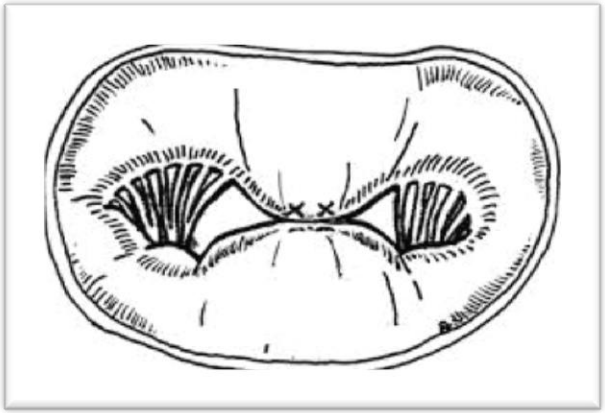


When to operate for MR

- Repair is preferred over replacement
  - Leads to better outcomes, heart function and less complications
- Symptomatic severe primary MR (EF>30%)
- Asymptomatic severe primary MR, EF<60% and or LVESD >40mm
- Severe MR undergoing other cardiac surgery



Mitraclip system



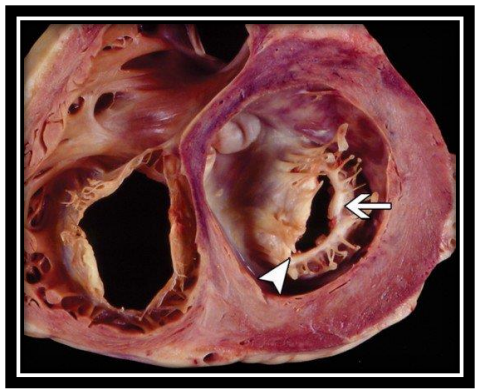
Alfieri Stitch

Percutaneous reduction of sig. symptomatic MR in patients at prohibitive high risk
For MV surgery by hear team, who are expected to have a reasonable life expectancy

Symptomatic relief and improvement of NYHA class, positive remodeling, but to date no Mortality benefit

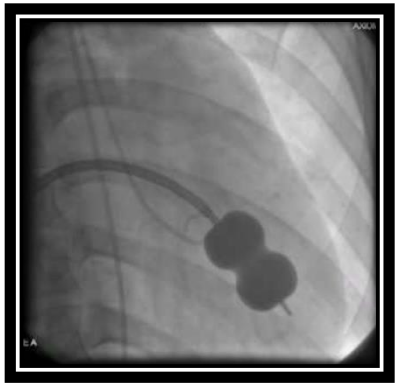
Mitral Stenosis

- Suspect if childhood history of rheumatic fever
- Medical therapy
  - Warfarin for MS and Afib, embolic event or LA thrombus (class I)
  - Heart rate control with Afib and RVR (Class IIa)
  - Heart rate control for MS without AF (Class IIb)



MS intervention

- Percutaneous mitral balloon Commissurotomy (PTMC) recommended for severe MS with symptoms and favorable anatomy
- Surgery for symptomatic severe MS (not candidate or failed previous PMBC)
- Severe MS undergoing other cardiac surgery



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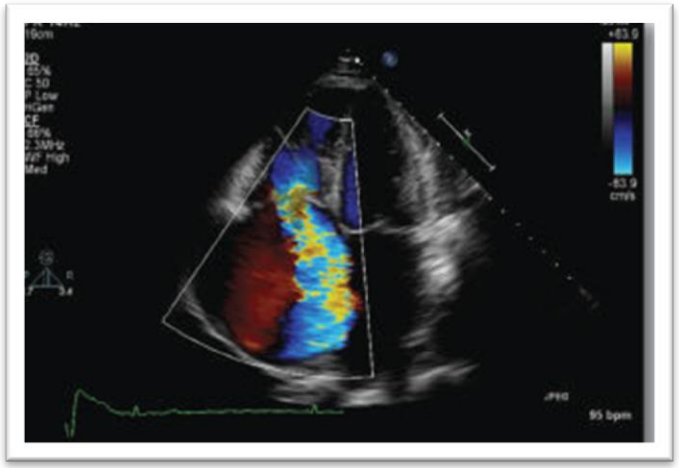
Tricuspid Regurgitation

- The forgotten valve
- Primary (degnerative) TR
  - RHD, prolapse, Ebsetin's , IE , carcinoid
- Secondary (functional) TR
  - Related to annular dilatation and leaflet tethering from RV remodeling
  - 80% of cases
- Often clinically silent

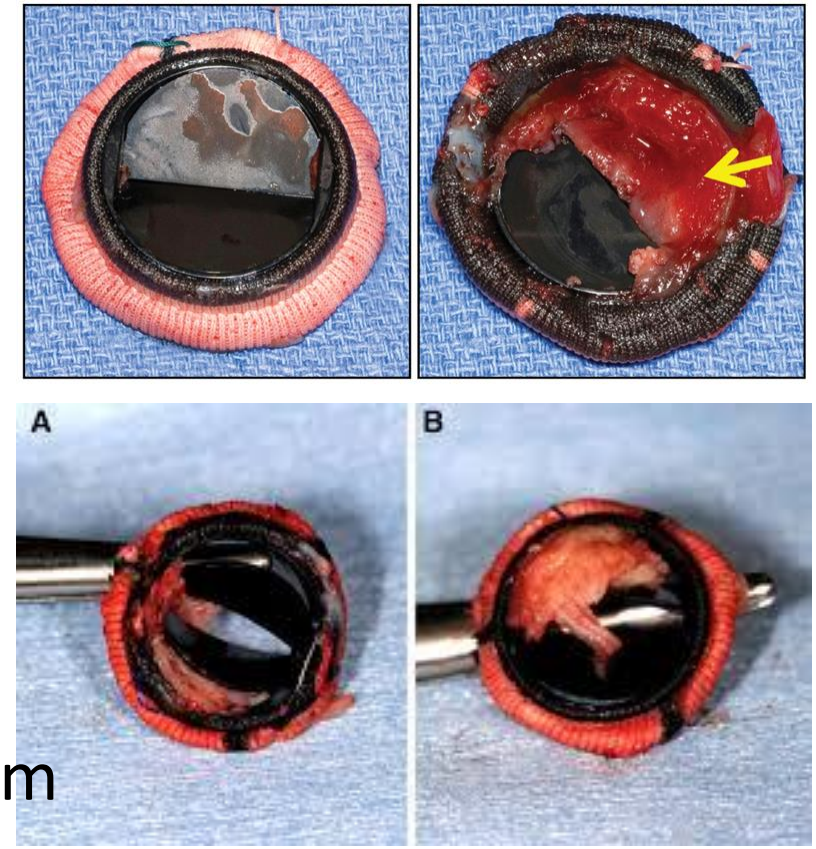


TR management

- Class IIA
  - Diuretics (loop and aldosterone antagonists) useful for severe TR with signs of RH failure
- Class IIB
  - Medical therapies to reduce PASP
- Class I
  - Sugery for severe TR for patients undergoing left sided valve surgery
- Sugery is still tricuspid repair/annuloplasty or replacement
- Percutaneous techniques are in development

Problem with prosthetic valves

- Bioprosthetic
  - Scan annually after 10 years
- Prosthetic valve dysfunction:
  - Degeneration (bioprosthetic)
  - Pannus
  - Thrombus
  - Paravalvular leaks / dehiscence
  - Infective endocarditis
- Re-echo if suspicion of problem

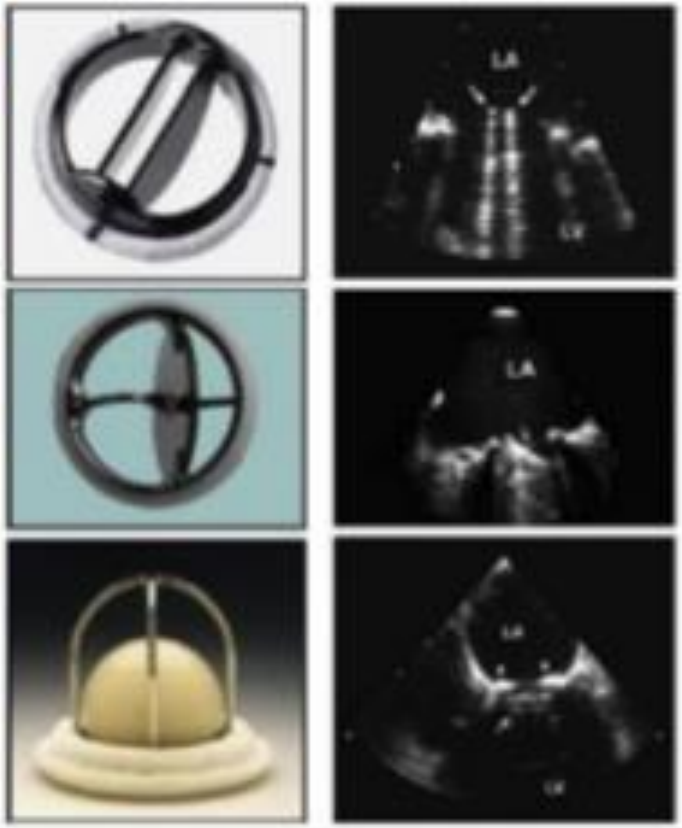


Anticoagulation Guidelines

Patients	Goal INR
Mechanical AVR (no risk factors for thromboembolism)	2.0-3.0
Mechanical AVR with risk factors*	2.5- 3.5
Mechanical MVR	2.5-3.5
All patients with mechanical valve	ASA 75-100 mg

Provided low bleeding risk

*AF, prior thromboembolism, LV dysfunction, hypercoagulable



2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease

HOW ABOUT HYPERTENSION

- DOSING STRATEGIES TO IMPROVE CONTROL
- MONITORING STRATEGIES TO IMPROVE CONTROL
- BP TARGETING STRATEGIES TO IMPROVE OUTCOME

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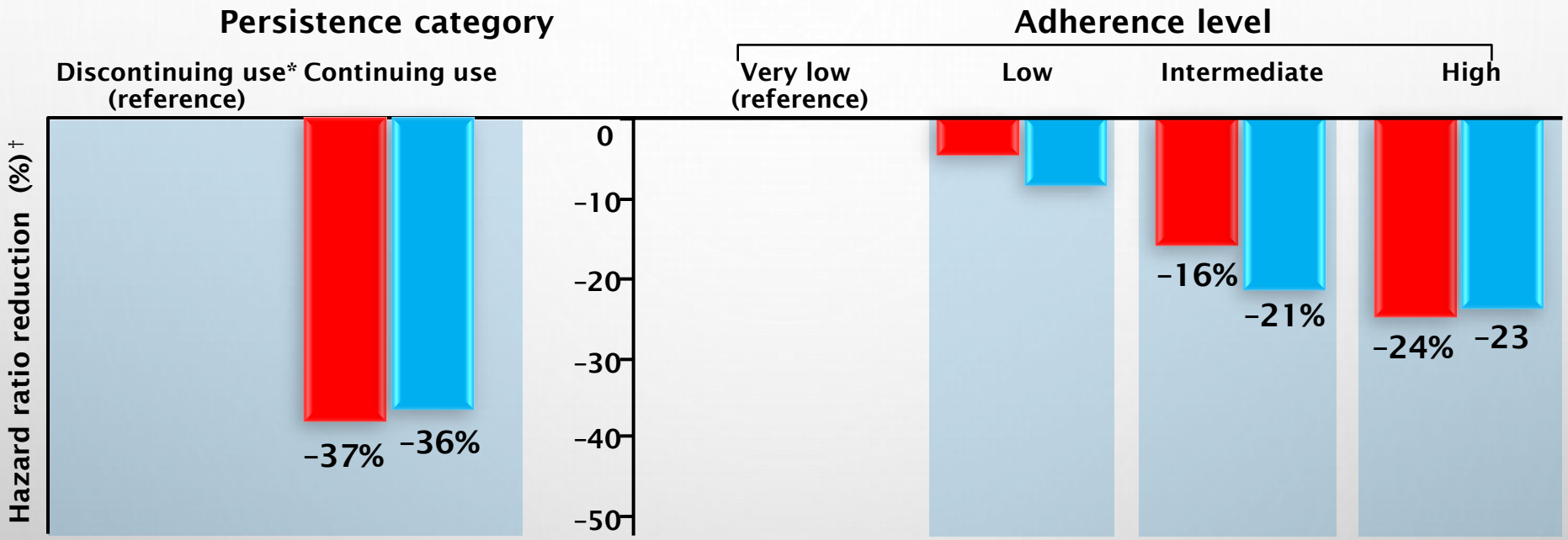
Effect of compliance with antihypertensive medications on the risk of cardiovascular outcomes



†Estimates are adjusted for gender, age, initial antihypertensive regimen, number of different classes of antihypertensive medications dispensed during follow-up, use of other drugs during follow-up, and categories of Charlson comorbidity index score.
* At least 1 episode of no prescription coverage for > 90 days.

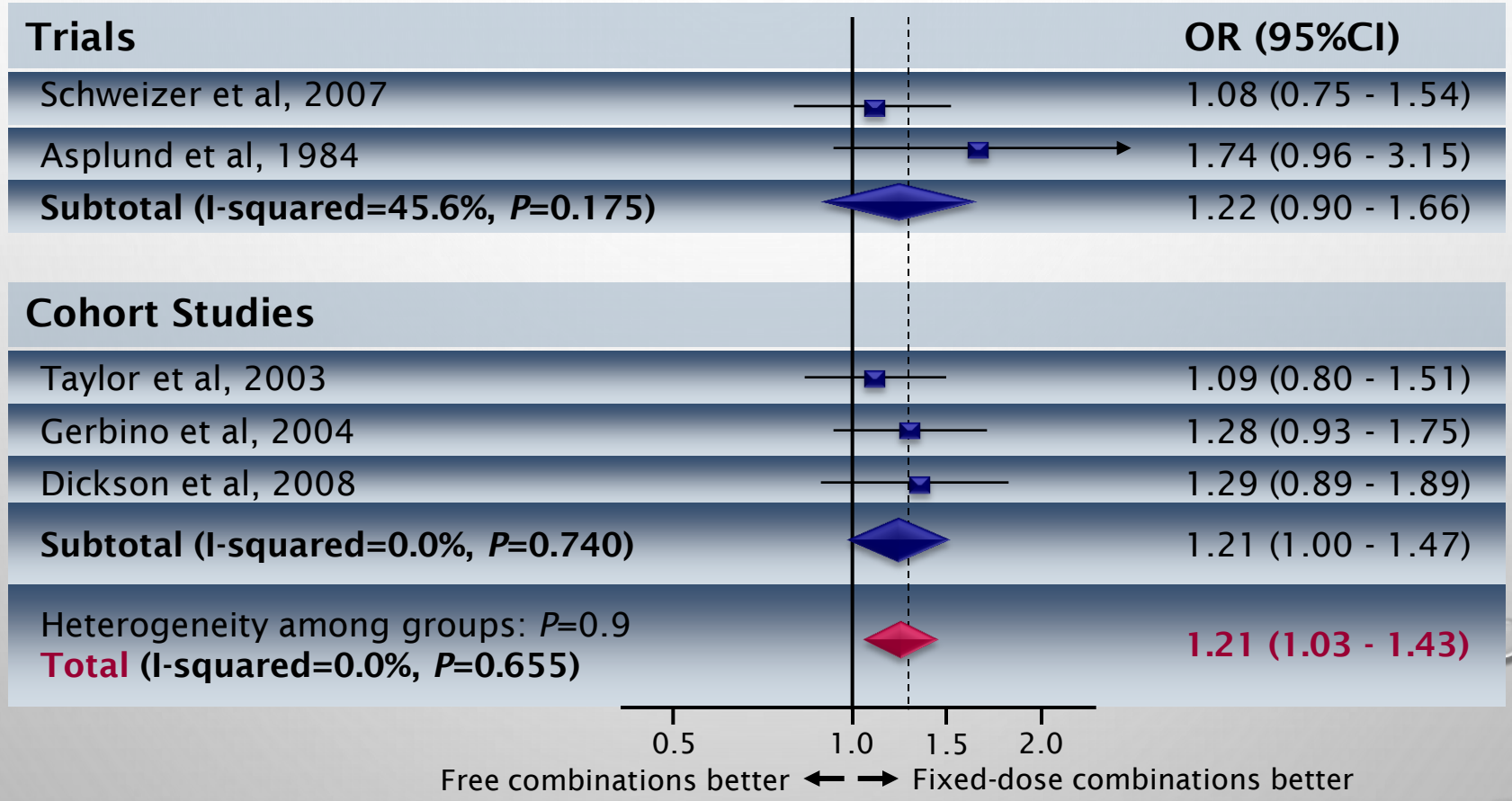
Coronary events
Cerebrovascular events

Taking drug for the duration of therapy

Conforming to the prescription

Corrao et al. *J Hypertens.* 2011;29:610-618.

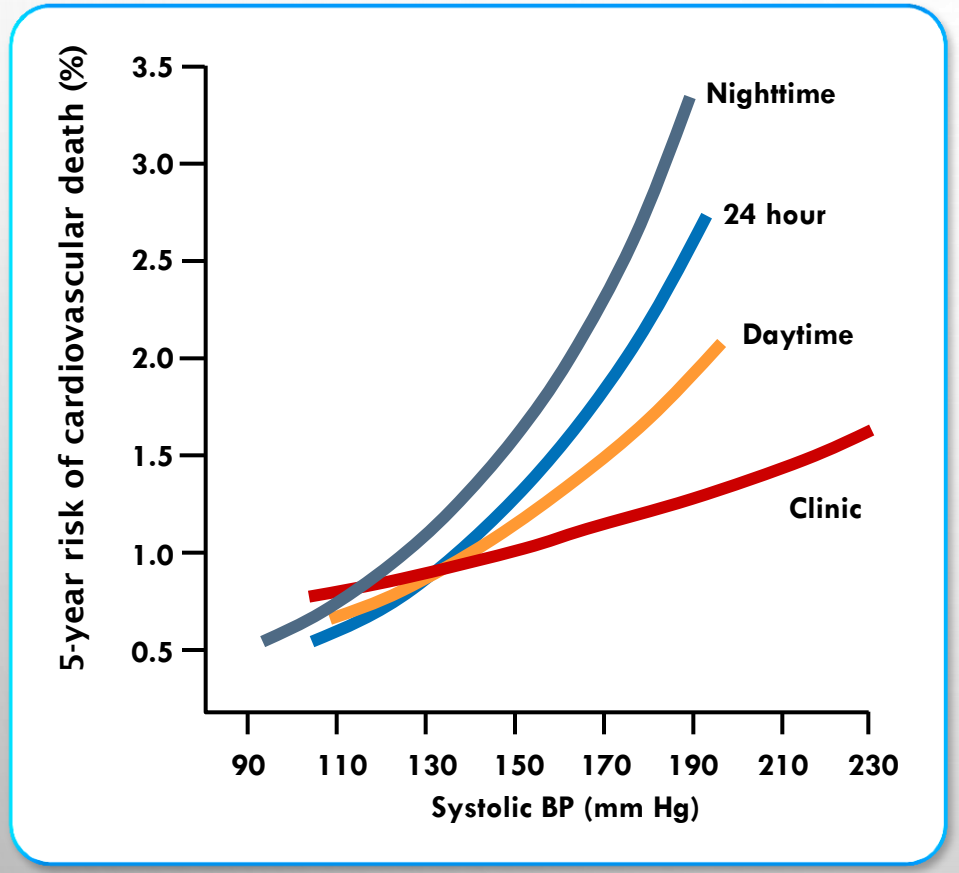
COMPLIANCE WITH TREATMENT INCREASES ON FIXED-DOSE COMBINATION THERAPY



Meta-analysis 18,000 paxs, compliance 21% higher

Gupta et al. *Hypertension.* 2010;55:399-407.

AMBULATORY BLOOD PRESSURE PREDICTS MORTALITY OVER AND BEYOND CLINIC BLOOD PRESSURE



Adjusted 5-year risk of cardiovascular death in the study cohort of 5292 patients for **clinic blood pressure monitoring** and **ambulatory blood pressure monitoring**

The relative risk was calculated with adjustment for baseline characteristics including sex, age, presence of diabetes mellitus, history of cardiovascular events, and smoking status

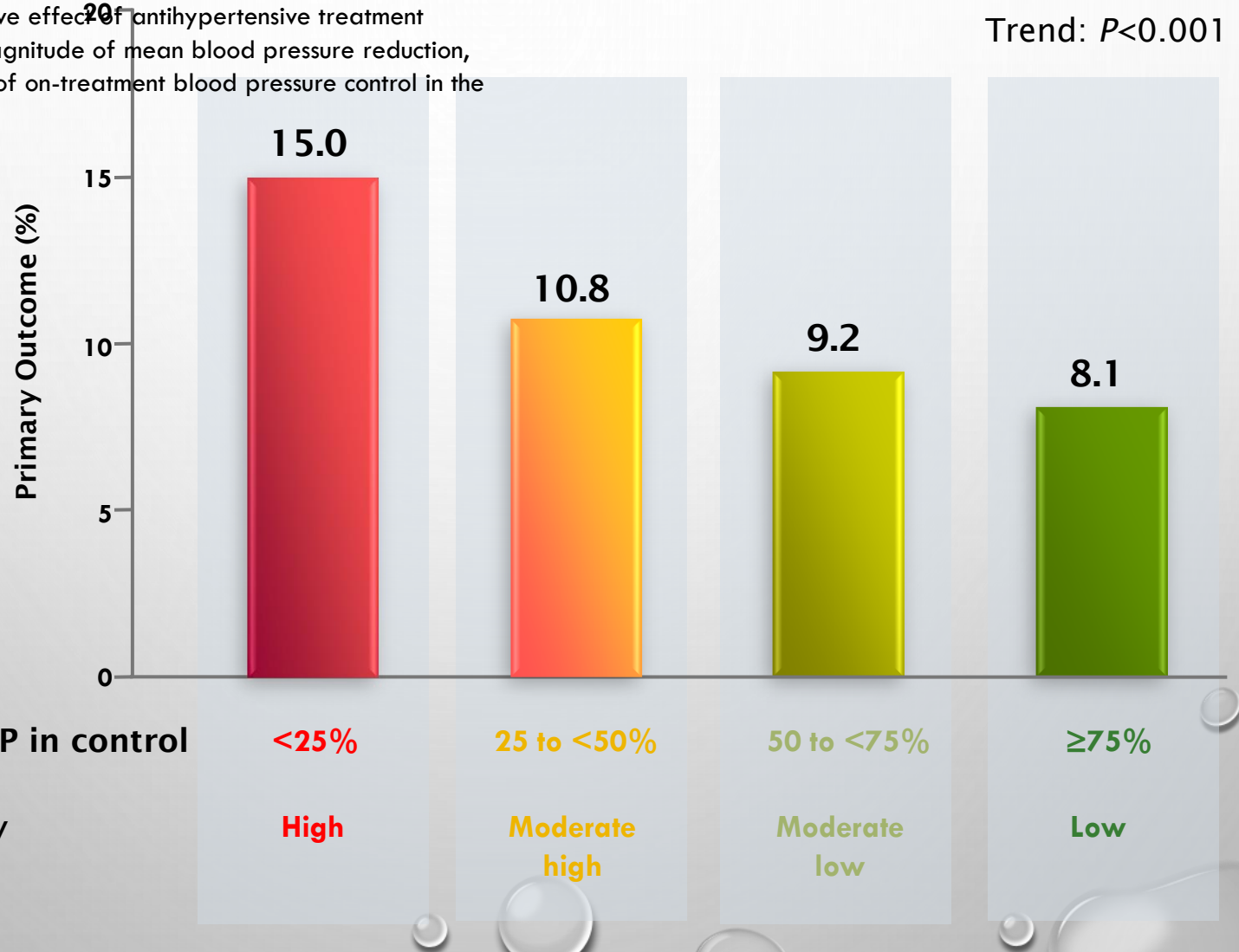
The 5-year risks are expressed as number of deaths per 100 subjects

Dublin outcome study

Dolan et al. *Hypertension.* 2005;46:156-161.

MORE CONSISTENT BLOOD PRESSURE CONTROL (LESS BLOOD PRESSURE VARIABILITY), BETTER OUTCOME

suggesting that the protective effect of antihypertensive treatment depends not only on the magnitude of mean blood pressure reduction, but also on the consistency of on-treatment blood pressure control in the long term.



Mancia et al. *Hypertension.* 2007;50:299-305.

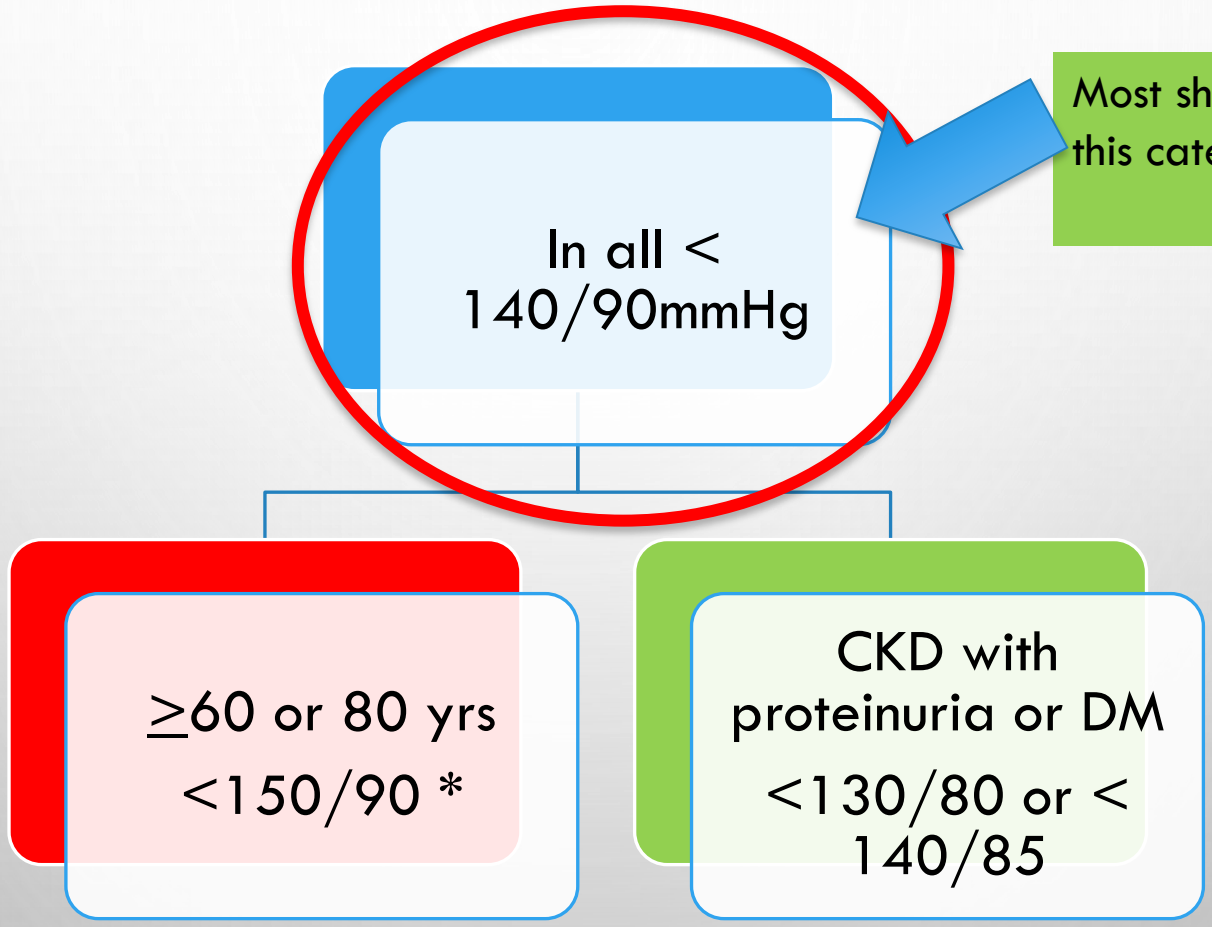
TARGET BP 2014

Table 6. Guideli

Guidel		DM
2014 Hypertens guideline		
	90	< 140/90
	90	< 140/90
ESH/ESC 2013[37]	90	**< 130/80**
		<140/85
CHEP 2013[38]	90	< 140/90
ADA 2013[39]		**< 140/90****
KDIGO 2012[40]	90	< 140/90
NICE 2011[41]	80	**< 130/80**
ISHIB 2010[42]	ke risk	

ISUS!

WHAT TARGET TO AIM FOR?



* Unless tolerating already or if physically fit

The NEW ENGLAND JOURNAL of MEDICINE

Examine effect of more intensive high blood pressure treatment than is currently recommended

Randomized Controlled Trial
Target Systolic BP (n=9361)

Intensive Treatment
Goal SBP < 120 mm Hg

Standard Treatment
Goal SBP < 140 mm Hg

SPRINT trial NEJM 2015

SPRINT design details available at:

- ***ClinicalTrials.gov (NCT01206062)***
- ***Ambrosius WT et al. Clin. Trials. 2014;11:532-546.***

SPRINT
Systolic Blood Pressure Intervention Trial

SPRINT SUMMARY AND CONCLUSIONS

- EXAMINED EFFECTS OF MORE INTENSIVE ANTIHYPERTENSIVE THERAPY (SBP<120MMHG)
- ADULTS ≥50 YEARS WITH HYPERTENSION AND ADDITIONAL RISK FOR CVD
- TRIAL STOPPED EARLY, DUE TO BENEFIT, MEDIAN FOLLOW-UP OF 3.26 YEARS
- PRIMARY OUTCOME (COMPOSITE OF CVD EVENTS) 25% LOWER IN INTENSIVE COMPARED TO STANDARD GROUP AND ALL-CAUSE MORTALITY REDUCED BY 27%.
- “NUMBER NEEDED TO TREAT” TO PREVENT PRIMARY OUTCOME EVENT OR DEATH 61 AND 90, RESPECTIVELY

HYPERTENSION STRATEGIES

- **DOSING STRATEGY**
  - SIMPLIFYING DOSING REGIME IMPROVES COMPLIANCE & OUTCOME
  - FIXED DOSE COMBINATIONS
    - MINIMIZE PILL COUNT, ALLOWS LOWER DOSES, BETTER ADHERENCE
- **MONITORING STRATEGY**
  - USEFUL PARAMETERS – 24HR ABP >> HBP >> OBPM
  - BENEFITS BEYOND MEAN BP LOWERING
    - CONSIDER NOCTURNAL HYPERTENSION, MORNING SURGES, BP VARIABILITY, CENTRAL AORTIC PRESSURE
- **TARGETING STRATEGY**
  - IS LOWER BETTER? → SPRINT
    - YES! SBP 120, SAFE IN ELDERLY, ADVERSE EVENTS ARE A REAL PROBLEM
  - TARGET DEPENDS ON
    - INDIVIDUAL CV RISK LEVEL, TOLERABILITY LEVEL, TARGET IN DIABETES LESS WELL ESTABLISHED

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HEART & CANCER CENTRE

Gleneagles Hospital,
#02-38/41, Annexe Block
6A Napier Road, Singapore
T +65 6472 3703

Mount Elizabeth Novena Specialist Centre
#07-41, 38 Irrawaddy Road,
Singapore
T +65 6694 0050

Email: reginald.liew@harleystreet.sg
www.harleystreet.sg