

# Bradikardili Hastaya Yaklaşım

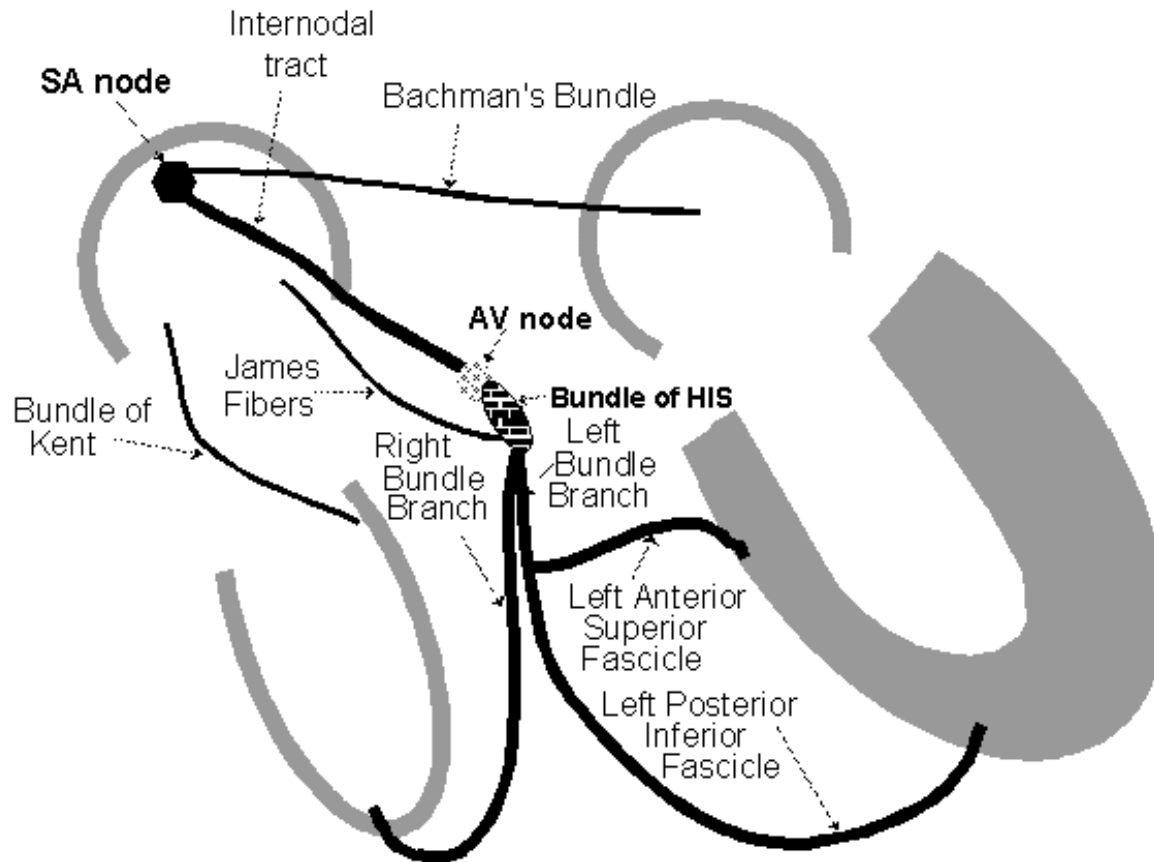
Doç. Dr. Mustafa KARACA

İKÇÜ

KARDİYOLOJİ KLİNİĞİ

# İleti Sistemi

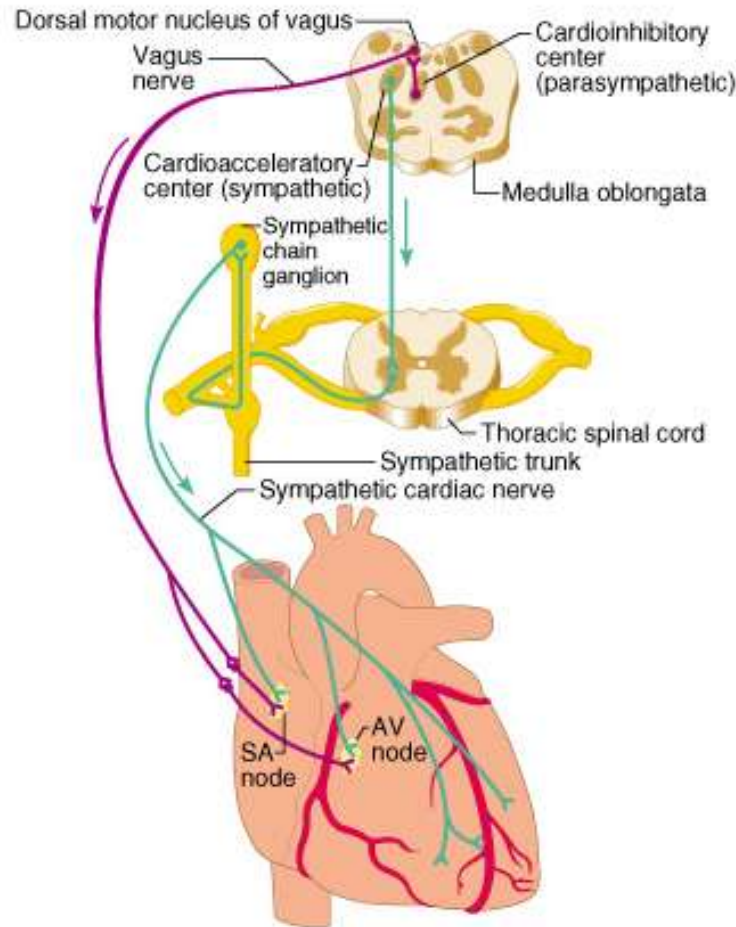
## The Conduction System of the Heart

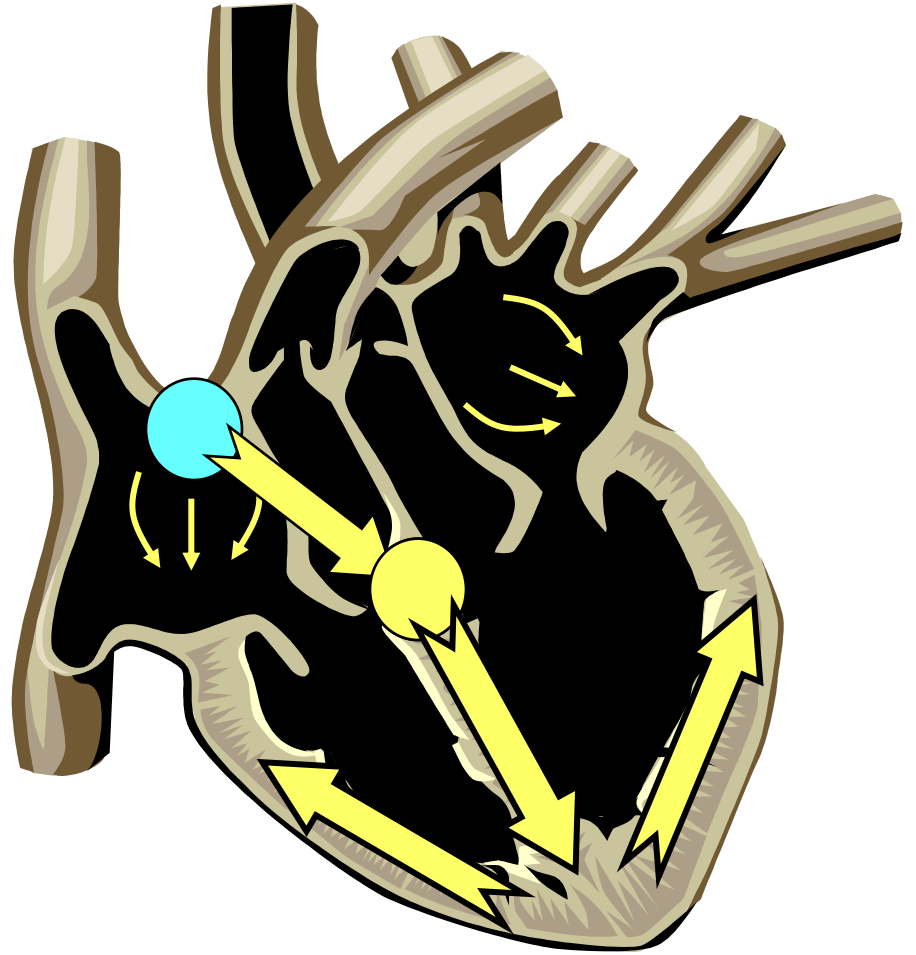
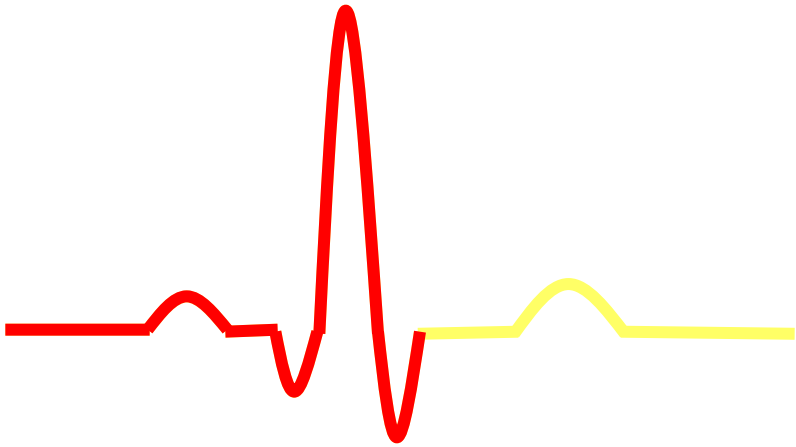




SENKOP

# Sempatik ve Parasempatik uyarım





Kalp debisi = **KALP HIZI** x Atım hacmi

**Çok düşük hızlarda** }  
**Çok yüksek hızlarda** } **Debi azalır**

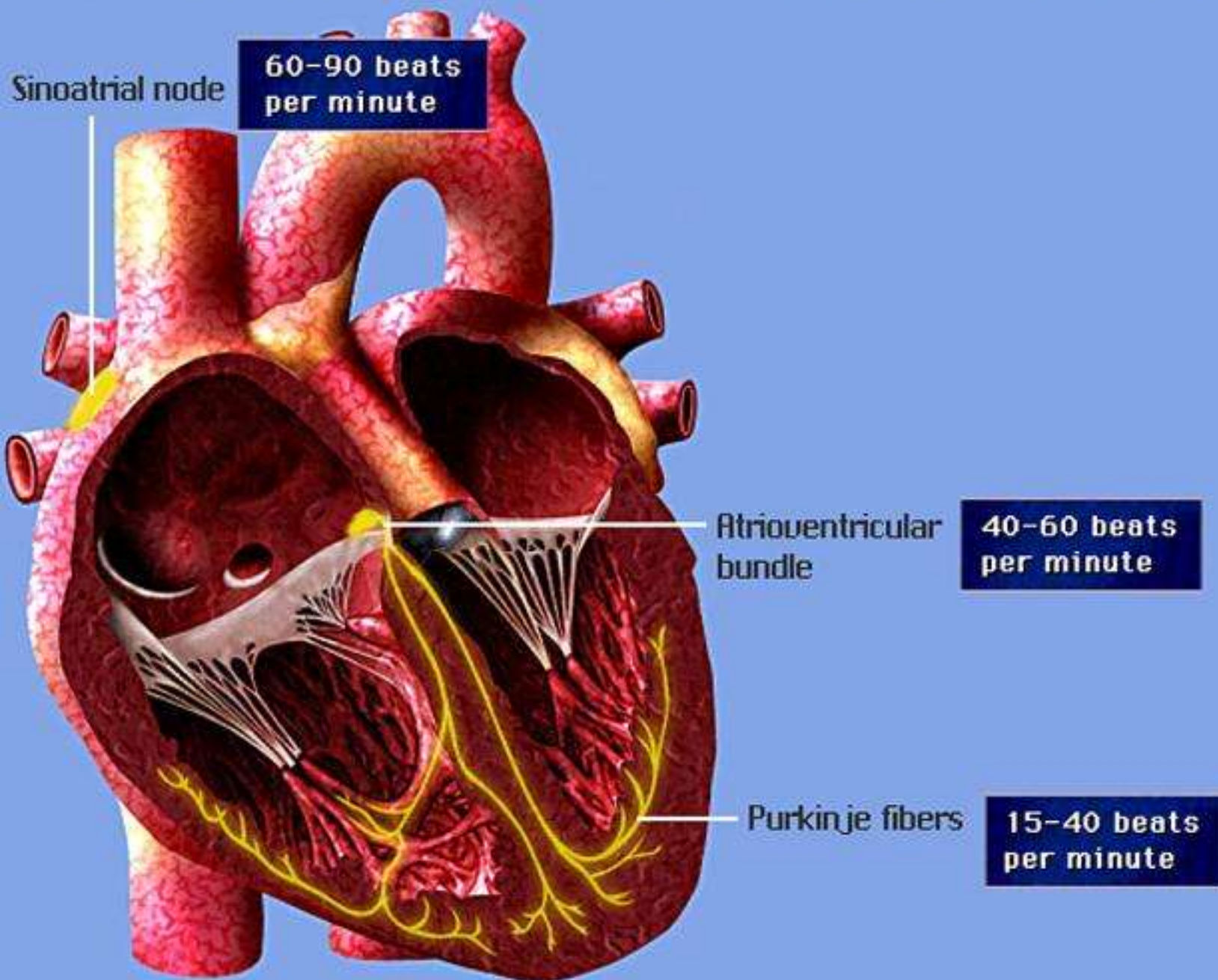
**Yetersiz koroner perfüzyon  
artmış miyokardiyal O<sub>2</sub> gereksinimi**



**İSKEMİ**

} **Debi daha  
fazla azalır**

# PACEMAKER ACTIVITY OF ELECTRICAL CONDUCTION SYSTEM



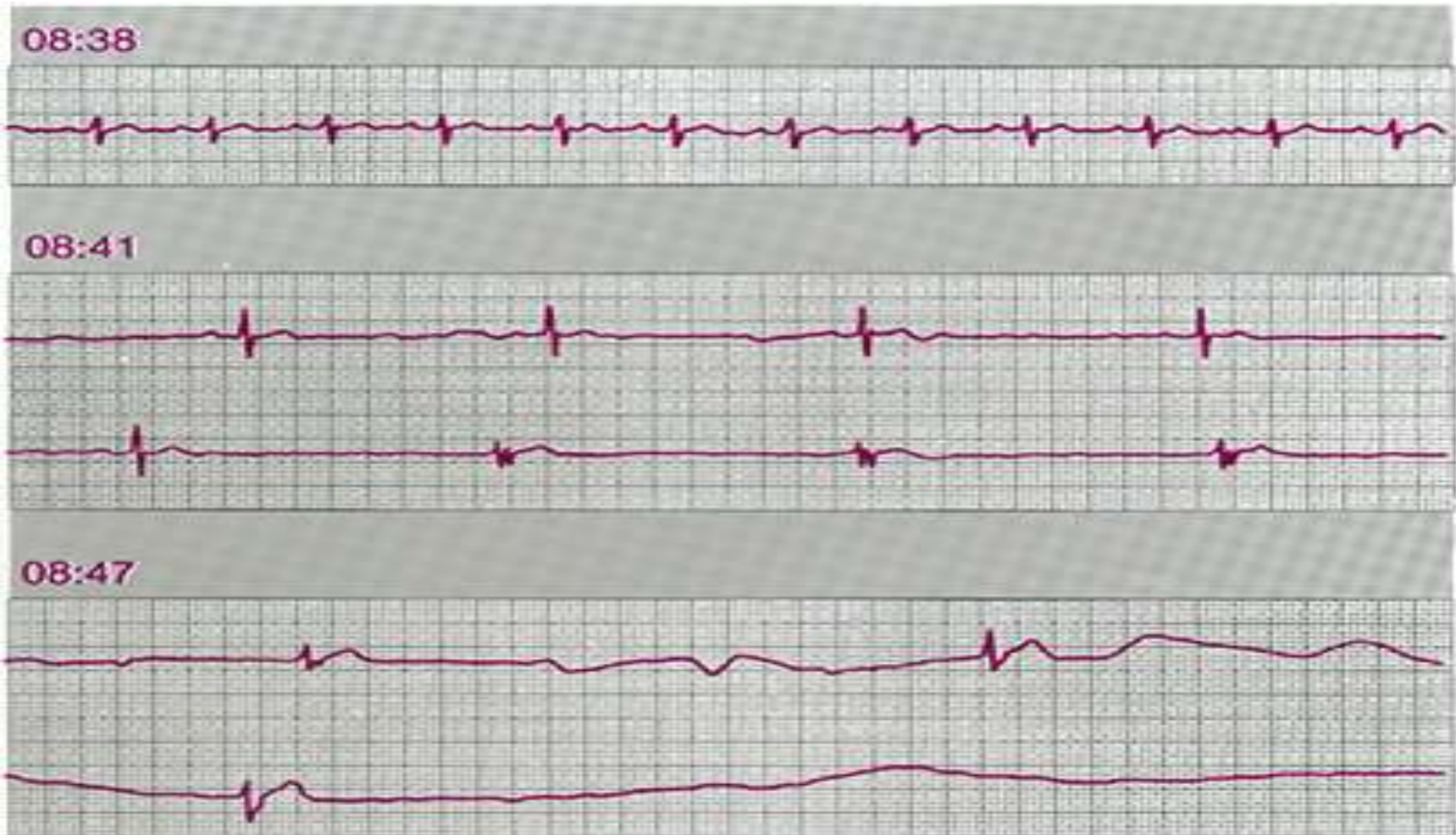


# Bradikardiler

- ✓ Kalp hızının yavaşlaması
- ✓ Klinik olarak **belirgin bradikardi** düşük sistemik perfüzyon bulgularının eşlik ettiği < 60/dk kalp hızı
- ✓ Sebep genellikle sinoatriyal (SA) düğüm veya atriyoventriküler (AV) düğümdeki iletim yavaşlamasıdır.

# Sinüs Ritimleri

- Normal sinüs ritmi
- Sinüs bradikardisi
- Sinüs taşikardisi
- Sinüs aritmisi
- Sinüs arresti



- Sinus arresti/duraklaması

# AV KAVŞAK RİTMİ ve AV BLOKLAR

- Kavşak (junction) ritmi
- Hızlanmış (akselere) kavşak ritmi
- Kavşak taşikardisi
- Birinci derece AV blok
- İkinci derece AV blok – Tip 1
- İkinci derece AV blok – Tip 2
- Üçüncü derece AV blok

# Kavşak Ritmi

- SA nodun baskılanması veya AV nodda otomositenin artması nedeniyle bir odak pacemaker olarak SA nodun yerini alır.
- **P dalgaları QRS kompleksinden hemen önce ya da ondan sonra gelir veya içinde gizlidir.**
- Sıklıkla **escape (kaçak)** bir ritim olarak ortaya çıkar.
- EKG özellikleri;
  - Hız : **40-60/dakika**
  - Ritim : **Düzenli**
  - P dalgası : Atriuma retrograd ileti ile gönderilir ve **pozitif derivasyonlarda negatif, negatif derivasyonlarda pozitif**dir.
  - P-R aralığı : **Kısa** (0.10 saniye veya daha az)
  - QRS : **Normal** (0.10 saniye veya daha az)

# Kavşak Ritmi



## Junctional Rhythm



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
40-60 bpm	Regular	Inverted, absent or after QRS	<.12	<.12

# AV iletim Blokları

1. Derece AV blok

2. Derece AV blok

Mobitz Tip 1 Wenckebach

Mobitz Tip 2

3. Derece AV blok

AVTB

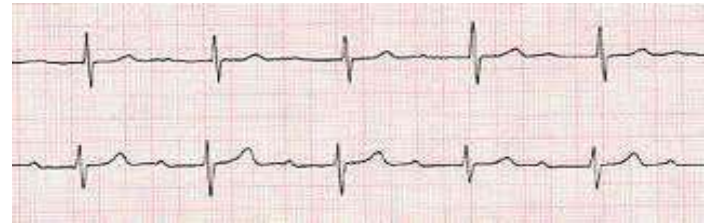


# 1. derece AV blok

## ■ 1. derece AV blok

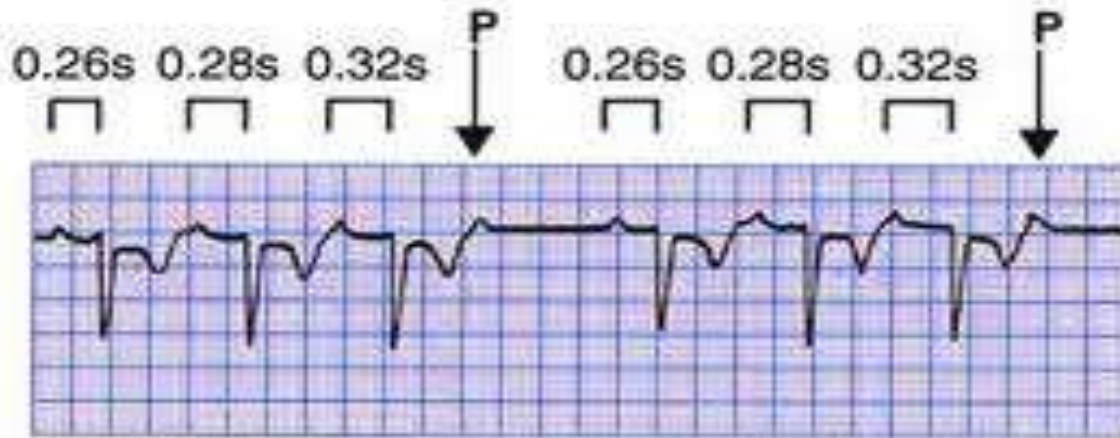
–P-R  
mesafesi  
uzun

–P-R > 200  
msn

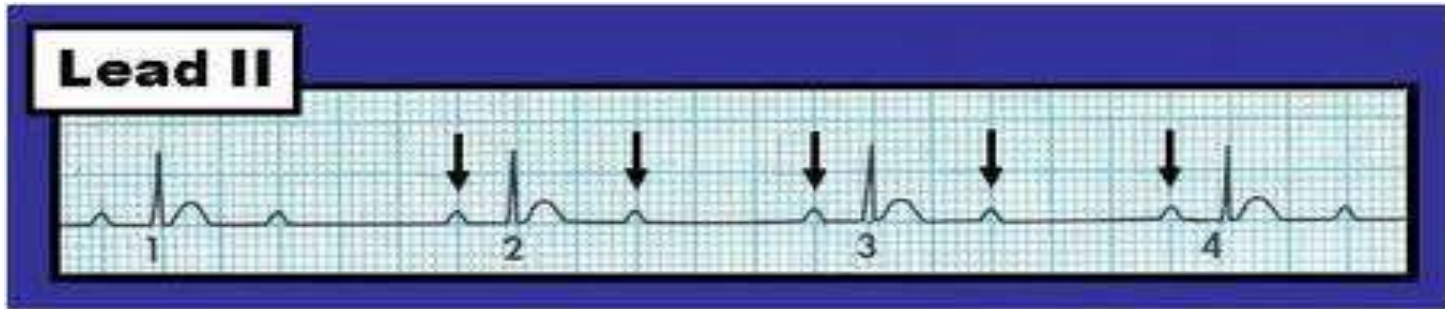


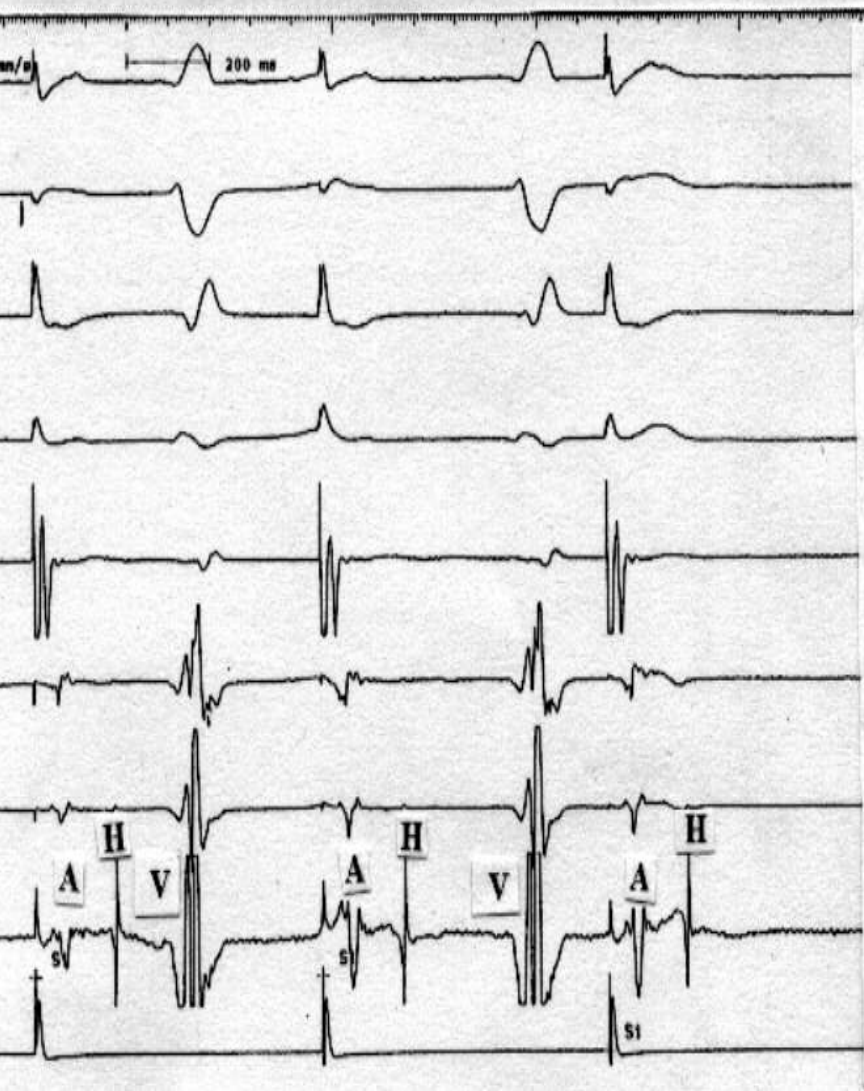
# Mobitz Tip 1

## Wenckebach type 2nd degree block

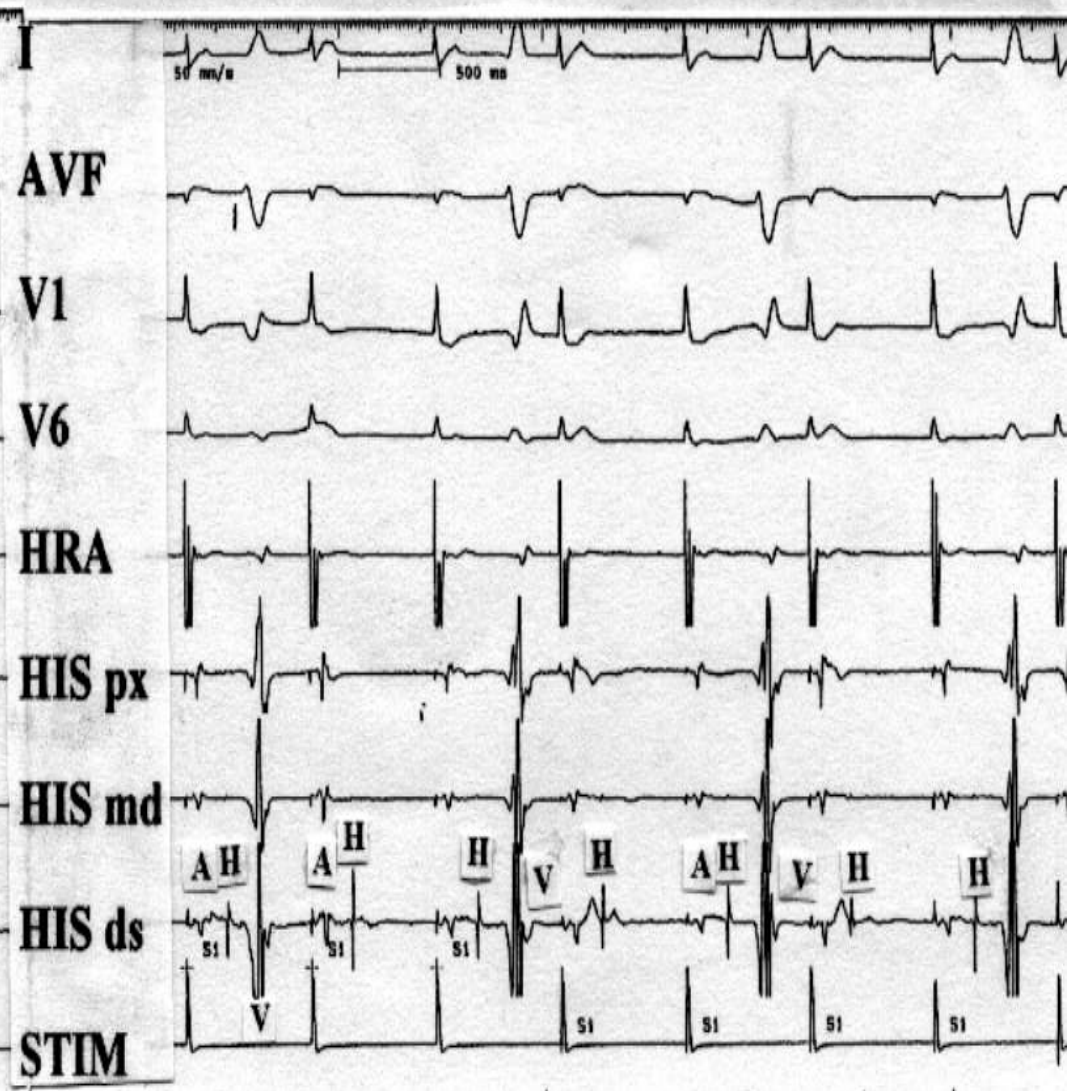


# Mobitz Tip 2



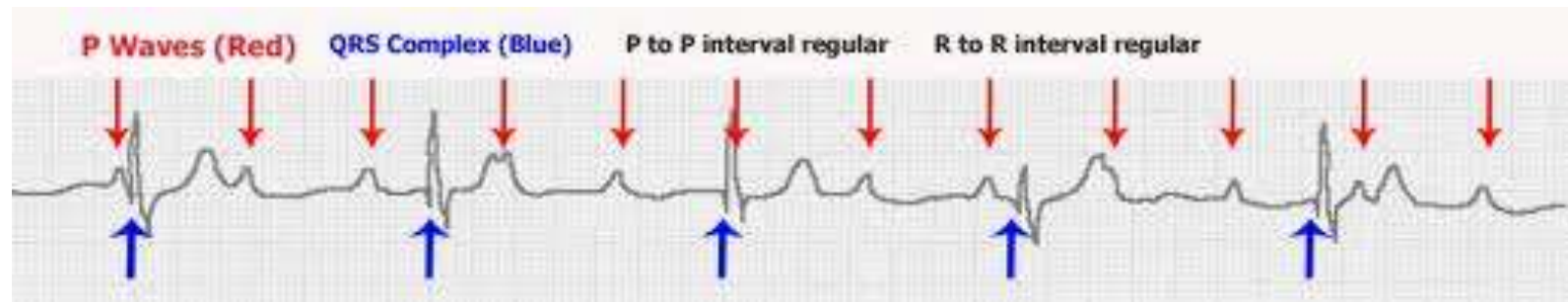


InfraHisian Wenckebach



InfraHisian 2:1 Blok

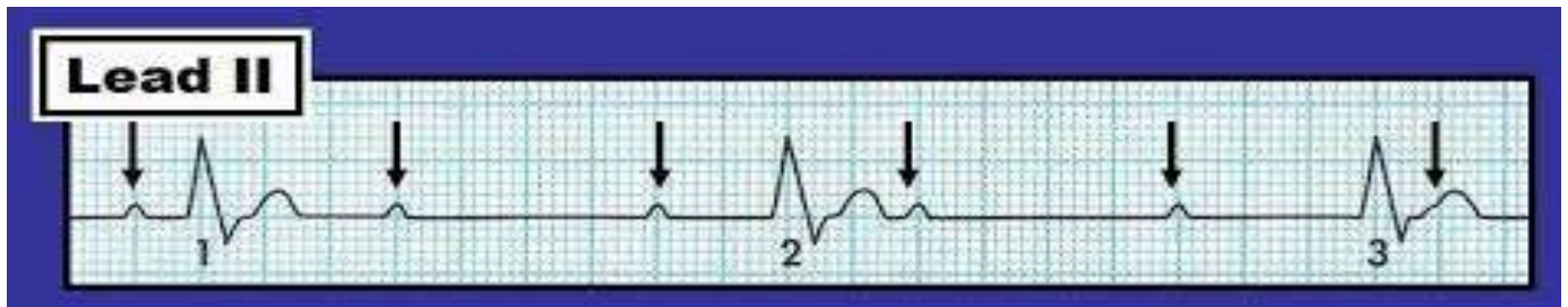
# AVTB



# AVTB



# AVTB



# AVTB

✓ **Doğuştan**

✓ **Edinsel**

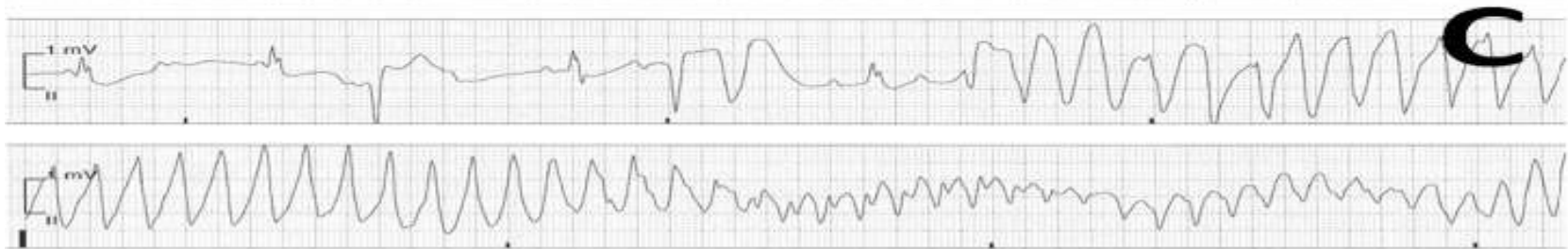
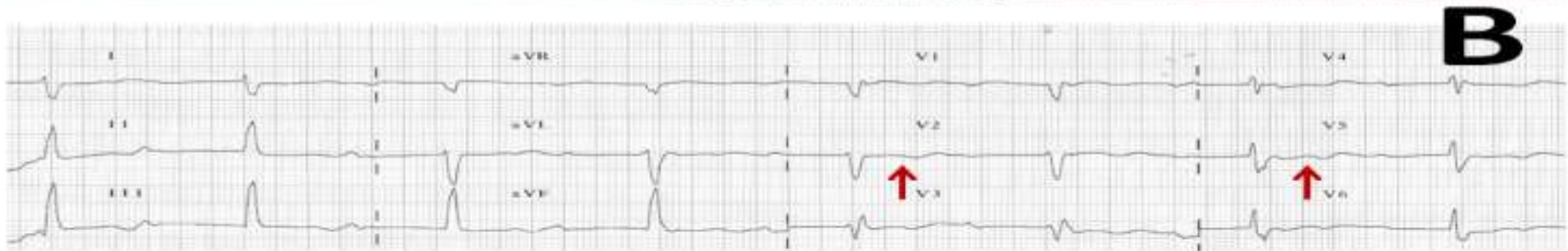
- **İskemik**
- **Postoperatif**
- **Dejeneratif**
- **Miyokardit**
- **Kardiyomiyopatiler**
- **Miyokard tümörleri**
- **İnfektif endokardit (miyokard apseleri)**



# AVTB Belirtiler

- ✓ **Belirtisiz**
- ✓ **Kalp yetersizliđi**
- ✓ **Kabuslar, uyuklama, huzursuzluk**
- ✓ **Presenkop/senkop (Adams-Stokes atakları)**
- ✓ **Ani ölüm**
- ✓ **Eksersiz intoleransı**
- ✓ **DERİN BRADİKARDİ VF'E İLERLEYEN ANİ ASİSTOLİ ATAKLARINA NEDEN OLABİLİR VE ACİLEN TEDAVİ EDİLMELİDİR**

# AVTB



**TEMEL YAŞAM DESTEĞİ  
OKSİJEN, MONİTÖR**

**PERFÜZYONUN  
DEĞERLENDİRİLMESİ**

**KALP ATIM HIZININ  
DEĞERLENDİRİLMESİ**

**RİTİM  
DEĞERLENDİRİLMESİ**

**NABİZ  
KAN BASINCI**

**KALP ATIMI VAR MI ?  
VARSA  
HIZLI MI? YAVAŞ MI?**

**KALP ATIMI SİNÜZAL MI?  
QRS GENİŞ Mİ DAR MI?  
(qrs süresi??)**

# İdiovventriküler Ritim

- Ventriküler ektopik bir odak uyarıları idiovventriküler hızda yolladığı zaman oluşur.
- Sıklıkla total kalp bloğu ile birlikte görülür.
- EKG özellikleri;
  - Hız : 20-40 atım/dakika
  - Ritim : Düzenli
  - P dalgası : Yoktur
  - P-R aralığı : Ölçülemez
  - QRS : Geniş (0.12 saniye veya daha fazla)

## Idioventricular Rhythms



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
20-40	Regular	Absent or not related	N/A	$\geq .12$

# Asistoli

- Miyokardiumun elektriksel aktivitesi yoktur.
- EKG özellikleri;
  - Dalga defleksiyonları yoktur
  - EKG'de düz bir çizgi görülür.

## Ventricular Asystole (standstill)



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
Absent	Absent	Absent or present	N/A	Absent

ABC'yi değerlendir ve gerekliyse destekle  
O<sub>2</sub> sağla  
Monitör/defibrilatör bağlantısını sağla

Bradikardi ciddi kalp-akciğer bozukluğu yapıyor mu?  
(düşük perfüzyon, hipotansiyon, solunum güçlüğü, bilinç değişikliği)

**HAYIR**

Göze  
ABC'yi destekle  
Daha ileri merkeze nakil etmeyi düşün

**EVET**

Oksijenlenme ve solunum desteğine karşın  
kalp hızı <50/dk ve düşük sistemik  
perfüzyon varsa  
Kalp masajı yap

**Epinefrin**

**Atropin**

**Pil uygulamasını düşün**

### Kalp-akciğer canlandırması sırasında

Trakeal entübasyon yap ve damar yolunu aç/kontrol et  
Elektrod ve pil padlerinin pozisyonlarını ve temasını kontrol et  
3-5 dakikada bir epinefrin ver ve epinefrin veya dopamin infüzyonunu düşün

Olası sebepleri sapt ve tedavi et

Hipoksemi  
Hipotermi  
Kafa travması  
Kalp bloğu  
İlaçlar/toksinler  
MI



# Gecici Kalp Pili



# Prognoz

- Bradikardi nedeni geçici, düzeltilebilir
- Düzeltilebilir neden yok !
  - Asemptomatik
  - Semptomatik
  - Kalp pili**

# 2013 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy

**The Task Force on cardiac pacing and resynchronization therapy of the European Society of Cardiology (ESC). Developed in collaboration with the Heart Failure Association (HFA) of the ESC**

**Authors/Task Force Members:** Michele Brignole (Italy), Angelo Auricchio (Switzerland), Gonzalo Baron-Esquivias (Spain), Pierre Bordachar (France), Giuseppe Boriani (Italy), Ole-A Breithardt (Germany), John Cleland (UK), Jean-Claude Deharo (France), Victoria Delgado (Netherlands), Perry M. Elliott (UK), Bulent Gorenek (Turkey), Carsten W. Israel (Germany), Christophe Leclercq (France), Cecilia Linde (Sweden), Lluís Mont (Spain), Luigi Padeletti (Italy), Richard Sutton (UK), Panos E. Vardas (Greece).

# Class of recommendation

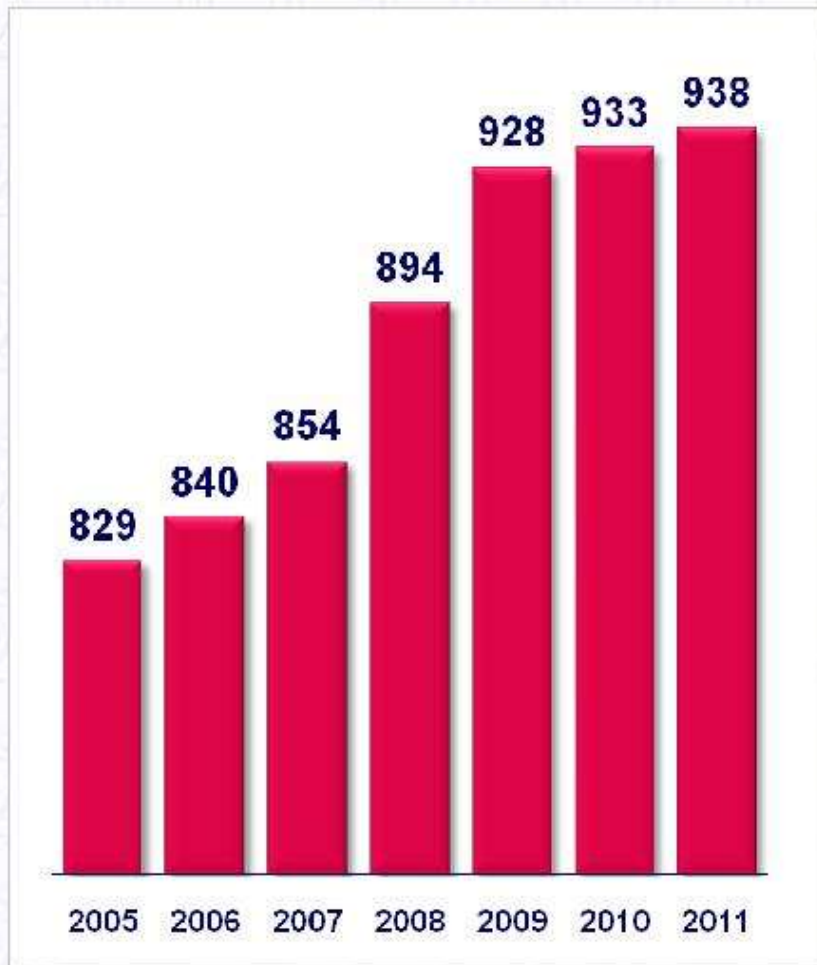
Classes of recommendations	Definition	Suggested wording to use
<b>Class I</b>	<b>Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.</b>	<b>Is recommended/ is indicated.</b>
<b>Class II</b>	<b>Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.</b>	
<i>Class IIa</i>	<i>Weight of evidence/opinion is in favour of usefulness/efficacy.</i>	<i>Should be considered.</i>
<i>Class IIb</i>	<i>Usefulness/efficacy is less well established by evidence/opinion.</i>	<i>May be considered.</i>
<b>Class III</b>	<b>Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.</b>	<b>Is not recommended.</b>

# Level of evidence

<b>Level of Evidence A</b>	<b>Data derived from multiple randomized clinical trials or meta-analyses.</b>
<b>Level of Evidence B</b>	<b>Data derived from a single randomized clinical trial or large non-randomized studies.</b>
<b>Level of Evidence C</b>	<b>Consensus of opinion of the experts and/or small studies, retrospective studies, registries.</b>

# PM

Units per million inhabitants/year



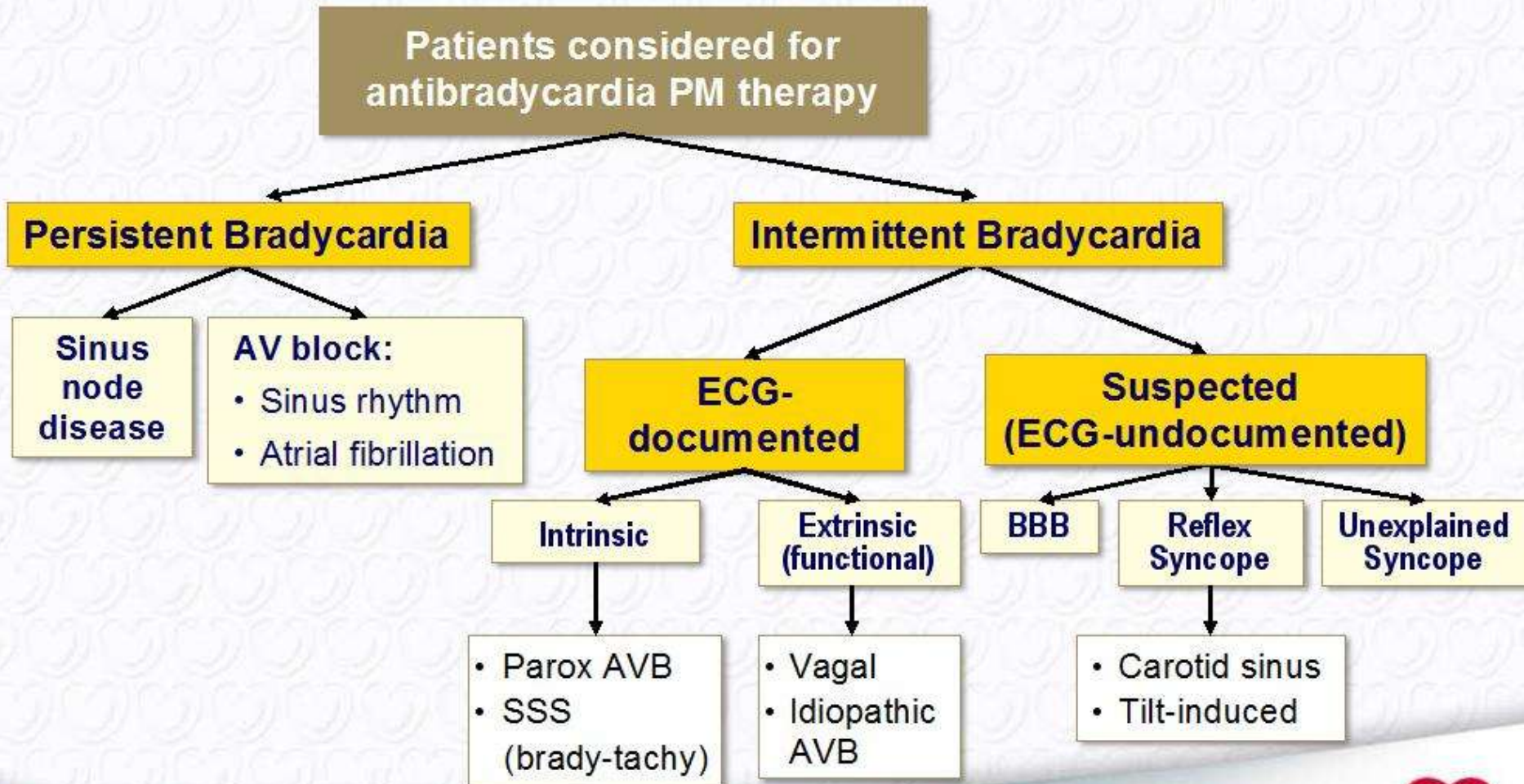
# PM 2011

Units per million inhabitants in the year 2011



Source: Eucomed ([www.eucomed.org/medical-technology/facts-figures](http://www.eucomed.org/medical-technology/facts-figures))

# Classification of bradyarrhythmias based on the patient's clinical presentation



# Indication for pacing in patients with persistent bradycardia

Recommendations	Class	Level
<b>1) Sinus node disease.</b> Pacing is indicated when symptoms can clearly be attributed to bradycardia.	I	B
<b>2) Sinus node disease.</b> Pacing may be indicated when symptoms are likely to be due to bradycardia, even if the evidence is not conclusive.	IIb	C
<b>3) Sinus node disease.</b> Pacing is not indicated in patients with sinus bradycardia which is asymptomatic or due to reversible causes.	III	C
<b>4) Acquired AV block.</b> Pacing is indicated in patients with third- or second-degree type 2 AV block irrespective of symptoms.	I	C
<b>5) Acquired AV block.</b> Pacing should be considered in patients with second-degree type 1 AV block which causes symptoms or is found to be located at intra- or infra-His levels at EPS.	IIa	C
<b>6) Acquired AV block.</b> Pacing is not indicated in patients with AV block which is due to reversible causes.	III	C



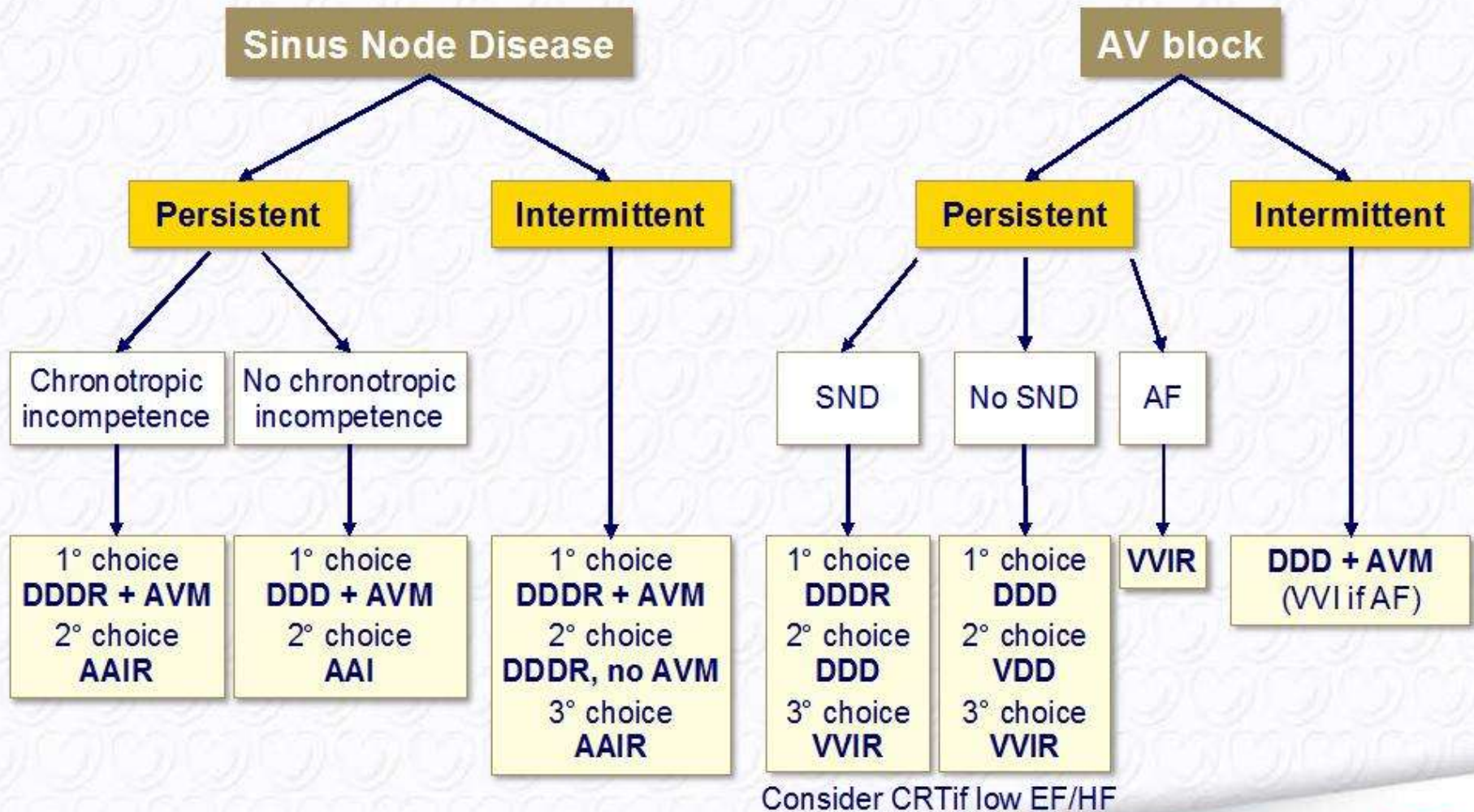
# Indication for pacing in intermittent documented bradycardia

Recommendations	Class	Level
<p><b>1) Sinus node disease (including brady-tachy form).</b> Pacing is indicated in patients affected by sinus node disease who have the documentation of symptomatic bradycardia due to sinus arrest or sinus-atrial block.</p>	I	B
<p><b>2) Intermittent/paroxysmal AV block (including AF with slow ventricular conduction).</b> Pacing is indicated in patients with intermittent/paroxysmal intrinsic third- or second-degree AV block.</p>	I	C
<p><b>3) Reflex asystolic syncope.</b> Pacing should be considered in patients <math>\geq 40</math> years with recurrent, unpredictable reflex syncope and documented symptomatic pause/s due to sinus arrest or AV block or the combination of the two.</p>	IIa	B
<p><b>4) Asymptomatic pauses (sinus arrest or AV block).</b> Pacing should be considered in patients with history of syncope and documentation of asymptomatic pauses <math>&gt;6</math> s due to sinus arrest, sinus-atrial block or AV block.</p>	IIa	C
<p><b>5) Pacing is not indicated in reversible causes of bradycardia.</b></p>	III	C

# Choice of pacing mode in intermittent documented bradycardia

Recommendations	Class	Level
<b>6) Intermittent documented bradycardia.</b> Preservation of spontaneous AV conduction is recommended.	I	B
<b>7) Reflex asystolic syncope.</b> Dual-chamber pacing with rate hysteresis is the preferred mode of pacing in order to preserve spontaneous sinus rhythm.	I	C

# Choice of pacing mode



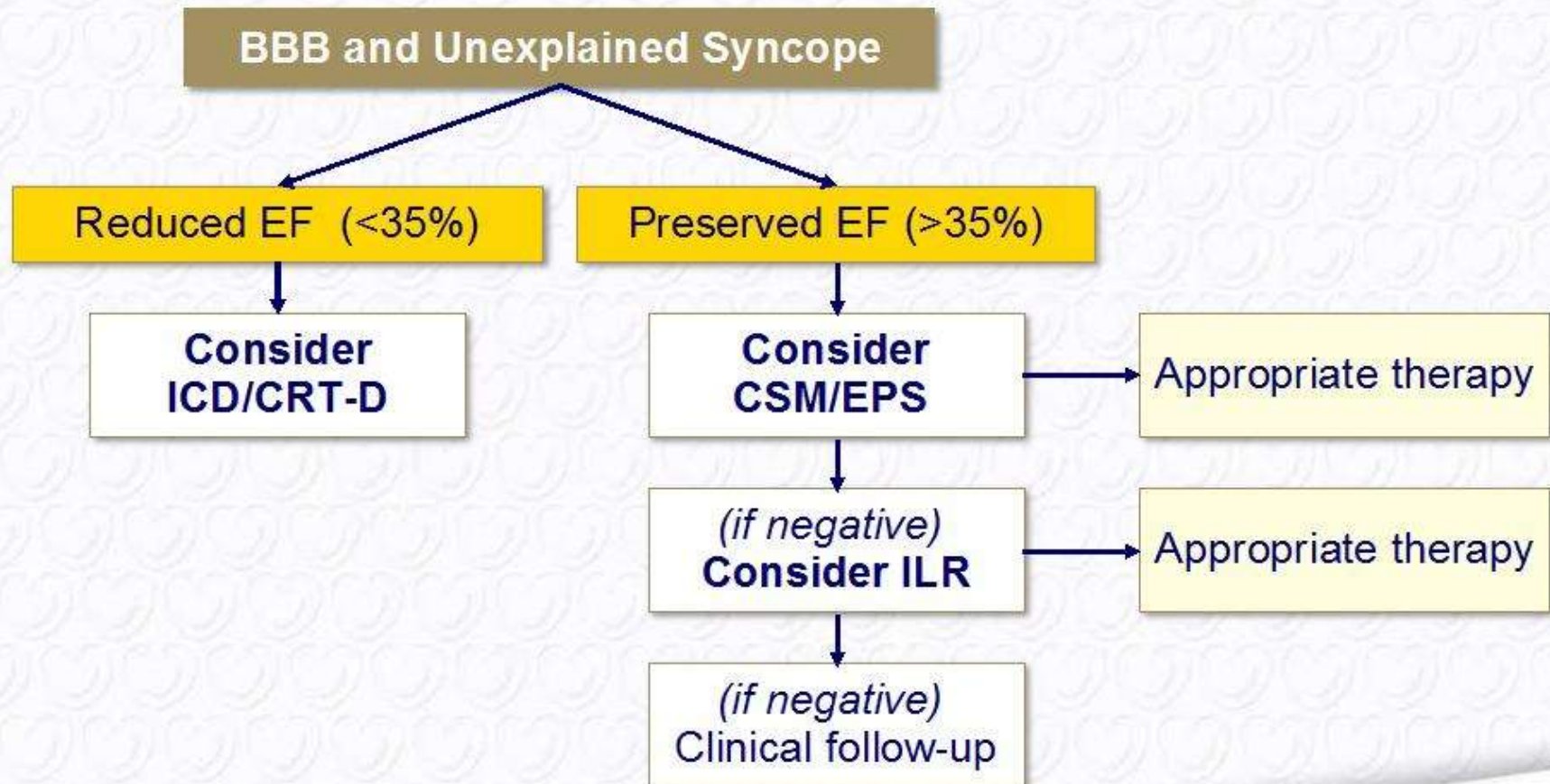
# Dual-chamber versus ventricular pacing

Outcome	Dual-chamber benefit over ventricular pacing
All-cause deaths	No benefit
Stroke, embolism	Benefit (in meta-analysis only, not in single trial)
Atrial fibrillation	Benefit
HF, hospitalization for HF	No benefit
Exercise capacity	Benefit
Pacemaker syndrome	Benefit
Functional status	No benefit
Quality of life	Variable
Complications	More complications with dual-chamber

# Indication for cardiac pacing in patients with BBB

Recommendations	Class	Level
<b>1) BBB, unexplained, syncope and abnormal EPS.</b> Pacing is indicated in patients with syncope, BBB and positive EPS defined as HV interval of $\geq 70$ ms, or second- or third-degree His-Purkinje block demonstrated during incremental atrial pacing or with pharmacological challenge.	I	B
<b>2) Alternating BBB.</b> Pacing is indicated in patients with alternating BBB with or without symptoms.	I	C
<b>3) BBB, unexplained syncope with non-diagnostic investigations.</b> Pacing may be considered in selected patients with unexplained syncope and BBB.	IIb	B
<b>4) Asymptomatic BBB.</b> Pacing is not indicated for BBB in asymptomatic patients	III	B

# Algorithm for patients with unexplained syncope and BBB

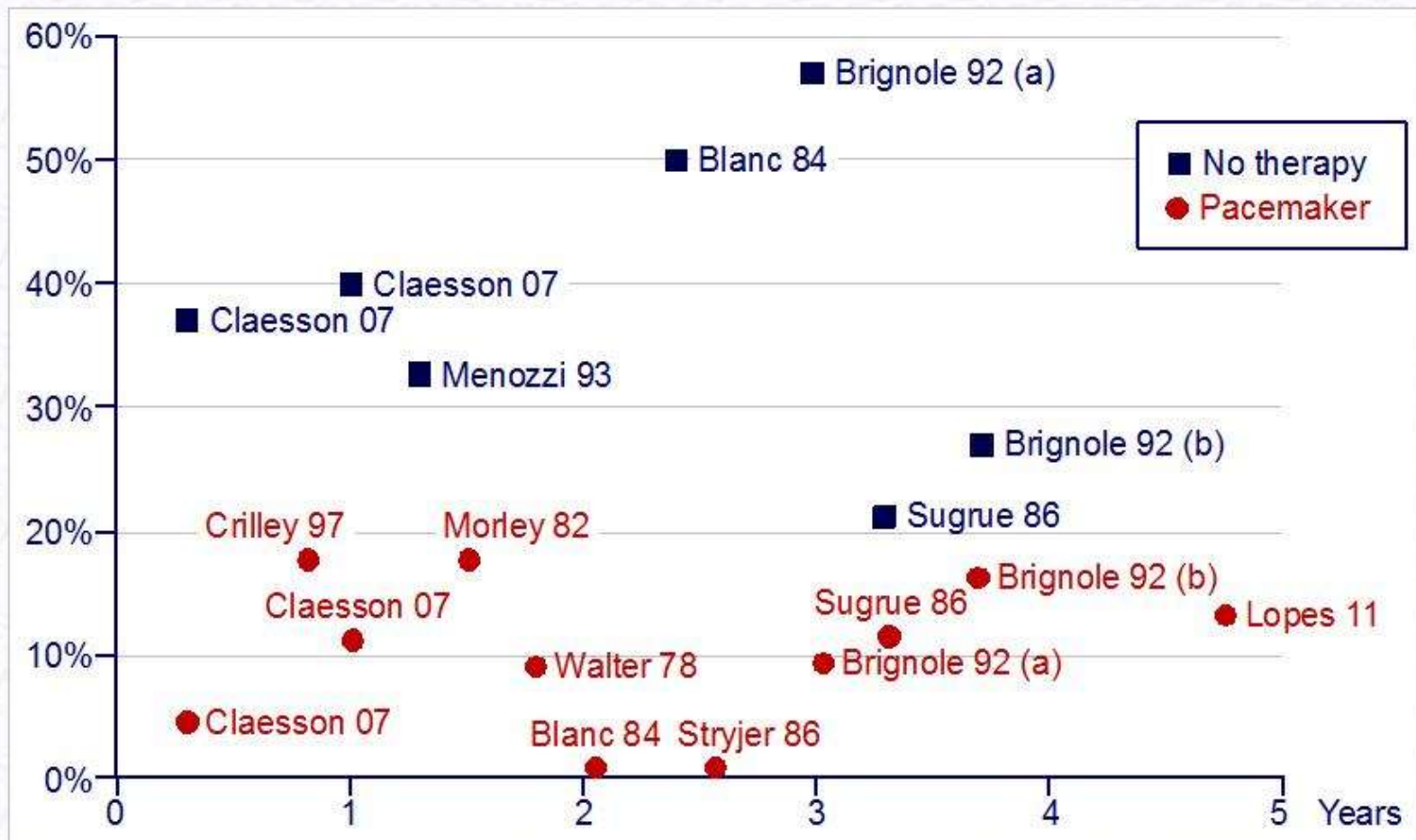


# Indication for cardiac pacing in patients with undocumented reflex syncope

Recommendations	Class	Level
<b>1) Carotid sinus syncope.</b> Pacing is indicated in patients with dominant cardioinhibitory carotid sinus syndrome and recurrent unpredictable syncope.	I	B
<b>2) Tilt-induced cardioinhibitory syncope.</b> Pacing may be indicated in patients with tilt-induced cardioinhibitory response with recurrent frequent unpredictable syncope and age >40 years after alternative therapy has failed.	IIb	B
<b>3) Tilt-induced non-cardioinhibitory syncope.</b> Cardiac pacing is not indicated in the absence of a documented cardioinhibitory reflex.	III	B

# CSS

## Syncopal recurrence rate





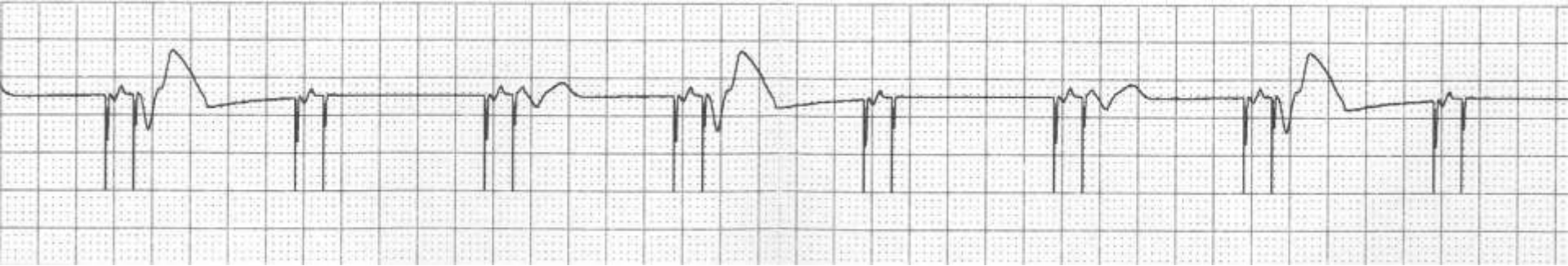
# Choice of pacing mode in patients with undocumented reflex syncope

Recommendations	Class	Level
<b>4) Carotid sinus syncope.</b> In patients with carotid sinus syndrome, dual-chamber pacing is the preferred mode of pacing.	I	B
<b>5) Tilt-induced cardioinhibitory syncope.</b> In patients with cardioinhibitory vasovagal syncope, dual-chamber pacing is the preferred mode of pacing.	I	C
<b>6) Lower rate and rate hysteresis should be programmed in order to achieve back-up pacing function which preserves native heart rhythm and AV conduction.</b>	IIa	C

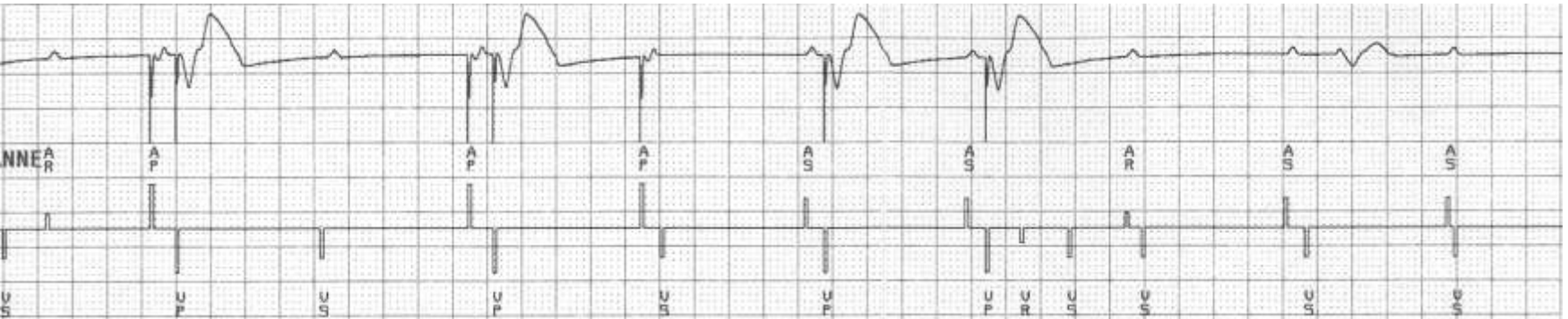
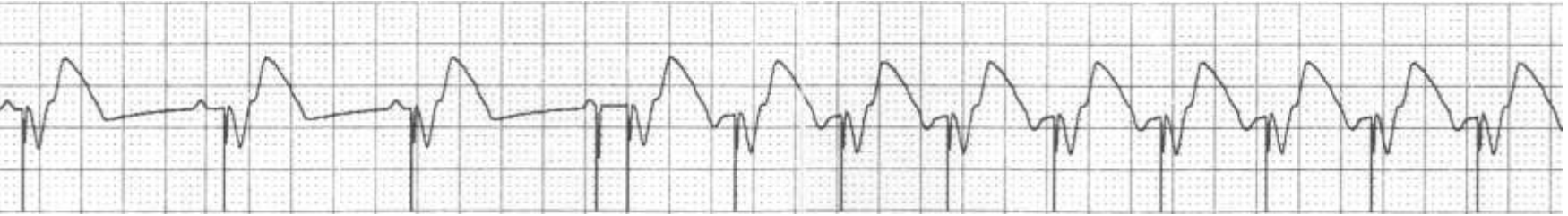
# Indication for cardiac pacing in patients with unexplained syncope

Recommendations	Class	Level
<b>1) Unexplained syncope and positive adenosine triphosphate test.</b> Pacing may be useful to reduce syncopal recurrences.	IIb	B
<b>2) Unexplained syncope.</b> Pacing is not indicated in patients with unexplained syncope without evidence of bradycardia or conduction disturbance.	III	C
<b>3) Unexplained falls.</b> Pacing is not indicated in patients with unexplained falls.	III	B

# Kalp pili disfonksiyonu



# Kalp pili disfonksiyonu



- Teşekkürler