

# ARİTMİLER

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**Ankara Üniversitesi Tıp Fakültesi kardiyoloji Anabilim Dalı**

# EKG

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- **E**lektro **K**ardiyo **G**ram:

Kalp atımları sırasında oluşan elektriksel deęişikliklerin vücut yüzeyine konan elektrotlar yardımıyla kaydedilmesidir.

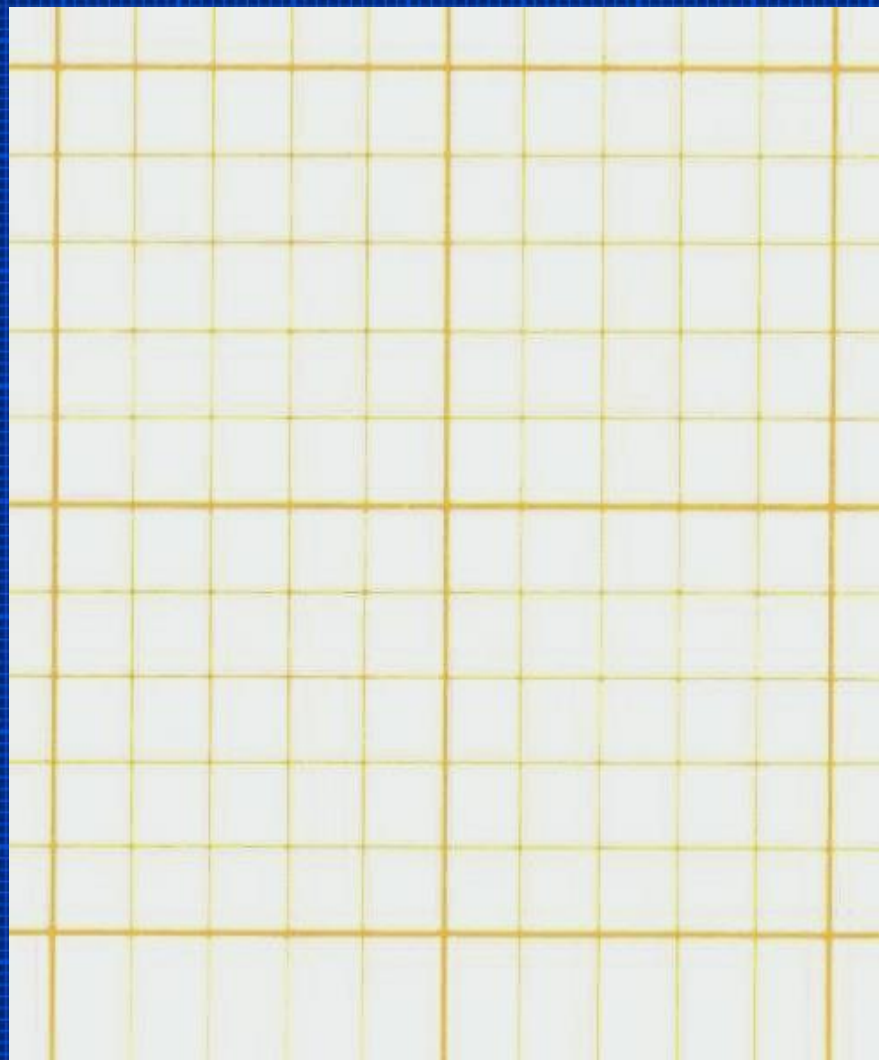
10 mm

5 mm

1 mm

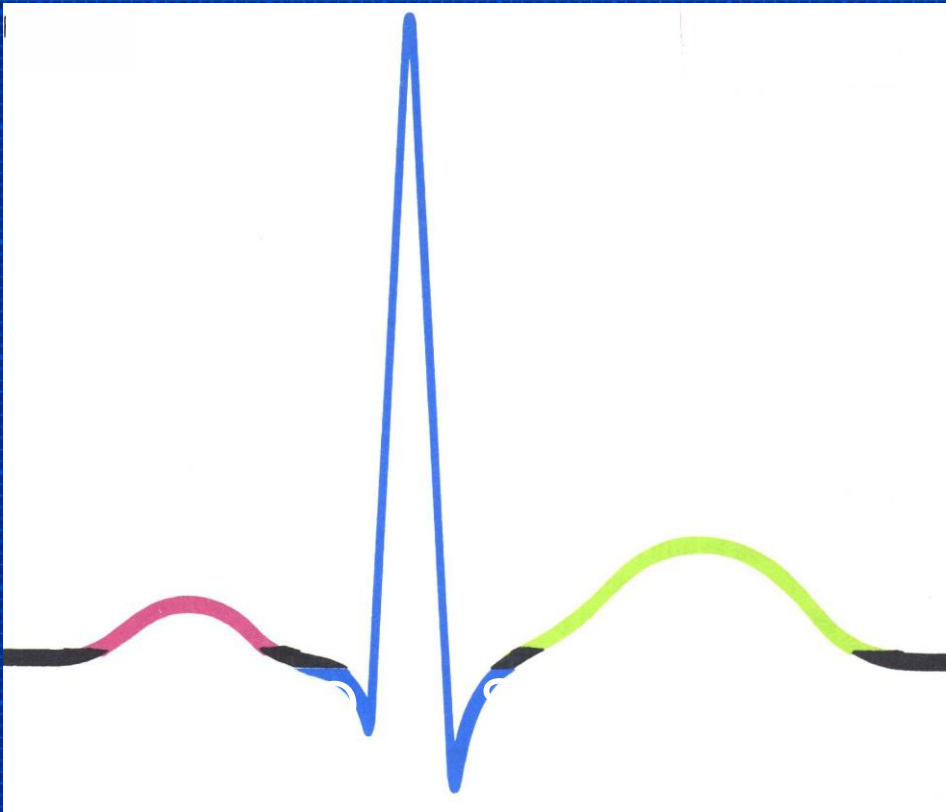
0.04sn

0.20sn



# EKG dalgaları

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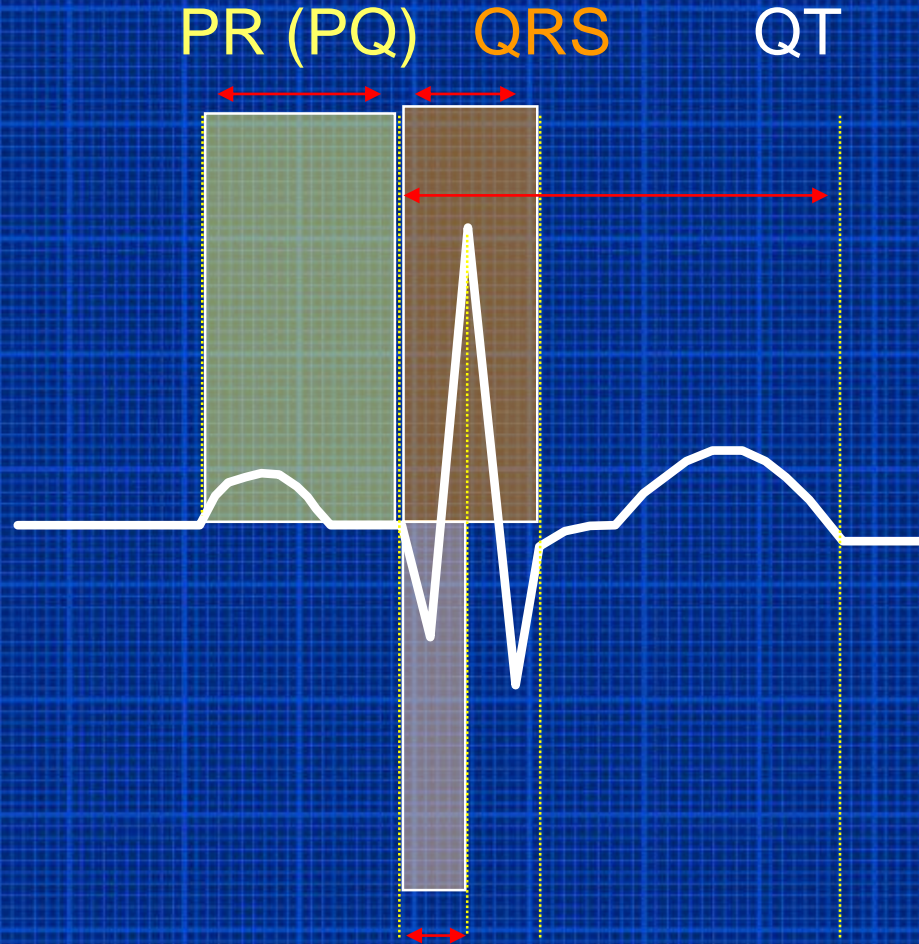
**P** Dalgası

**QRS** kompleksi

**T** dalgası

# EKG'de aralıklar

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# EKG derivasyonları

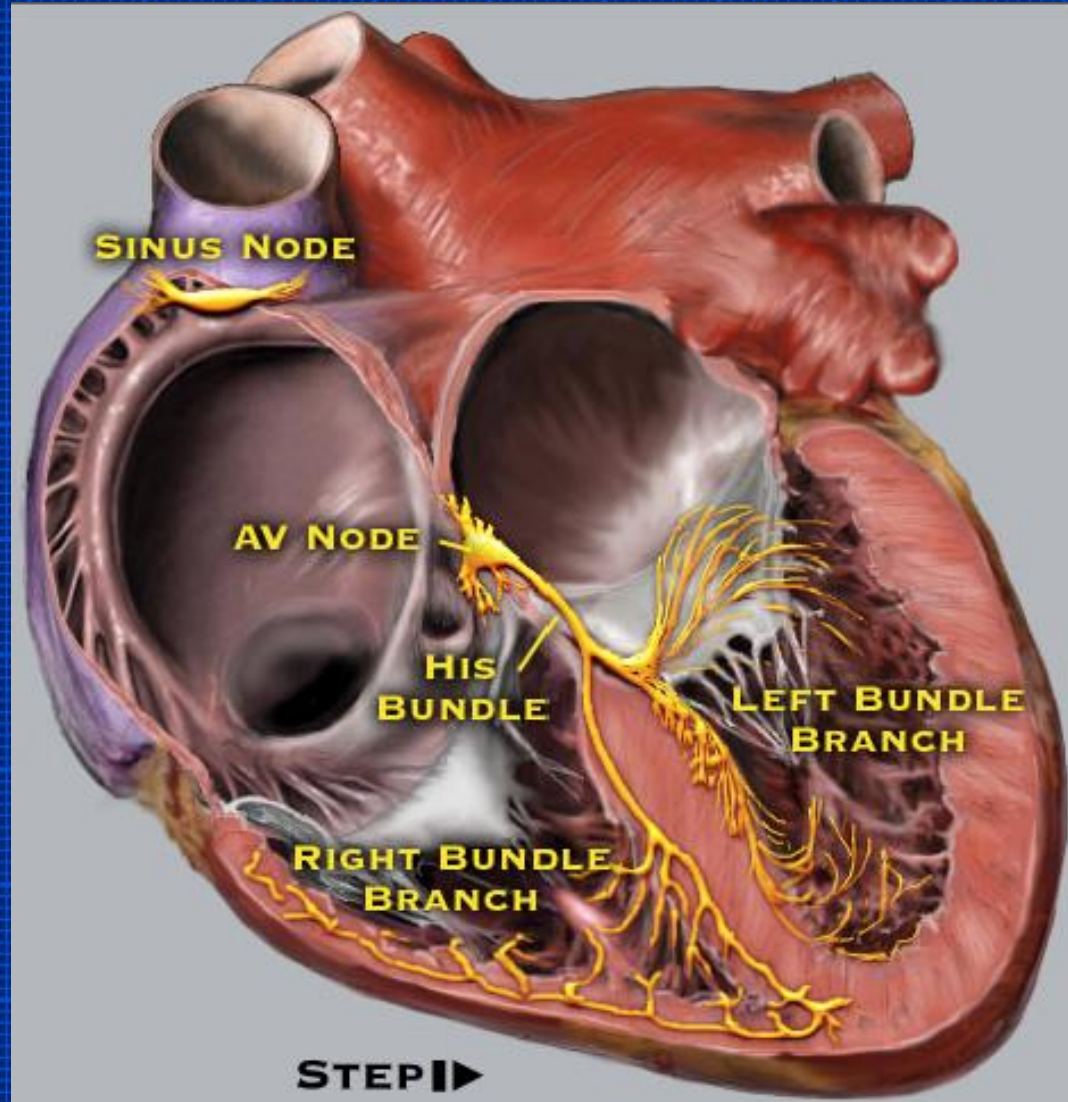
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- Ekstremitte derivasyonları
  - Bipolar derivasyonlar
    - **DI, DII, DIII**
  - Unipolar derivasyonlar
    - **aVR, aVL, aVF**
- Göğüs derivasyonları (unipolar)
  - **V1, V2, V3, V4, V5, V6**

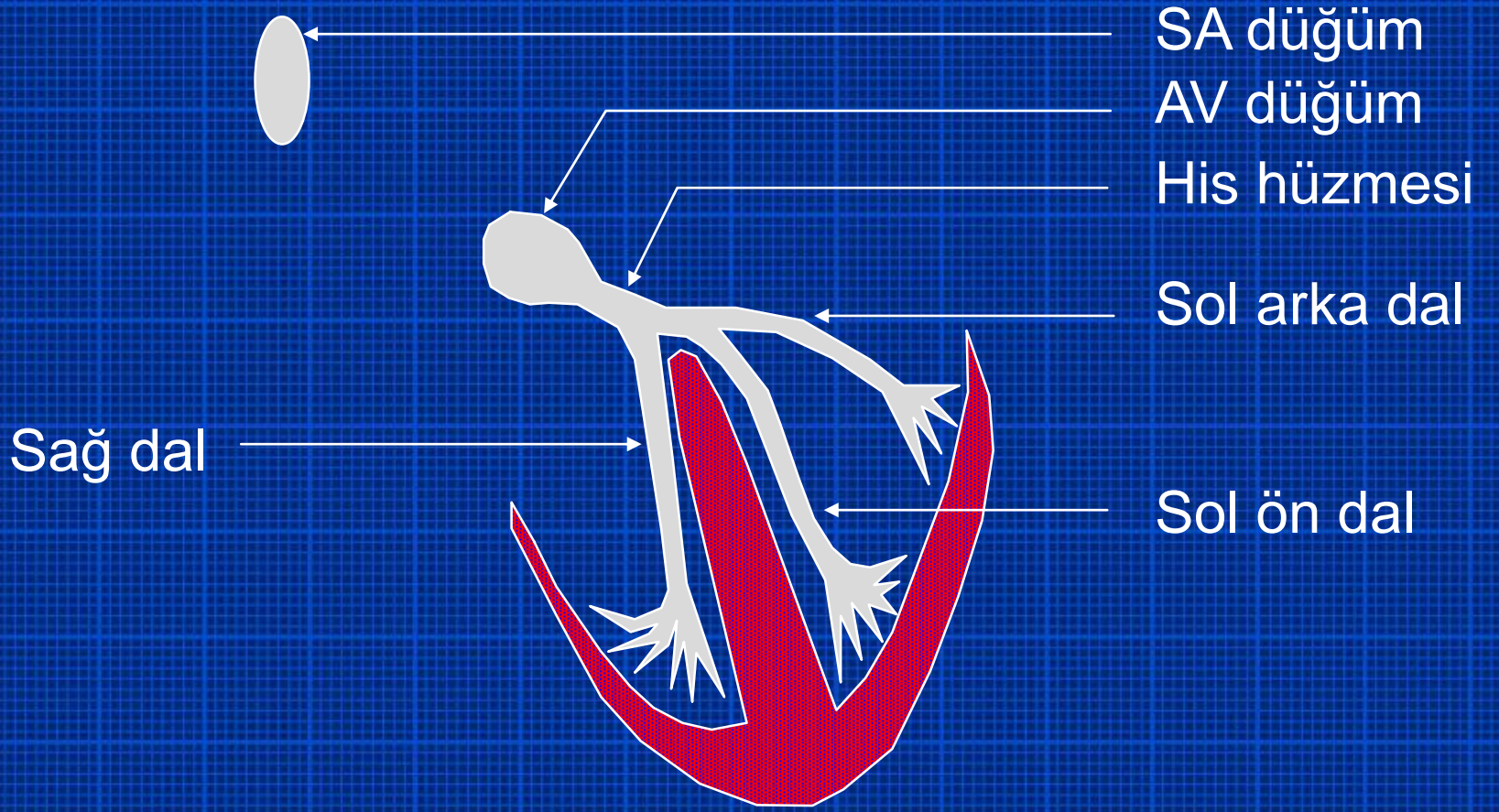
Lead	P	Q	R	S	ST	T
I	<u>Upright.</u>	Small (less than 0.04 s and less than 25% of R).	Dominant. Largest deflection of the QRS complex.	Less than R, or none.	Usually isoelectric; may vary from +1 to -0.5 mm.	<u>Upright.</u>
II	<u>Upright.</u>	Small or none.	Dominant.	Less than R, or none.	Usually isoelectric; may vary from +1 to -0.5 mm.	<u>Upright.</u>
III	Upright, flat, diphasic, or inverted, depending on frontal plane axis.	Small or none, depending on frontal plane axis; or large (0.04-0.05 s or greater than 25% of R).	None to dominant, depending on frontal plane axis.	None to dominant, depending on frontal plane axis.	Usually isoelectric; may vary from +1 to -0.5 mm.	Upright, flat, diphasic, or inverted, depending on frontal plane axis.
aVR	Inverted.	Small, none, or large.	Small or none, depending on frontal plane axis.	Dominant (may be QS).	Usually isoelectric; may vary from +1 to -0.5 mm.	Inverted.
aVL	Upright, flat, diphasic, or inverted, depending on frontal plane axis.	Small, none, or large, depending on frontal plane axis.	Small, none, or dominant, depending on frontal plane axis.	None to dominant, depending on frontal plane axis.	Usually isoelectric; may vary from +1 to -0.5 mm.	Upright, flat, diphasic, or inverted, depending on frontal plane axis.
aVF	<u>Upright.</u>	Small or none.	Small, none, or dominant, depending on frontal plane axis.	None to dominant; depending on frontal plane axis.	Usually isoelectric; may vary from +1 to -0.5 mm.	Upright, flat, diphasic, or inverted, depending on frontal plane axis.
V <sub>1</sub>	Inverted, flat, upright, or diphasic.	None (may be QS).	Less than S, or none (QS); small r' may be present.	Dominant (may be QS).	0 to +3 mm.	Upright, flat, diphasic, or inverted.
V <sub>2</sub>	Upright; less commonly diphasic or inverted.	None (may be QS).	Less than S, or none (QS); small r' may be present.	Dominant (may be QS).	0 to +3 mm.	Upright; less commonly flat; diphasic, or inverted.
V <sub>3</sub>	<u>Upright.</u>	Small or none.	R less than, greater than, or equal to S.	S greater than, less than, or equal to R.	0 to +3 mm.	<u>Upright.</u>
V <sub>4</sub>	<u>Upright.</u>	Small or none.	R greater than S.	S less than R.	Usually isoelectric; may vary from +1 to -0.5 mm.	<u>Upright.</u>
V <sub>5</sub>	<u>Upright.</u>	Small.	Dominant (less than 26 mm).	S less than SV <sub>4</sub> .		<u>Upright.</u>
V <sub>6</sub>	<u>Upright.</u>	Small.	Dominant (less than 26 mm).	S less than SV <sub>5</sub> .		<u>Upright.</u>

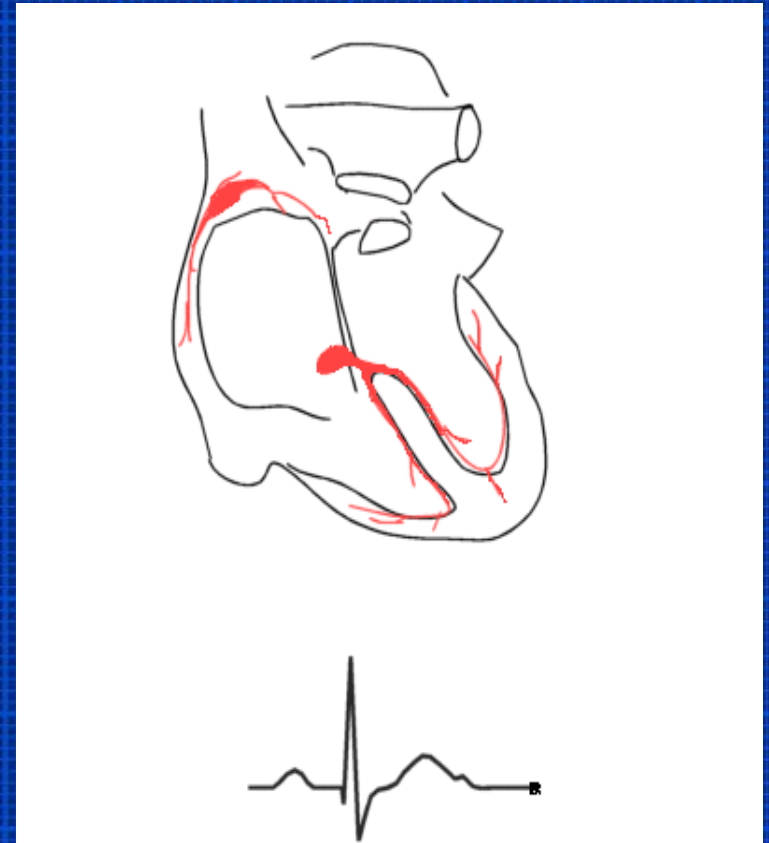
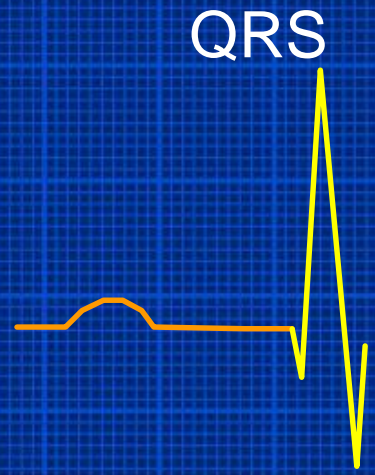
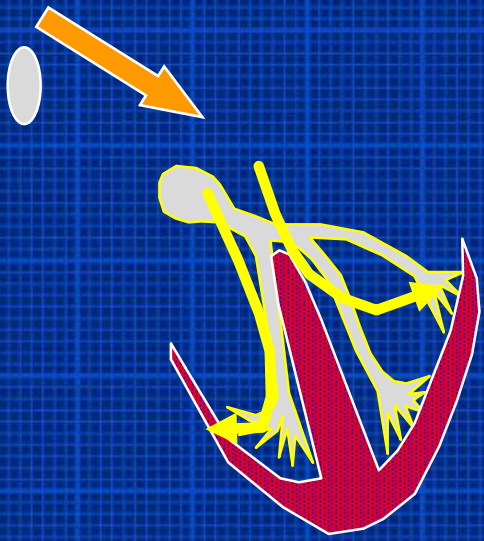
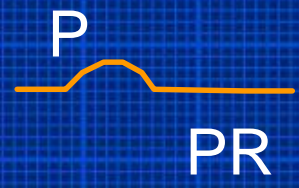
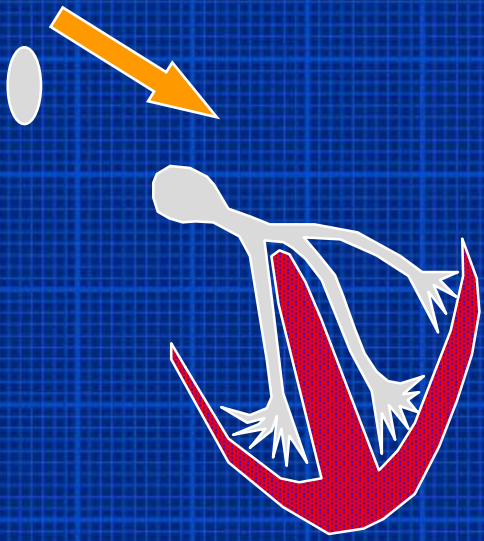
# İletim Sistemi

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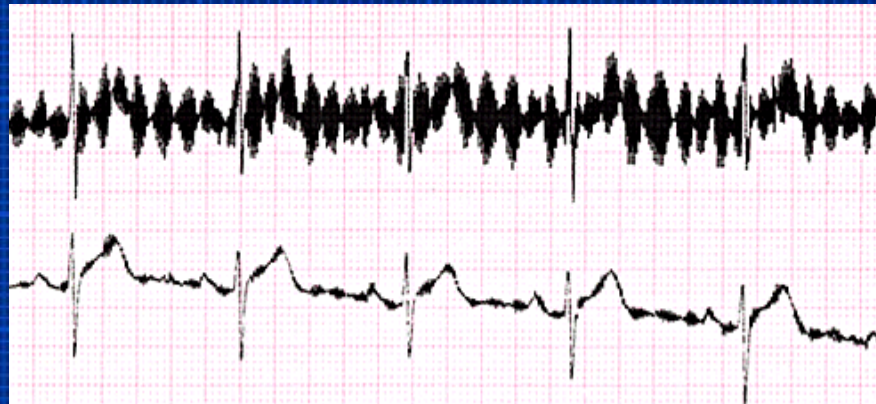
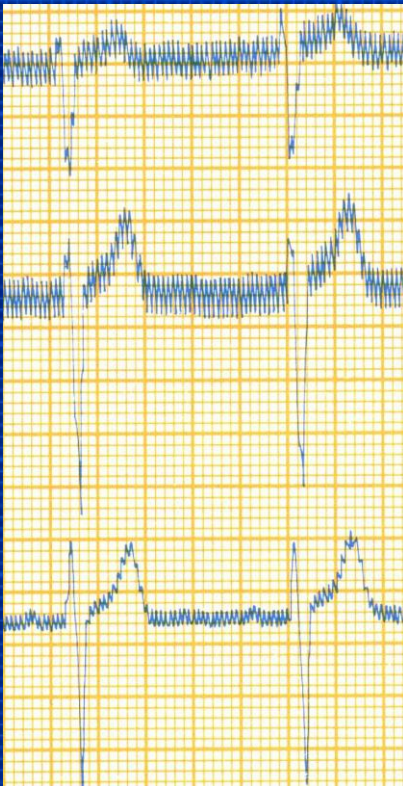
# EKG nasıl incelenir ?

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- Kayıt kalitesi ?
- Hastanın ismi ve tarih var mı ?
- Kalibrasyon?
- P dalgası aranacak
- P-QRS ilişkisi
- P ve QRS hızları nasıl ?
- Aralıklar
- Tüm derivasyonlardaki dalgalar sırasıyla gözden geçirilecek

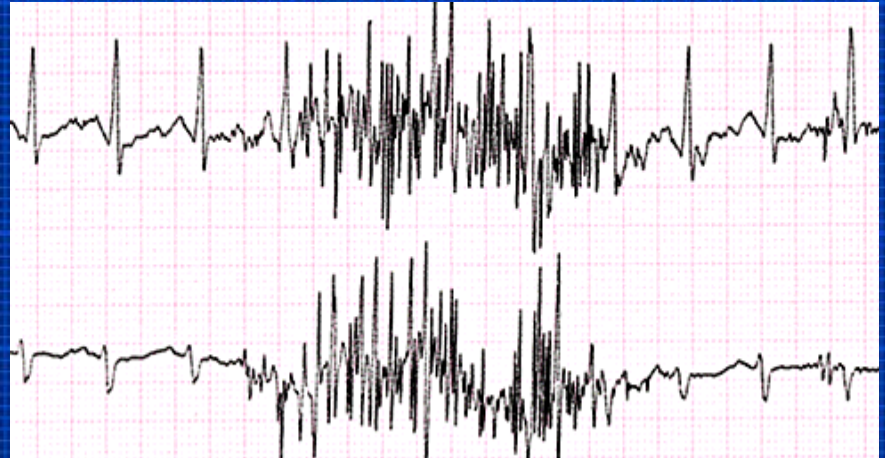
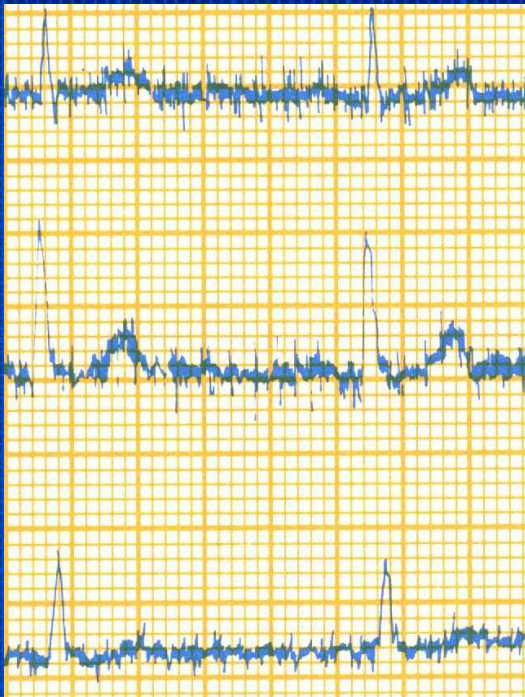
# Alternatif Akım Paraziti

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# Adale kasılmaları ve tremorlar

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# İzoelektrik hat kaymaları

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# Kalibrasyon

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# EKG de hız saptanması

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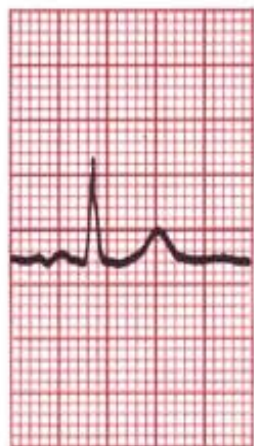
$$300 / 3 = 100$$

$$1500 / 15 = 100$$

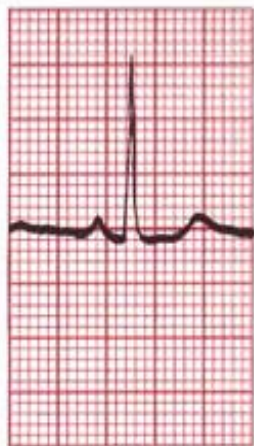
# Sinüs Ritmi

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- I, II, aVF, ve V2-6 da pozitif, aVR'de negatif p dalgası,
- Tüm QRS komplekslerinin önünde P dalgası bulunmalı
- PR intervali sabit ve normal (0.12-0.20 sn) olmalı
- Kalp hızı 60-100/dk arası olmalı



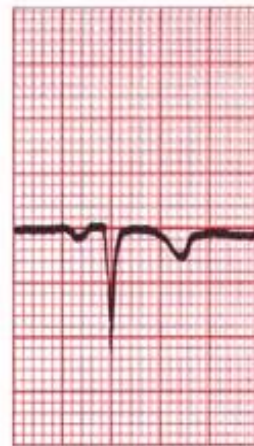
I



II



III



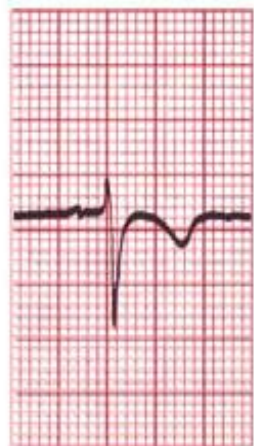
VR



VL



VF



V<sub>1</sub>



V<sub>2</sub>



V<sub>3</sub>



V<sub>4</sub>

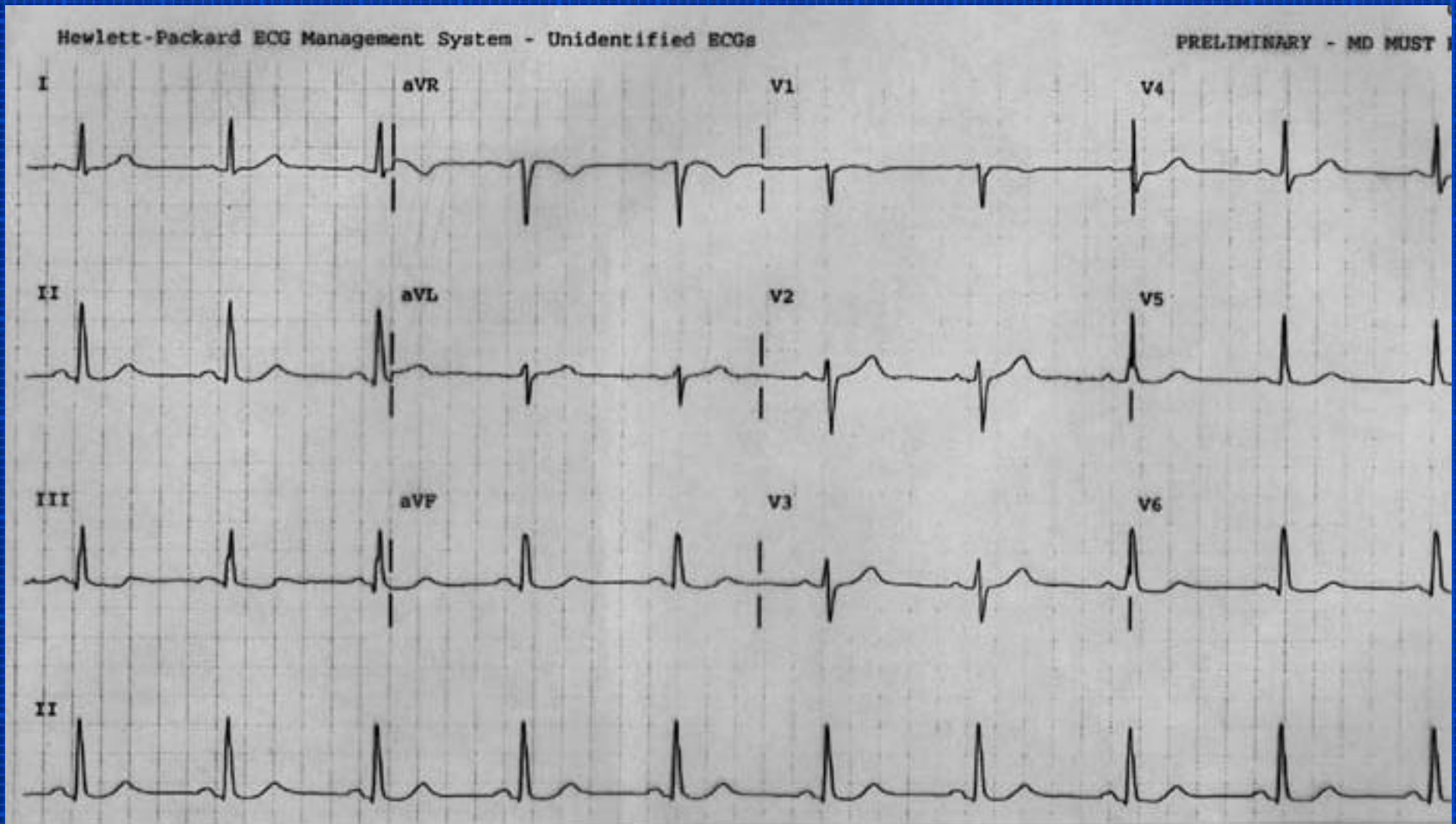


V<sub>5</sub>



V<sub>6</sub>

# Normal EKG



# Aritmiler

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- Aritmi düzensiz ritim demek değildir.
- Aritmi tek başına patolojik bir durum ifade etmez.
- Aritmide yalnızca elektrokardiyografik tablo değil, klinik tablo da önemlidir

# Aritmiler

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- Kaynaklandıkları (veya bağımlı oldukları) yere göre;
  - Supraventriküler
    - Sinüs, atriumlar, AV kavşak
  - Ventriküler
- Altta yatan mekanizmalara göre;
  - Otomatisite anormalliği ve/veya
  - İletim anormalliği
- Klinikte ortaya çıkışları açısından;
  - Paroksismal
  - Sürekli
- Elektrokardiyografik ifade biçimi olarak;
  - Hiperaktif (hızlı, hakim ritim)
  - Hipoaktif (yavaş)

# Aritmiler (orijine göre)

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## •SA düğüm

- Sinüzal aritmi
- Sinüs bradikardisi
- Sinüs takikardisi
- Sinüs duraklaması (arrest)
- Sinoatrial blok

## •Atrial

- Prematür atrial kontraksiyon (APS)
- Atrial takikardi
  - Unifokal AT
  - Multifokal AT
- Atrial flutter
- Atrial fibrilasyon

## •AV düğüm

- AV blok
  - 1. derece
  - 2. derece
    - Mobitz Tip I
    - Mobitz Tip II
  - 3. derece

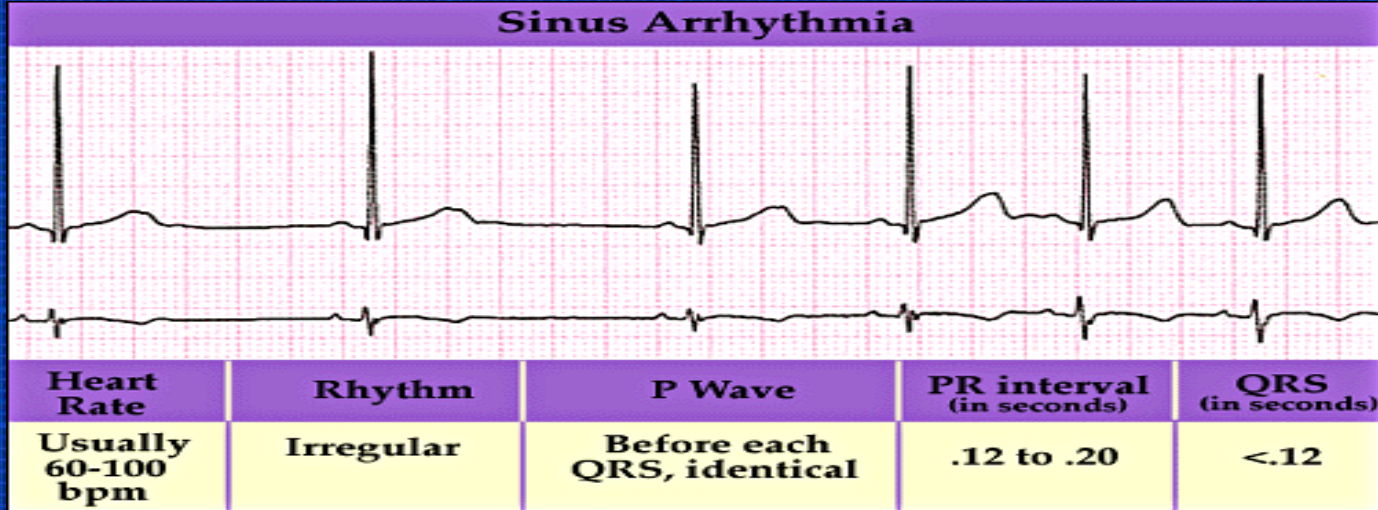
## • Dal blokları

- Sol dal bloğu
  - LAFB
  - LPFB
- Sağ dal bloğu

## • Ventriküler

- Ventriküler Prematüre kontraksiyon (VPS)
- Ventriküler takikardi
  - Non-sustained VT
  - Sustained VT
    - Monomorfik VT
    - Polimorfik VT
- Ventriküler flutter/fibrilasyon
- İdyoventriküler ritim
- Asistoli

# Sinüzal aritmi



- P-P veya QRS aralıkları değişir
- P, PR intervali ve QRS genişliği normaldir.



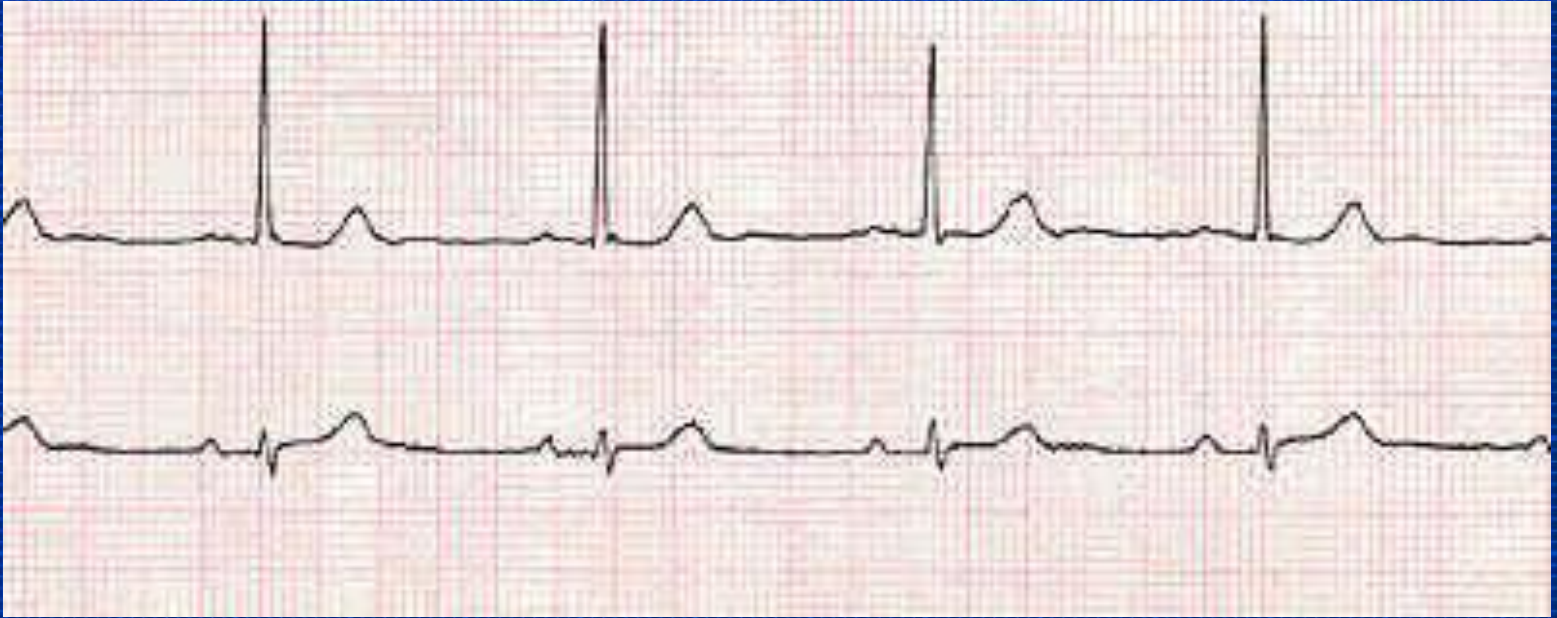
# Sinüzal aritmi

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- Solunumla ilgili (fazik) veya ilgisiz (nonfazik) olabilir
- Çocuklarda, gençlerde ve atletlerde fazla, yaşla azalır
- Çoğunlukla semptom yok. Tedavi gerekli değil.

# Sinüs Bradikardisi

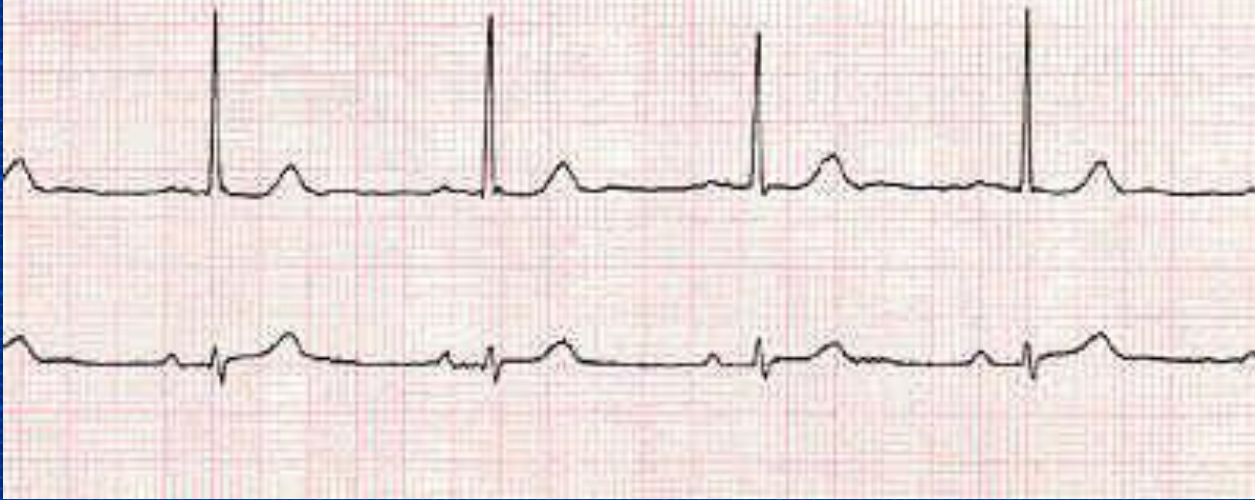
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- Kalp hızı  $< 60$
- P, PR ve QRS normal

# Sinüs Bradikardisi

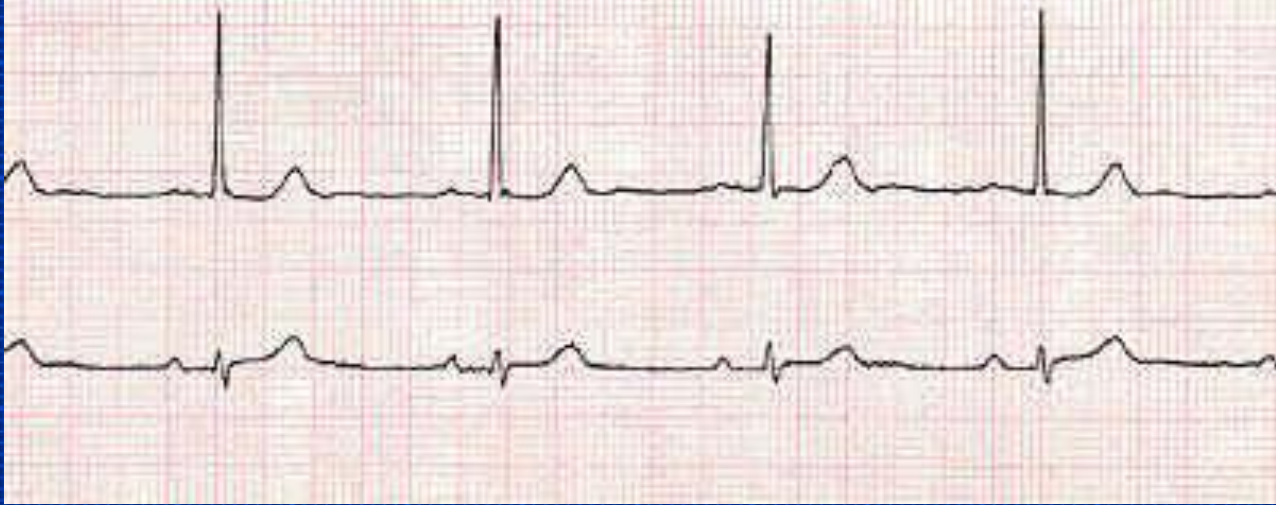
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- Atletlerde normalde olabilir.
- Çocuklarda veya uykuda gençlerde  $<30$  olabilir, 2 sn'ye kadar duraklama olabilir.

# Sinüs Bradikardisi

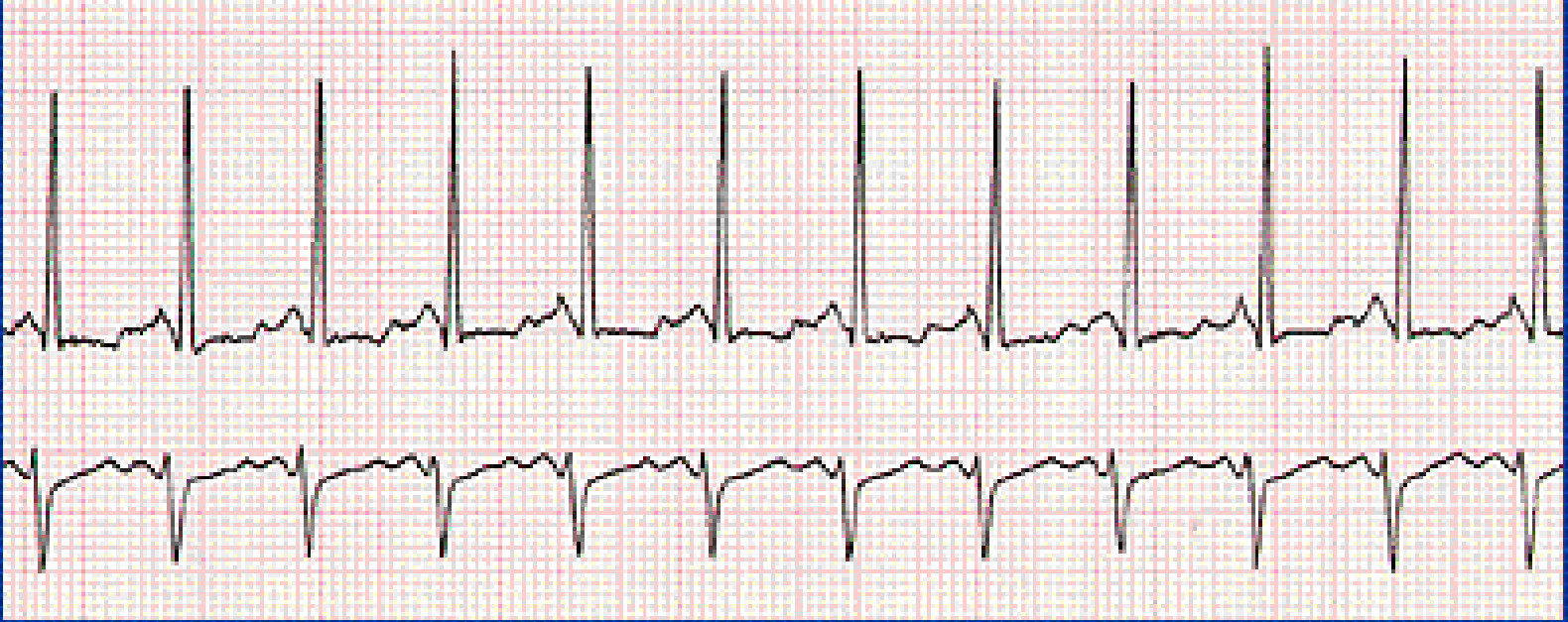
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- AMİ (inf),
- Hipotiroidizm,
- Hipotermi, hipopotasemi,
- SLE, kollajen hast.
- İlaçlar (BB, digital, kalsiyum kanal blokerleri, amiodaron vb.)

# Sinüs Takikardisi

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- Kalp hızı  $> 100$
- P ve T dalgalarını ayırdetmek güç olabilir
- Ağrı , ateş , egzersiz

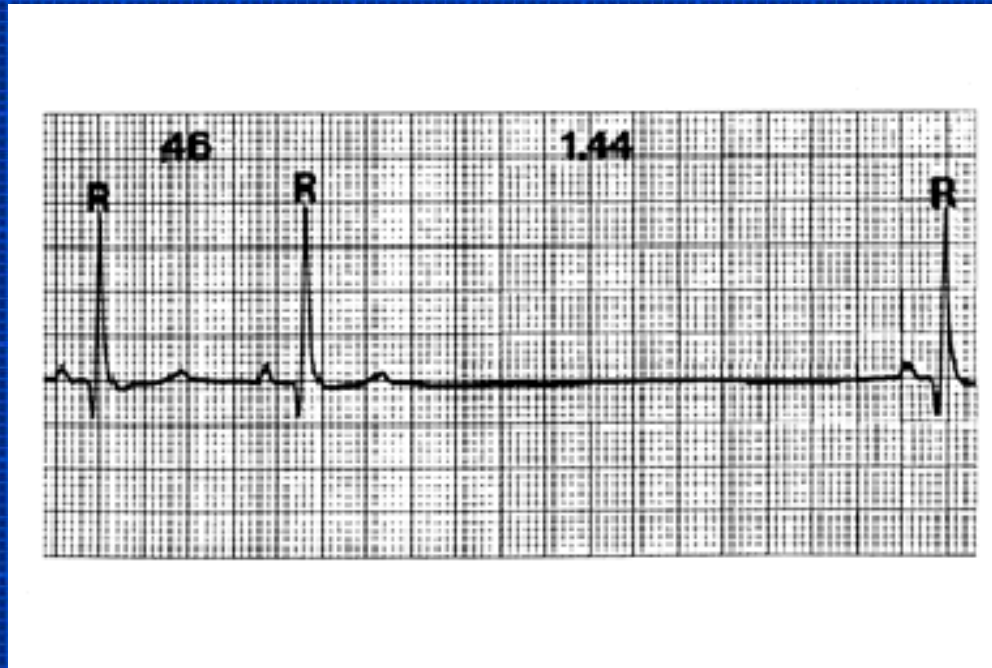
# Sinüs Takikardisi

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- Ateş
- Hipertiroidi
- Hipovolemi
- Anksiyete
- Feokromasitoma
- Sepsis
- Anemi
- İlaçlar  
(sempatomimetik)
- Kafein, nikotin vb.
- Hipotansiyon ve şok
- Pulmoner emboli
- Koroner iskemi, infarktüs,
- Kalp yetmezliği,
- Kalp yetmezliği,
- AC hastalıkları
- Hipoksi

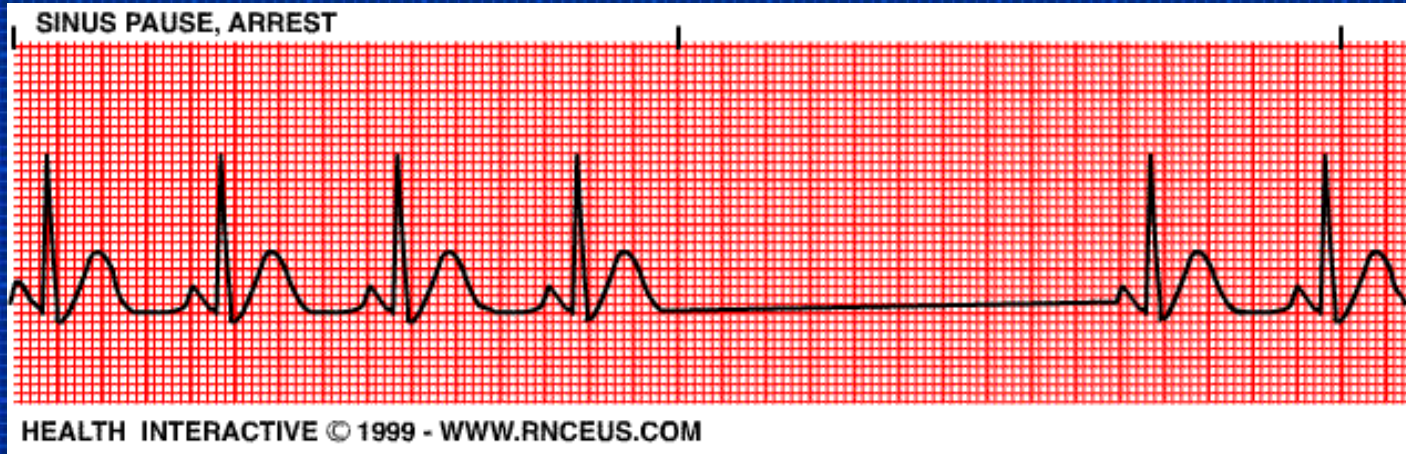
# Sinüs duraklaması (arrest)

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# Sinüs duraklaması (arrest)

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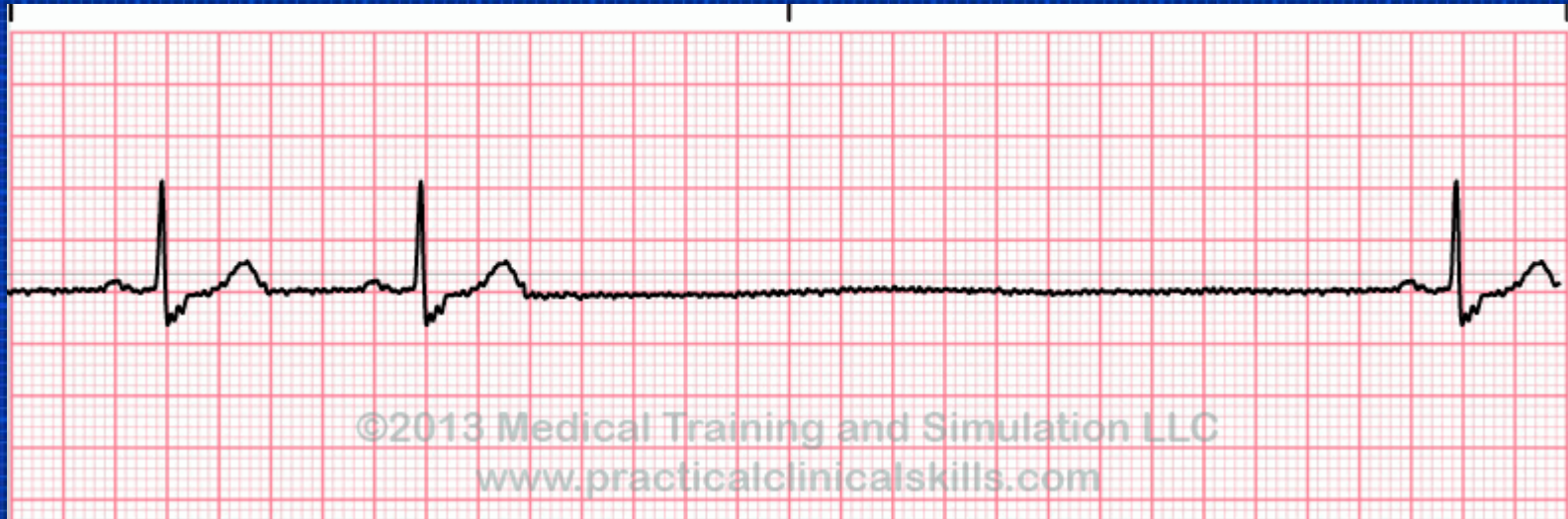


- Sağlıklı kalplerde de olabilir,
- Vagal tonus artışında, miyokardit, Mİ veya digital toksitesi,
- Duraklama uzun olursa kaçış (escape) vurusu çıkabilir,
- Tedavi; altta yatan nedene bağlı



# Sinüs duraklaması (arrest)

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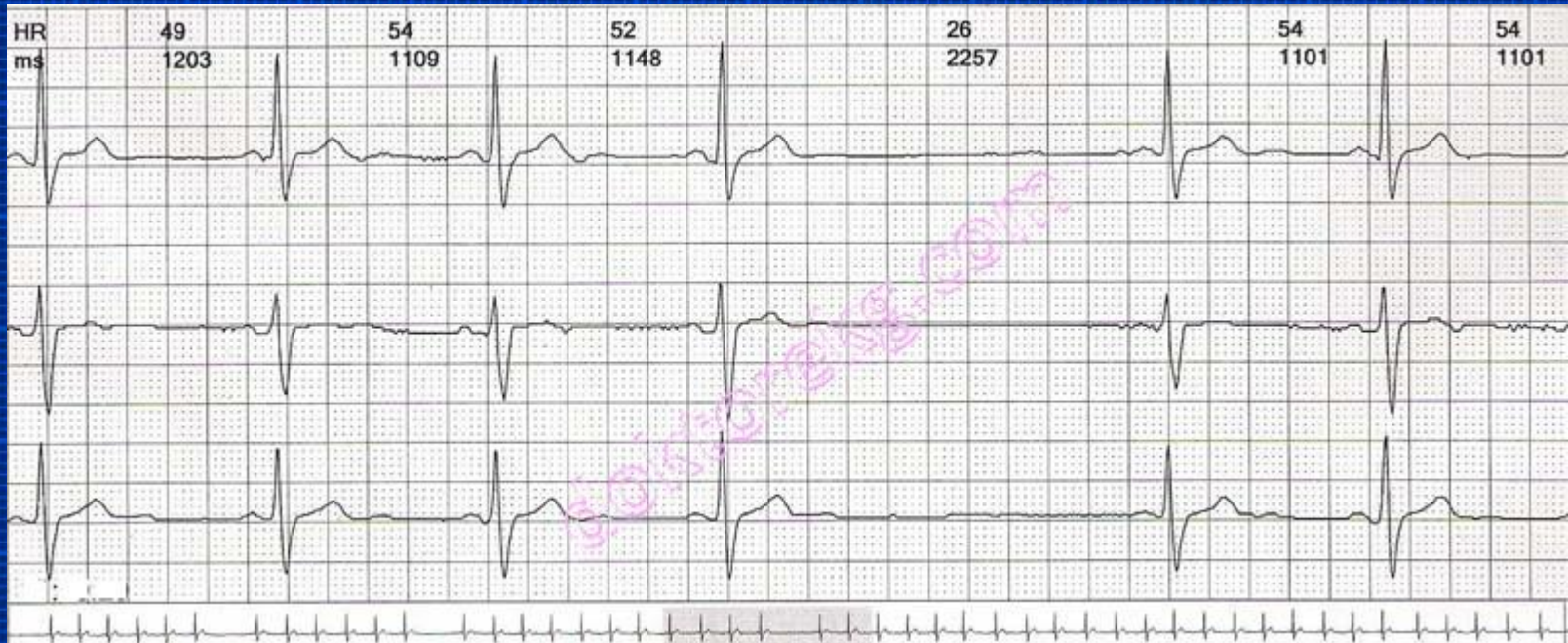
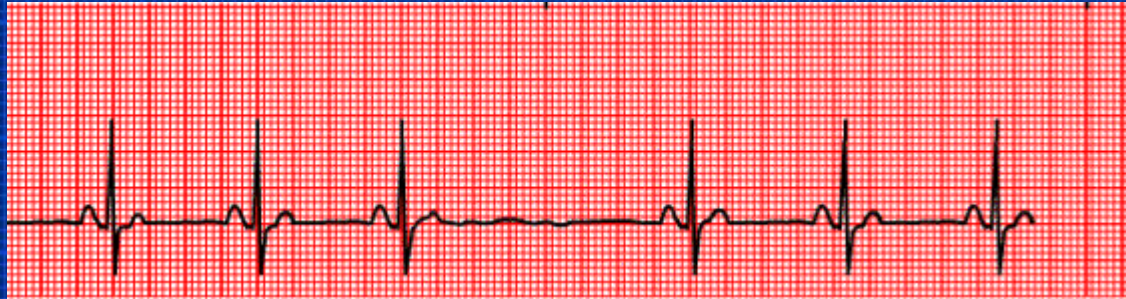
# Sinoatrial Blok

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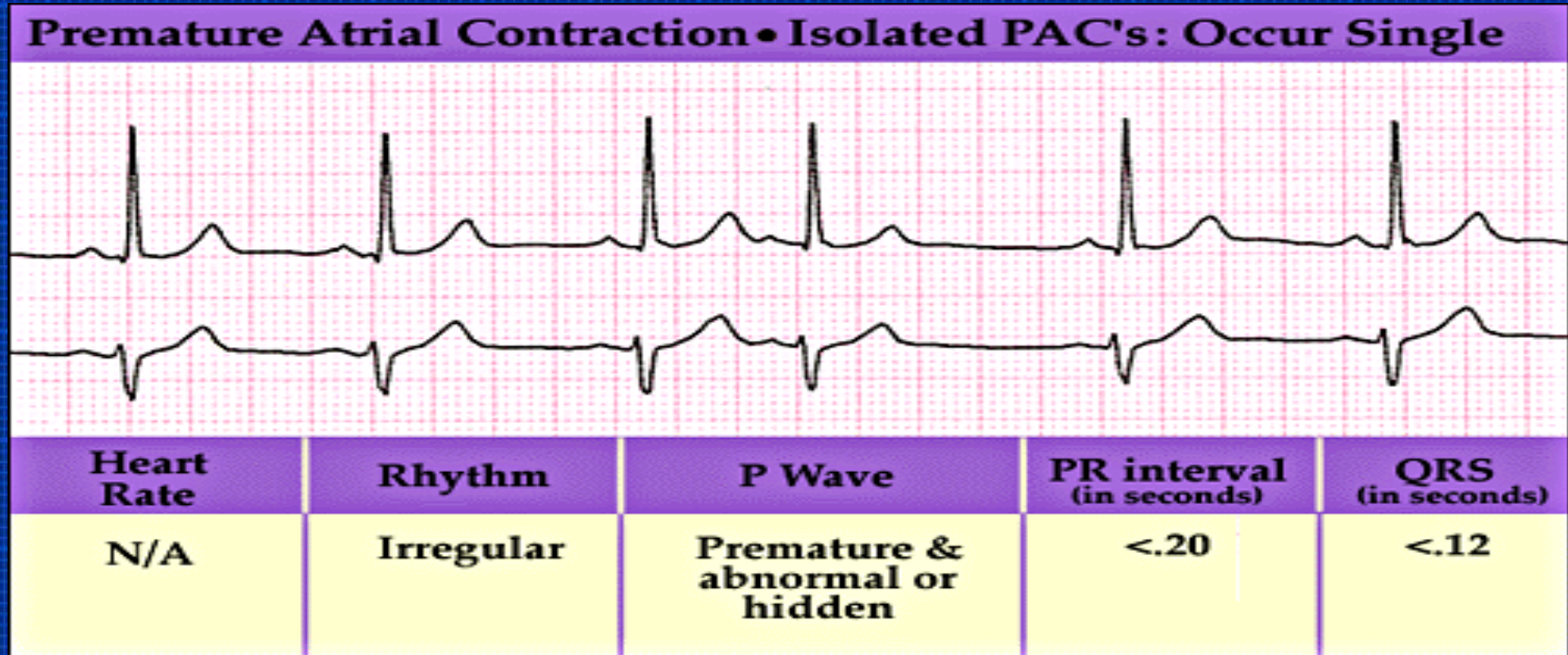


# Sinoatrial Blok

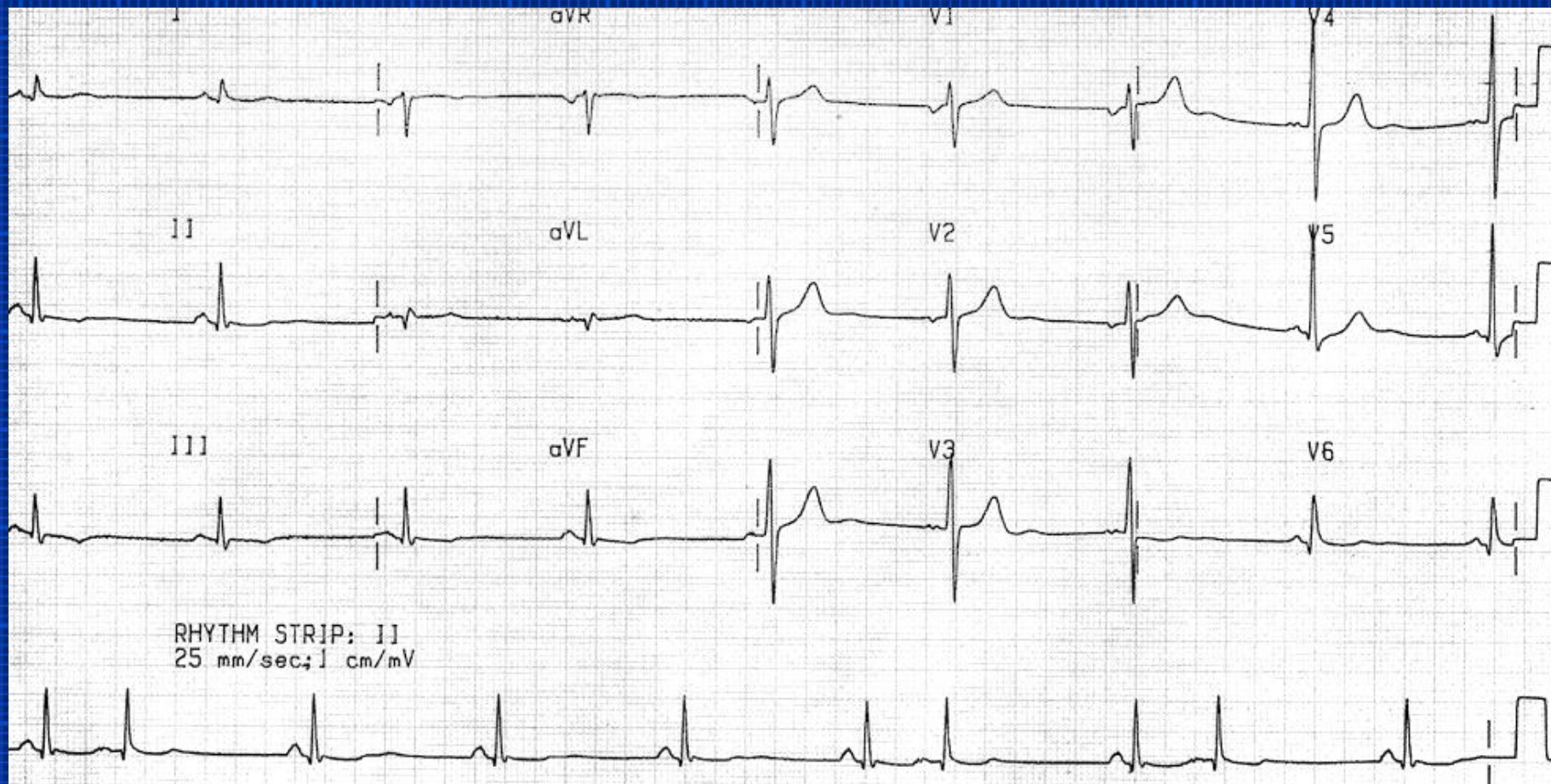
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# Atrial Prematür Kontraksiyon (APS, APD, APC)

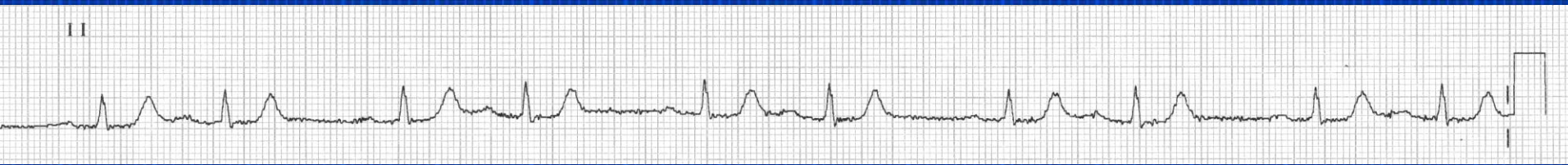


- Başka bir odaktan oluşan P dalgası,
- Erken,
- P morfoljisi ve PR intervali farklı olabilir



# Bigemine APS

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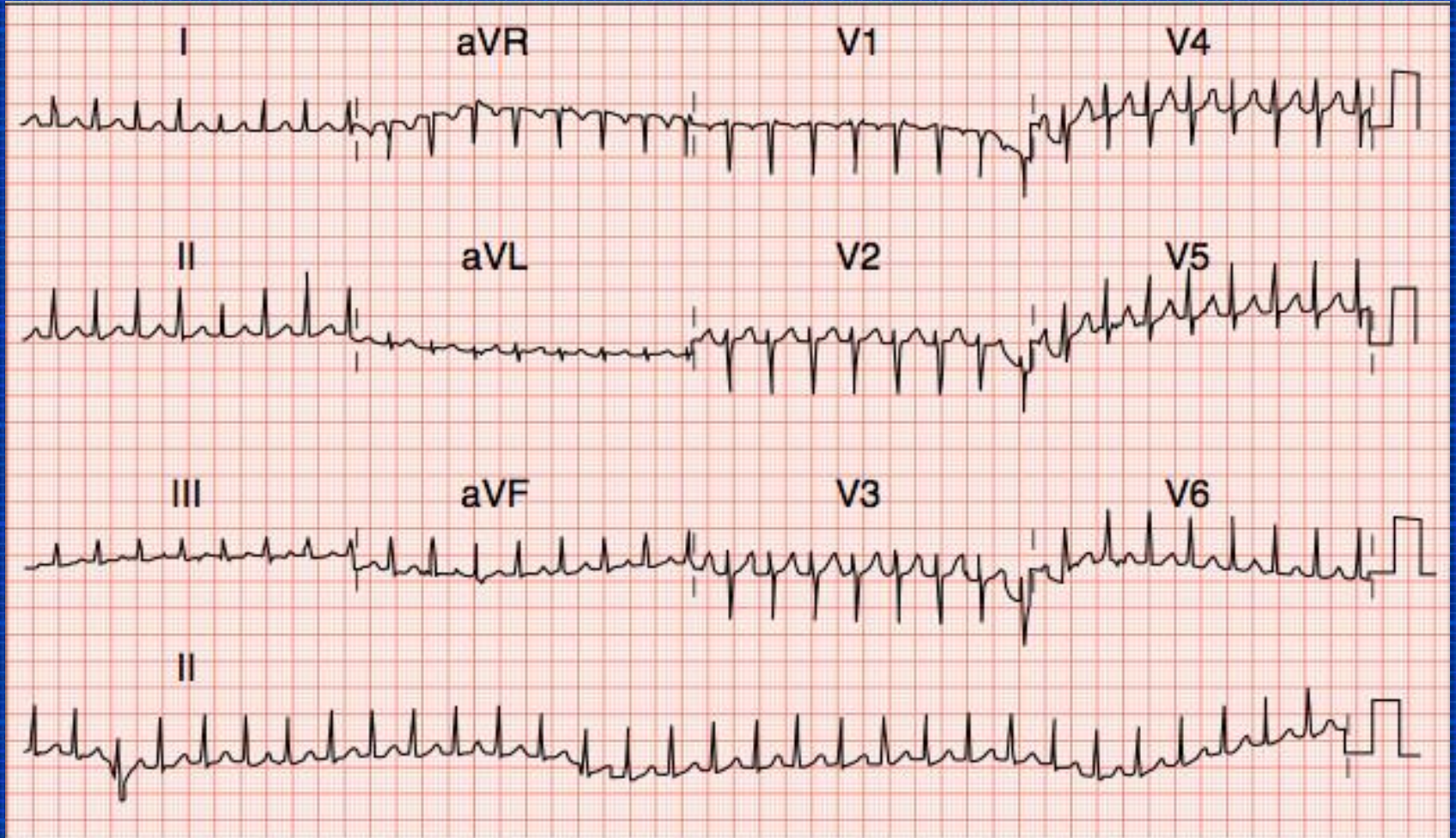


# Atrial Takikardi

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# Atrial Takikardi

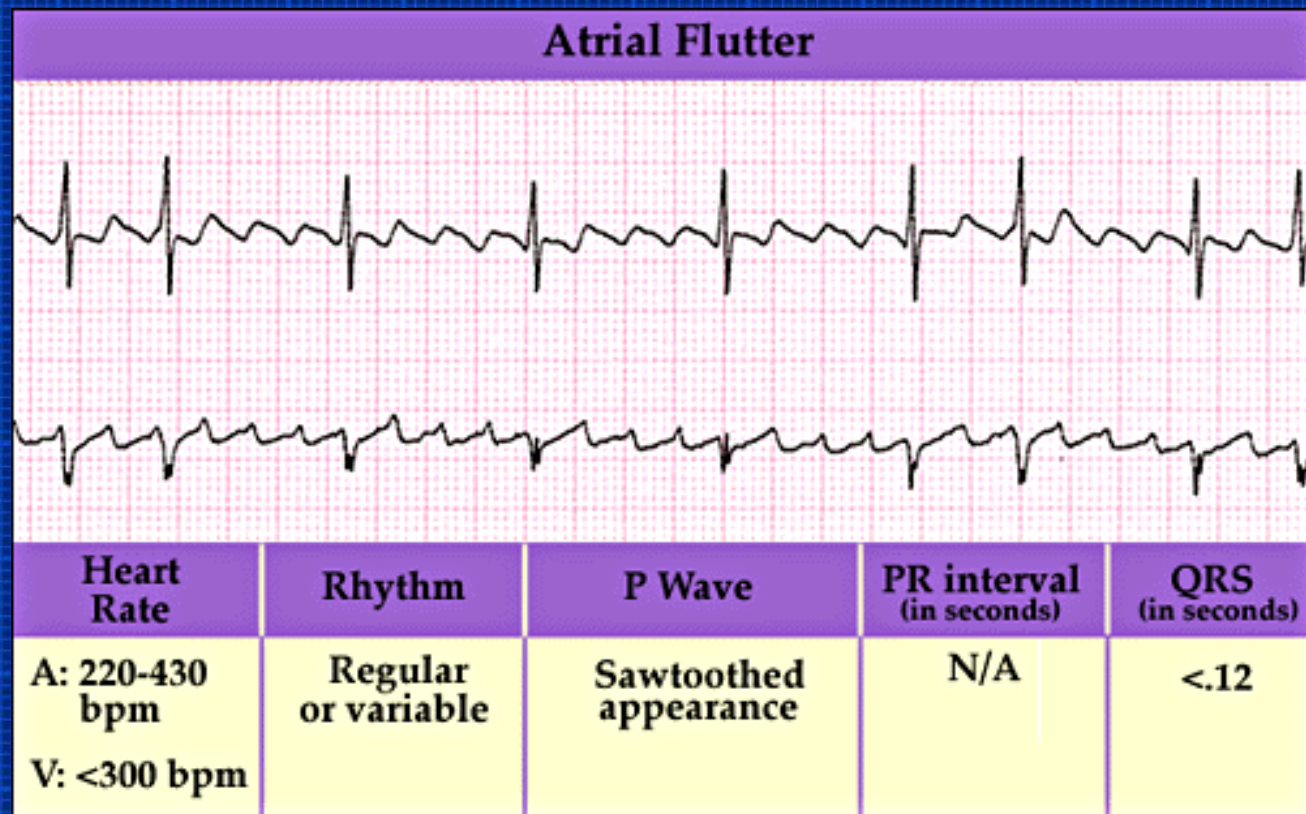


- Dar QRS, düzenli RR intervali, P dalgaları net olarak seçilemez
- Ani başlar ve ani sonlanır
- Vagal manevralar aritmiyi sonlandırabilir

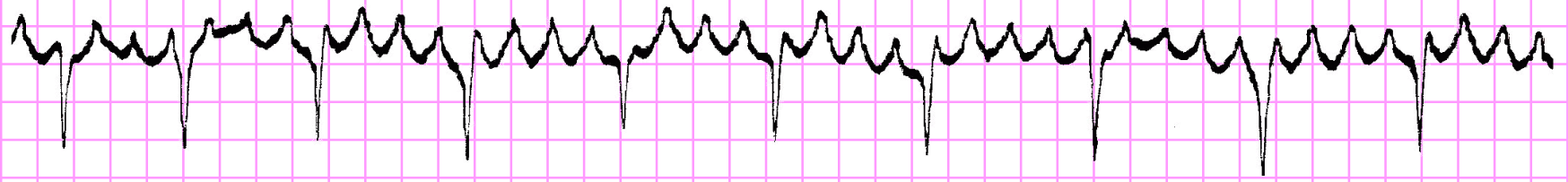


# Atrial Flutter

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10mm/mV 25mm/sn



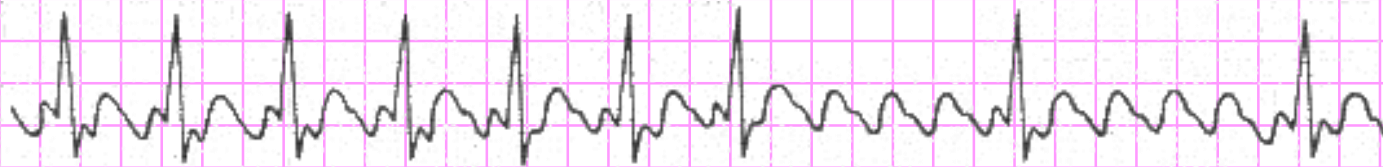
10mm/mV 25mm/sn



4:1 Geçişli Atriyal flutter

## Vagal Stimülasyon

10mm/mV 25mm/sn



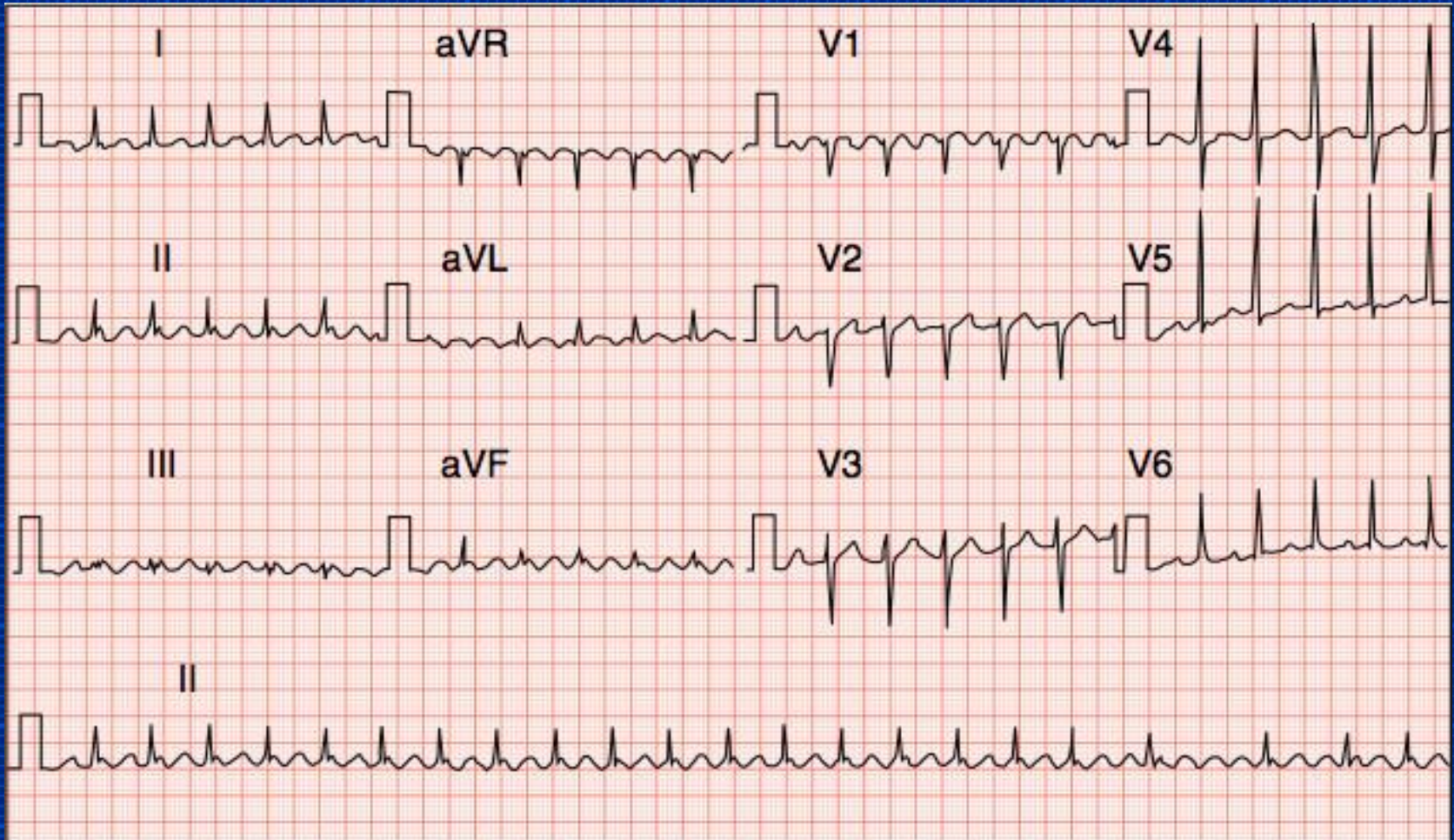
2:1 iletim

5:1 iletim

## Atriyal flutter

# Atrial Flutter

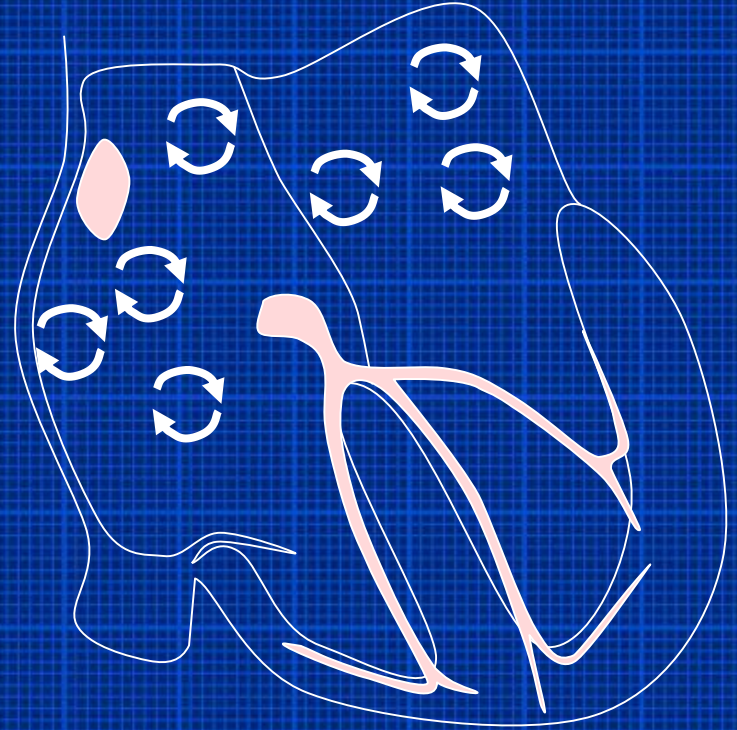
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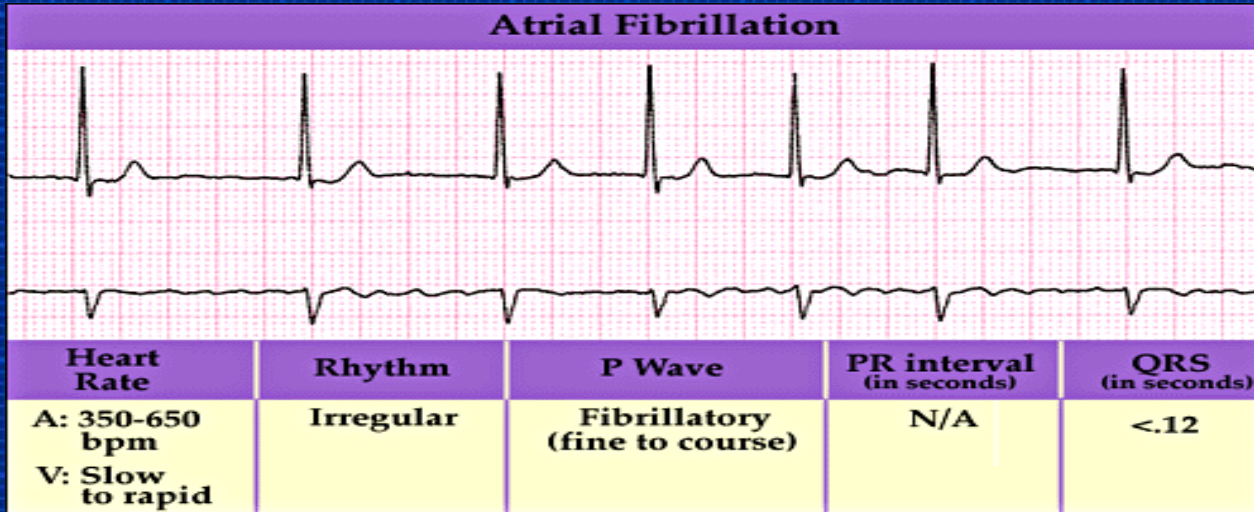
# Atriyal fibrilasyon

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- Atriyumlardaki çok sayıda mikro-reentran halkalar ile ortaya çıkan bir ritm bozukluęu.
- AV düęüm refrakter periyoduna uygun olarak düzensiz ventriküler aktivasyon



# Atrial Fibrilasyon



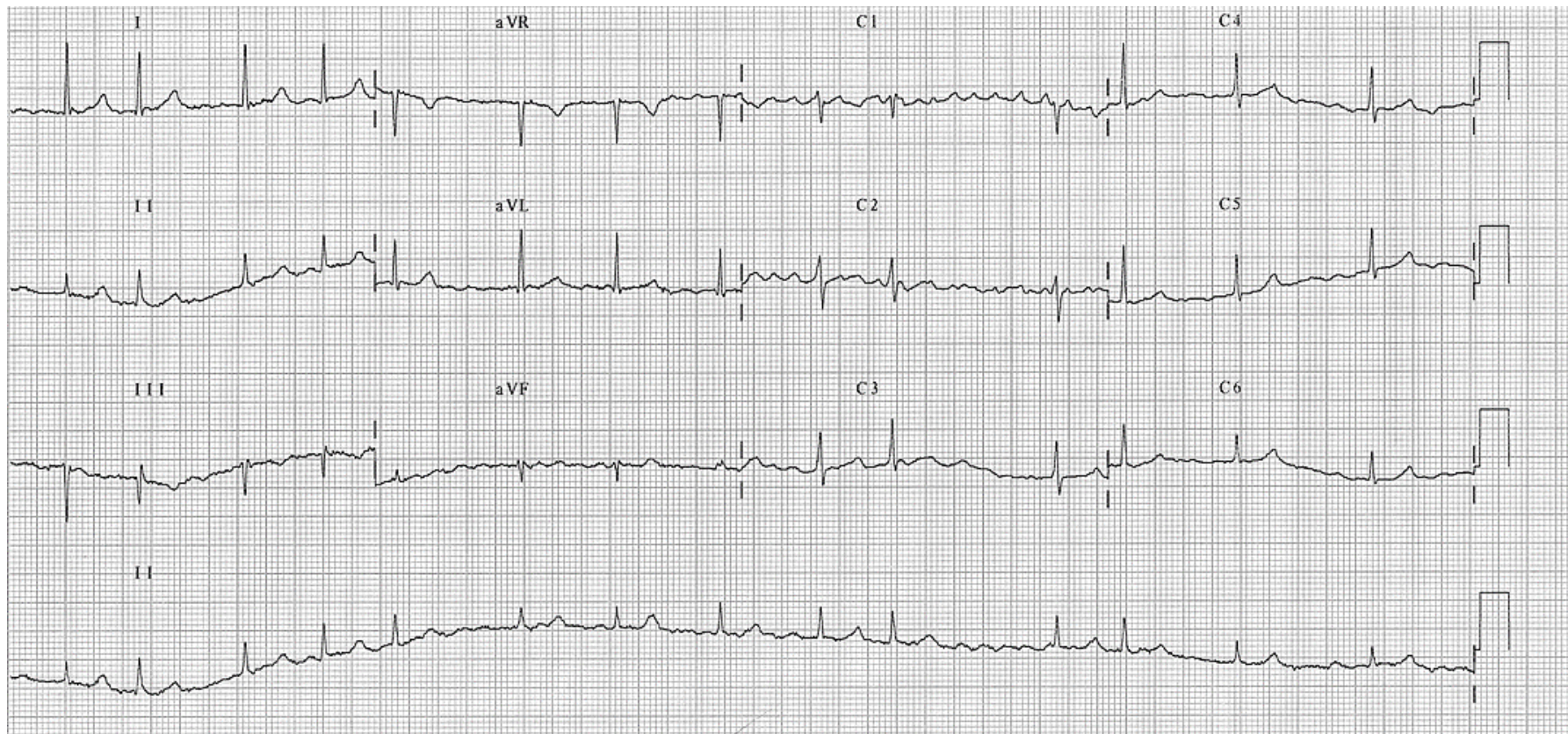
- P dalgaları yok,
- Düzensiz ventrikül yanıtı,
- QRS dar.

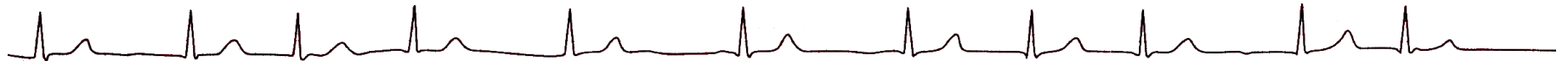
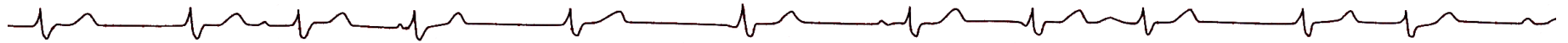
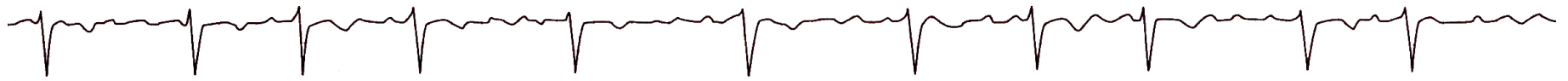
# Atrial fibrilasyon

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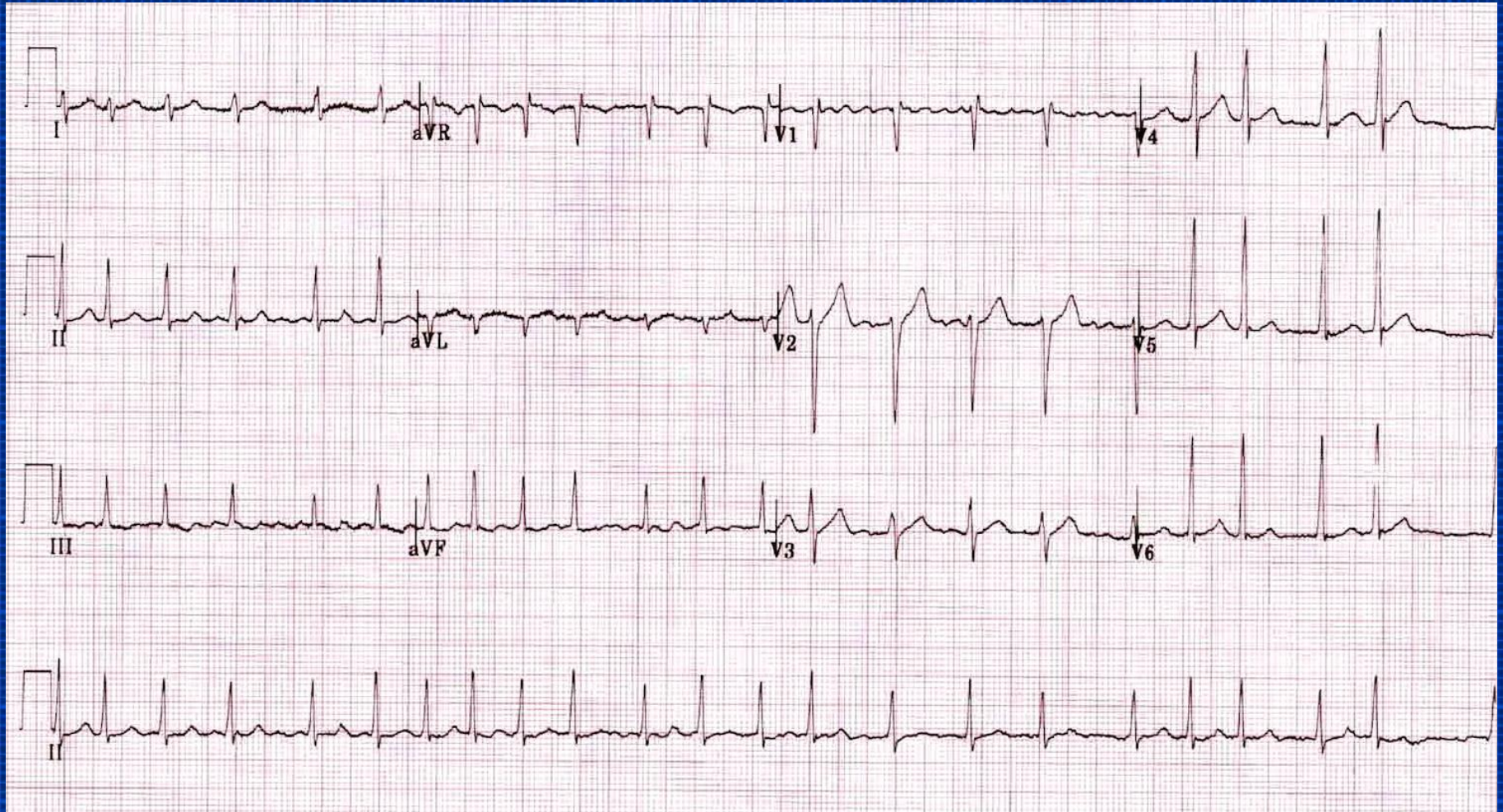
- EKG’de P dalgası bulunmaz
- P dalgası yerine tüm izoelektrik hattı bozan “f” ile gösterilen fibrilasyon dalgaları izlenir
- QRS kompleksleri genelde normaldir
- QRS araları düzensizdir



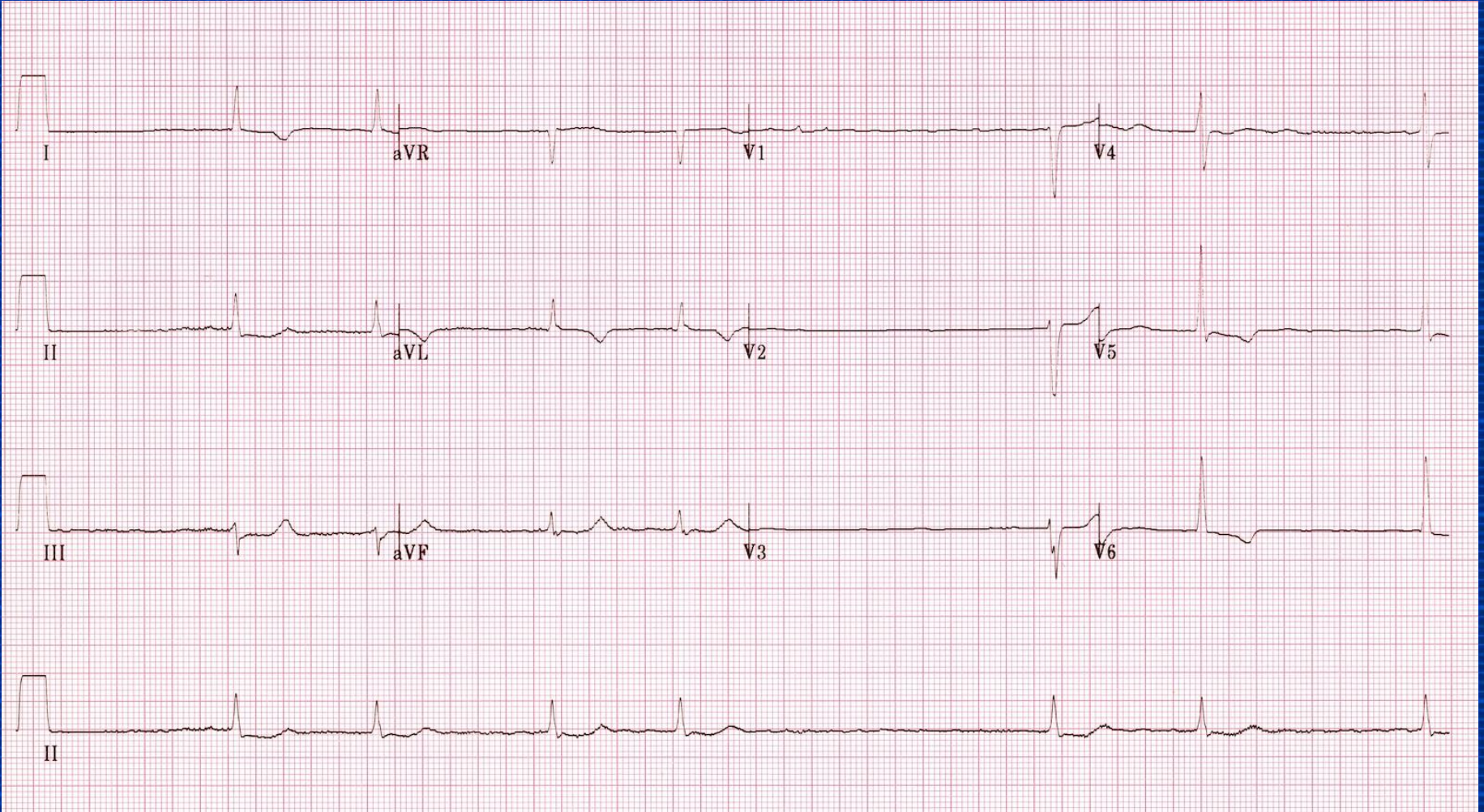




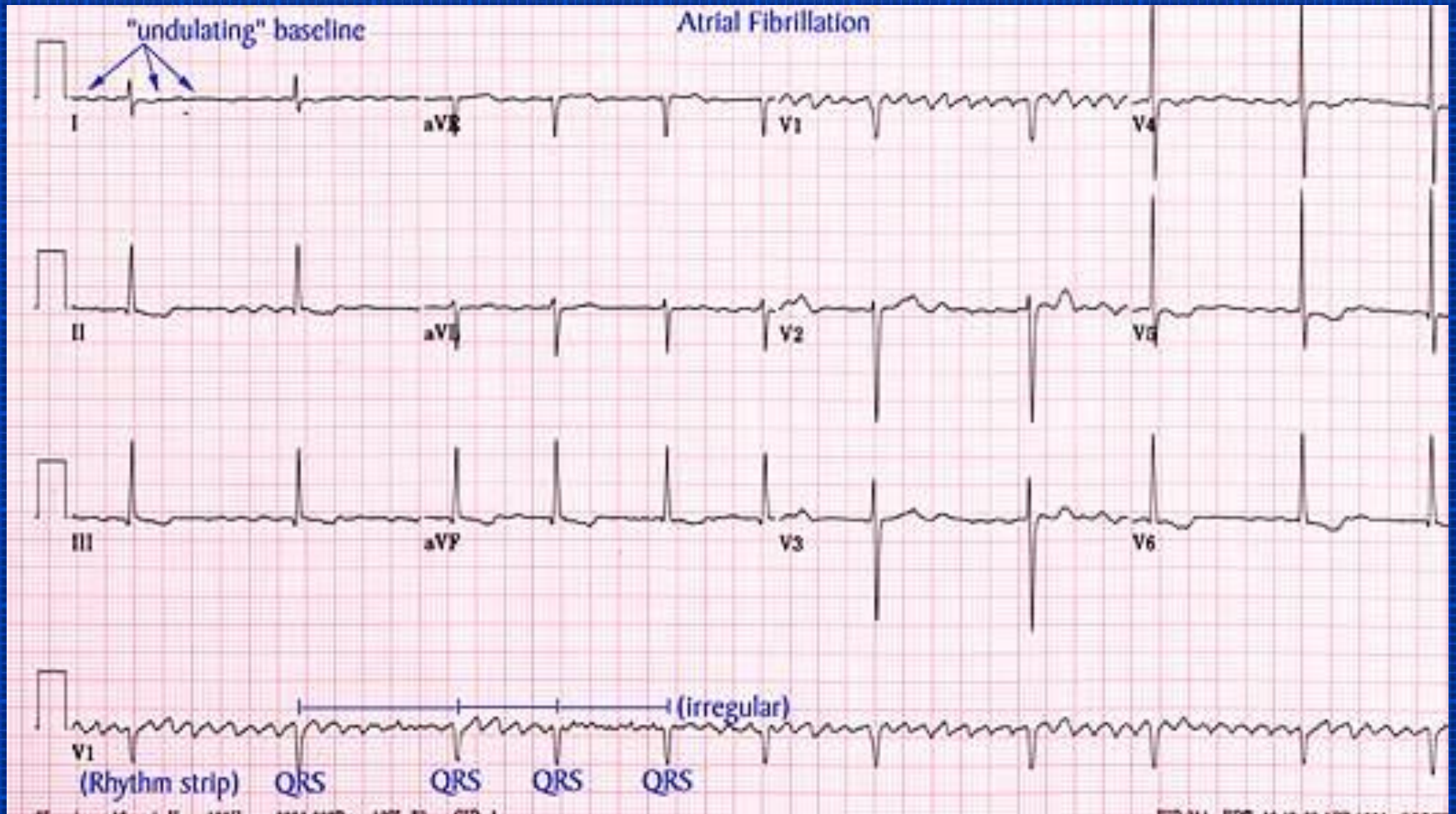
# Hızlı ventrikül yanıtı atriyal fibrilasyon



# Yavaş ventrikül yanıtı atriyal fibrilasyon



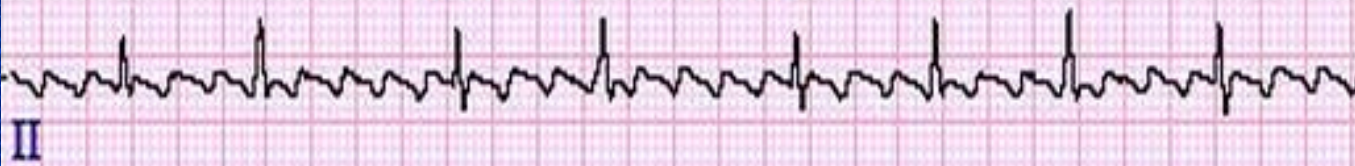
# Atrial Fibrilasyon



**Atrial Fibrillation - fibrillatory waves**



**Atrial Flutter - sawtooth pattern**



# Aritmiler (orijine göre)

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- AV düğüm

- AV blok

- 1. derece

- 2. derece

- Mobitz Tip I

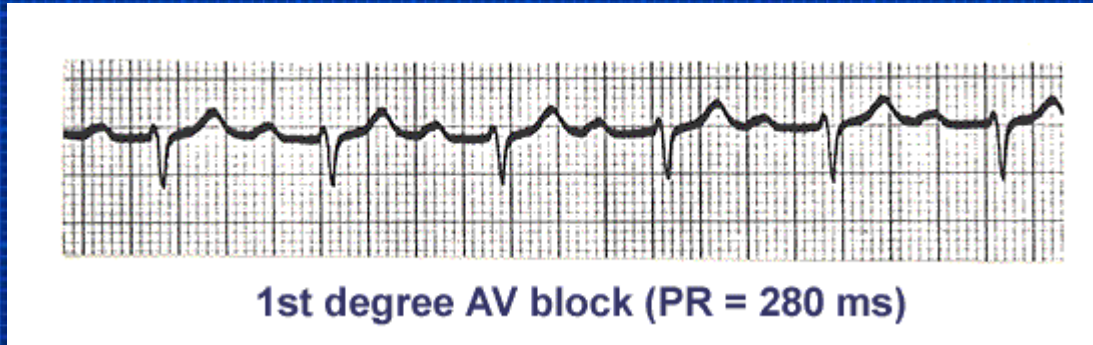
- Mobitz Tip II

- 3. derece

# AV Bloklar

## 1. derece

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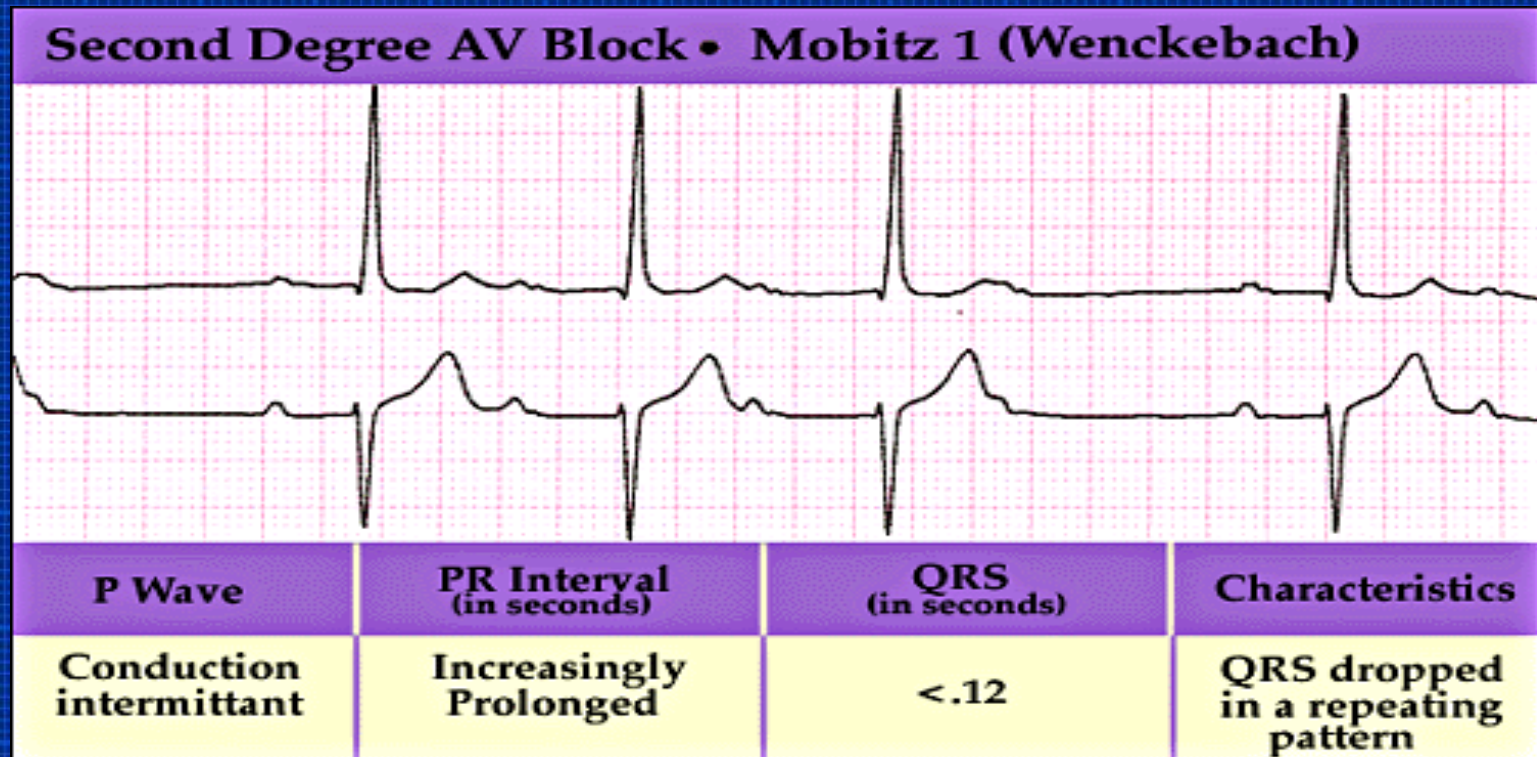


Uzamiş PR mesafesi (> 200 ms)



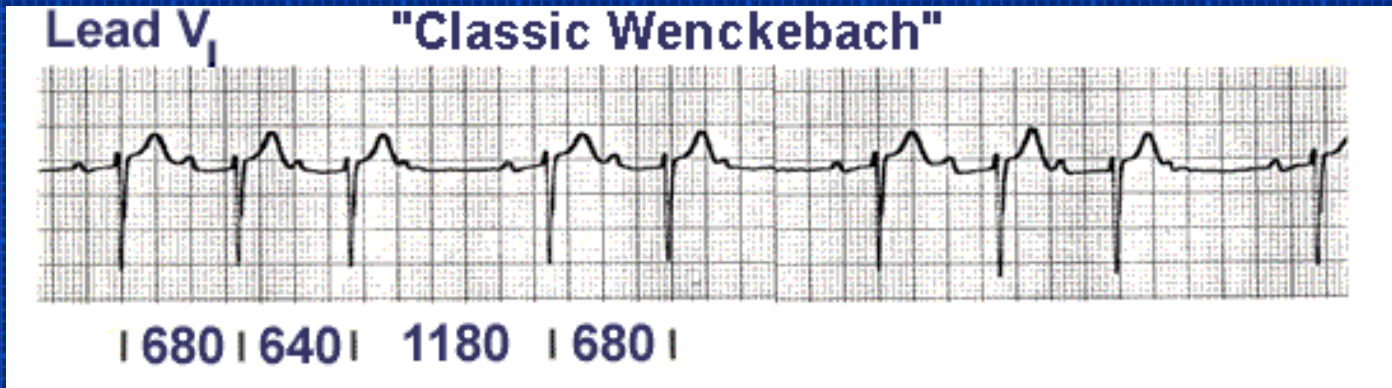
# AV Bloklar

## 2.derece (Mobitz tip I yada Wenckeback)



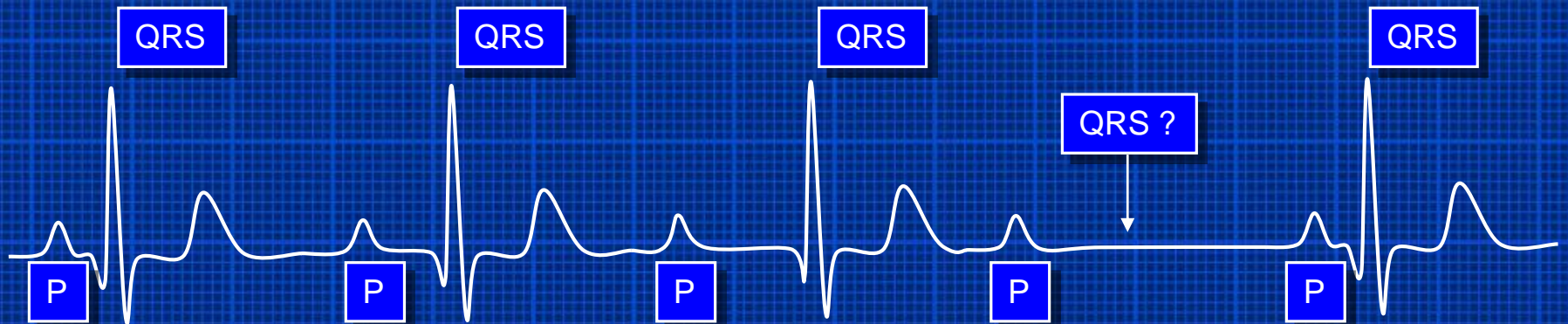
# AV Bloklar

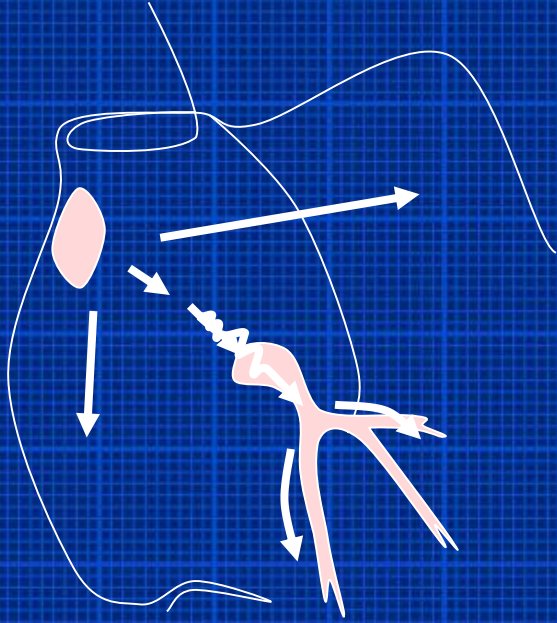
## 2. derece (Mobitz tip I yada Wenckebach)



- Artan PR + kısalan RR intervali ve bir P dalgasını QRS takip etmez
- Sabit PP intervali

## 2. derece AV blok Mobitz Tip I (Wenckebach)





Normal PR ile başlangıç  
Progresif PR uzaması  
Yanıtız P  
Normal PR ile siklusun yeniden başlaması

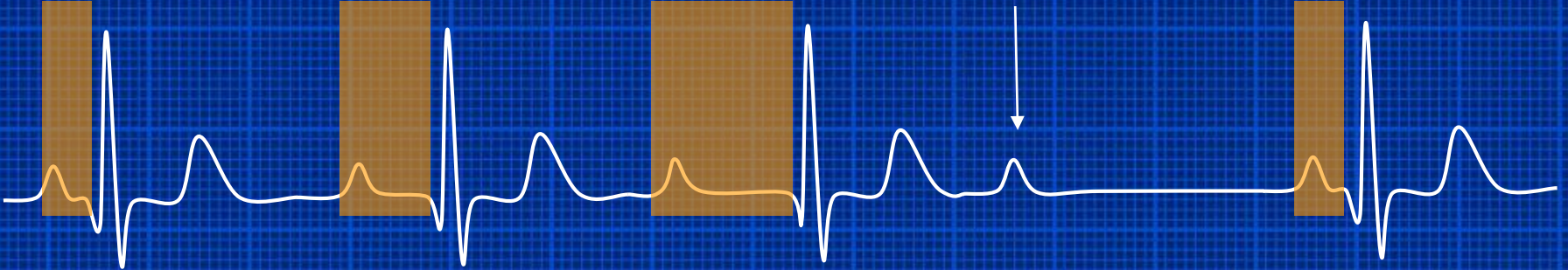
Normal PR

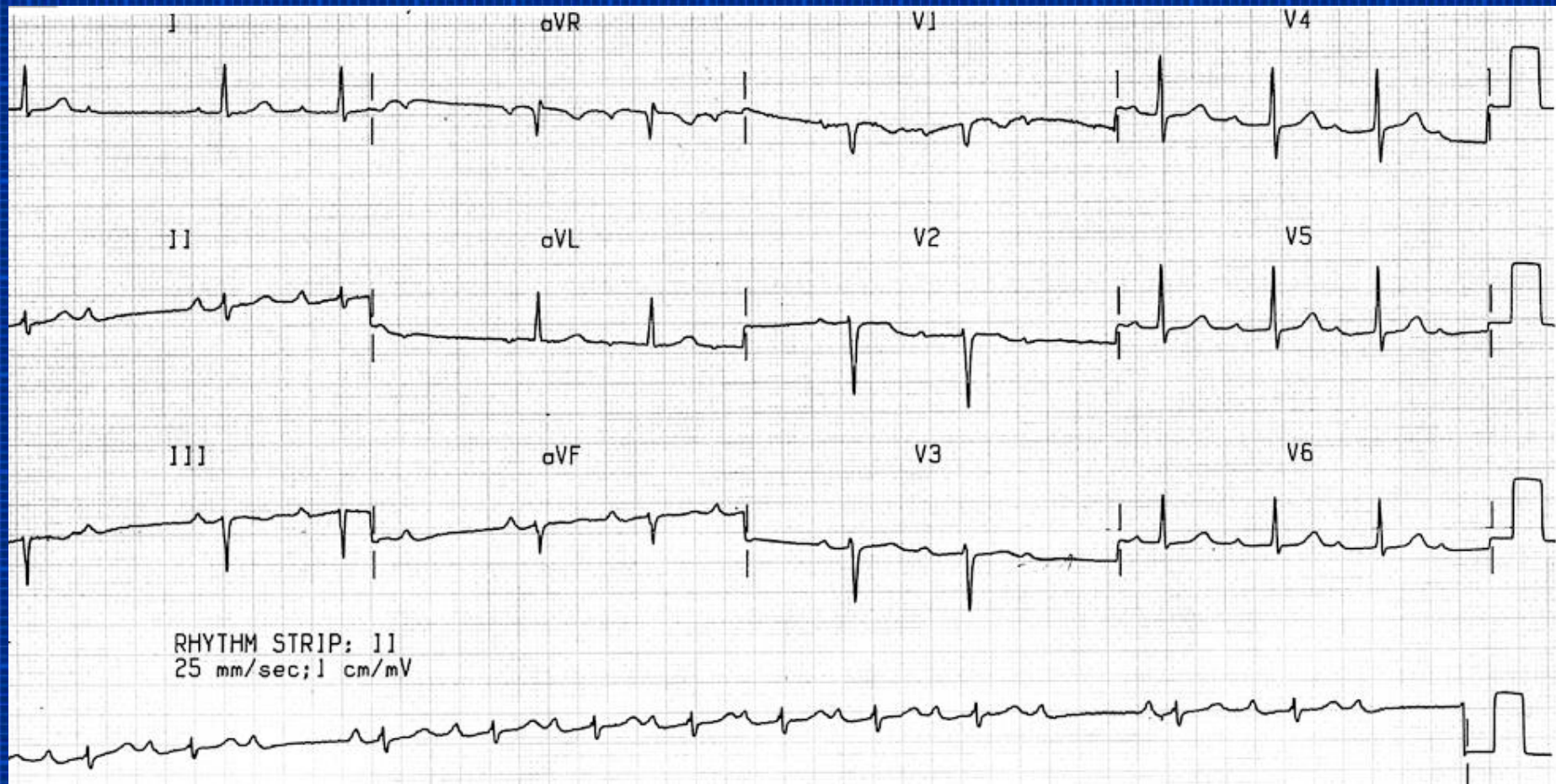
PR=0.24 sn

PR=0.38 sn

Yanıtız P

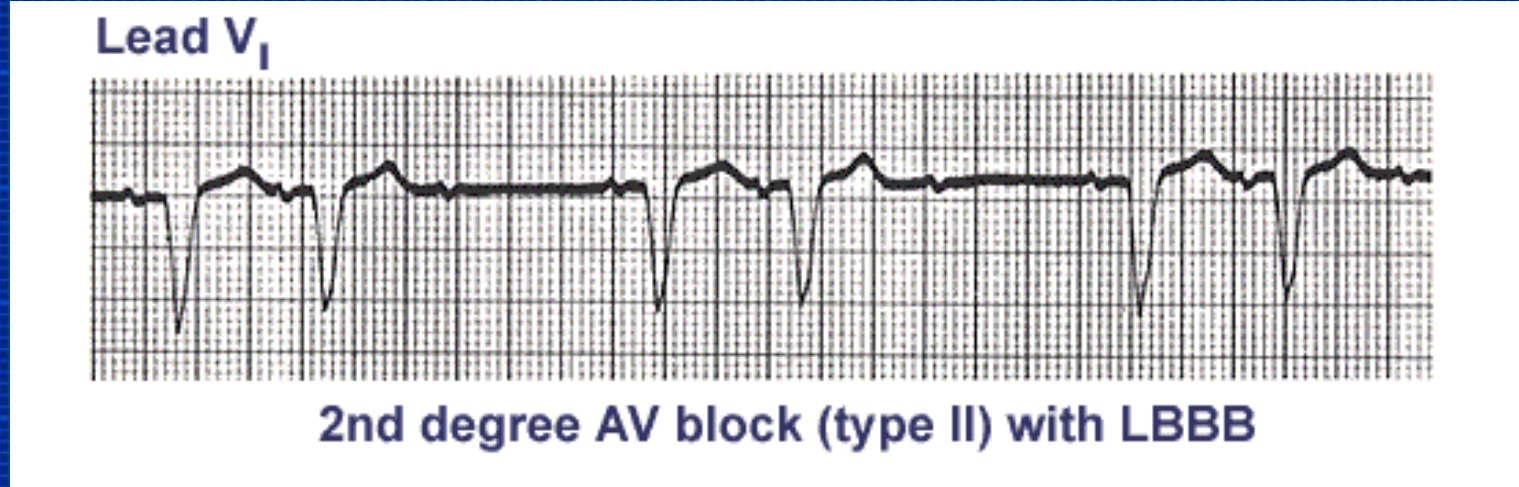
Normal PR





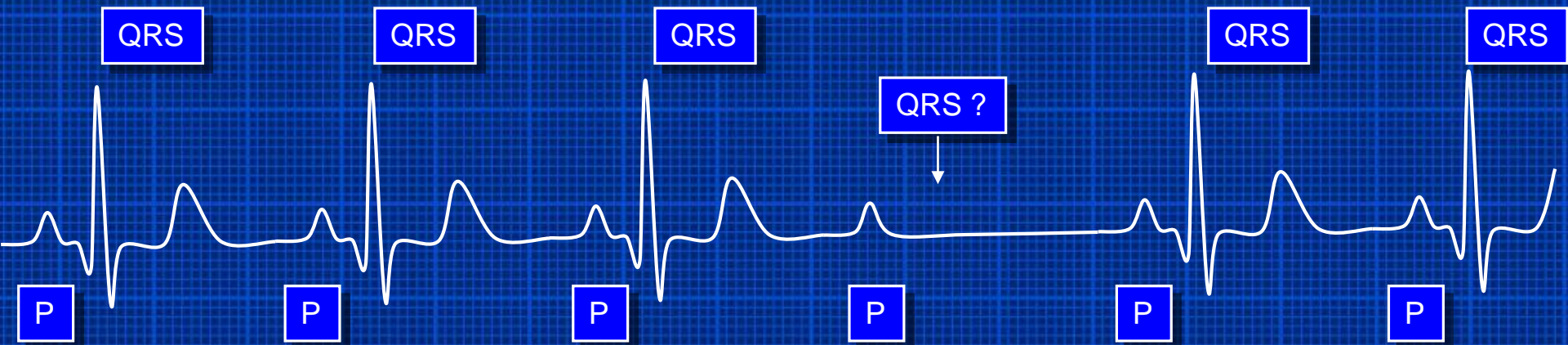
# AV Bloklar

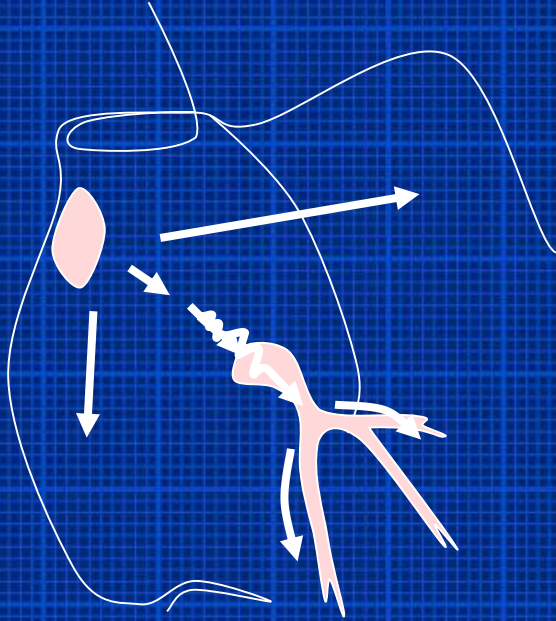
## 2.derece (Mobitz Tip II)



- Normal PR intervalleri eşit,
- Bazı P dalgaları ventriküler geçmez,

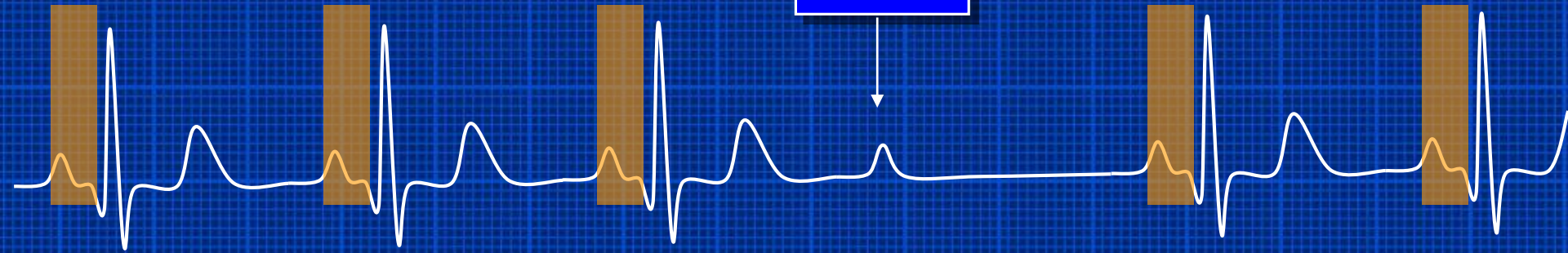
## 2. derece AV blok Tip II





PR Sabit (normal veya uzamış)  
Arada yanıtız P

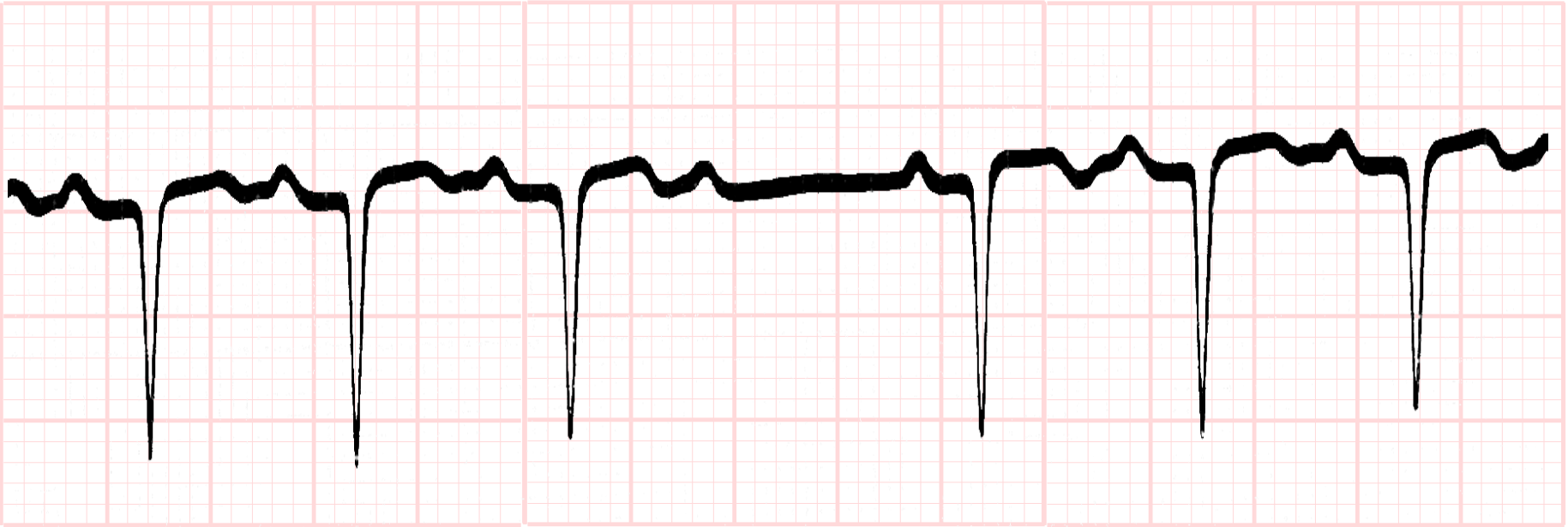
Yanıtız P

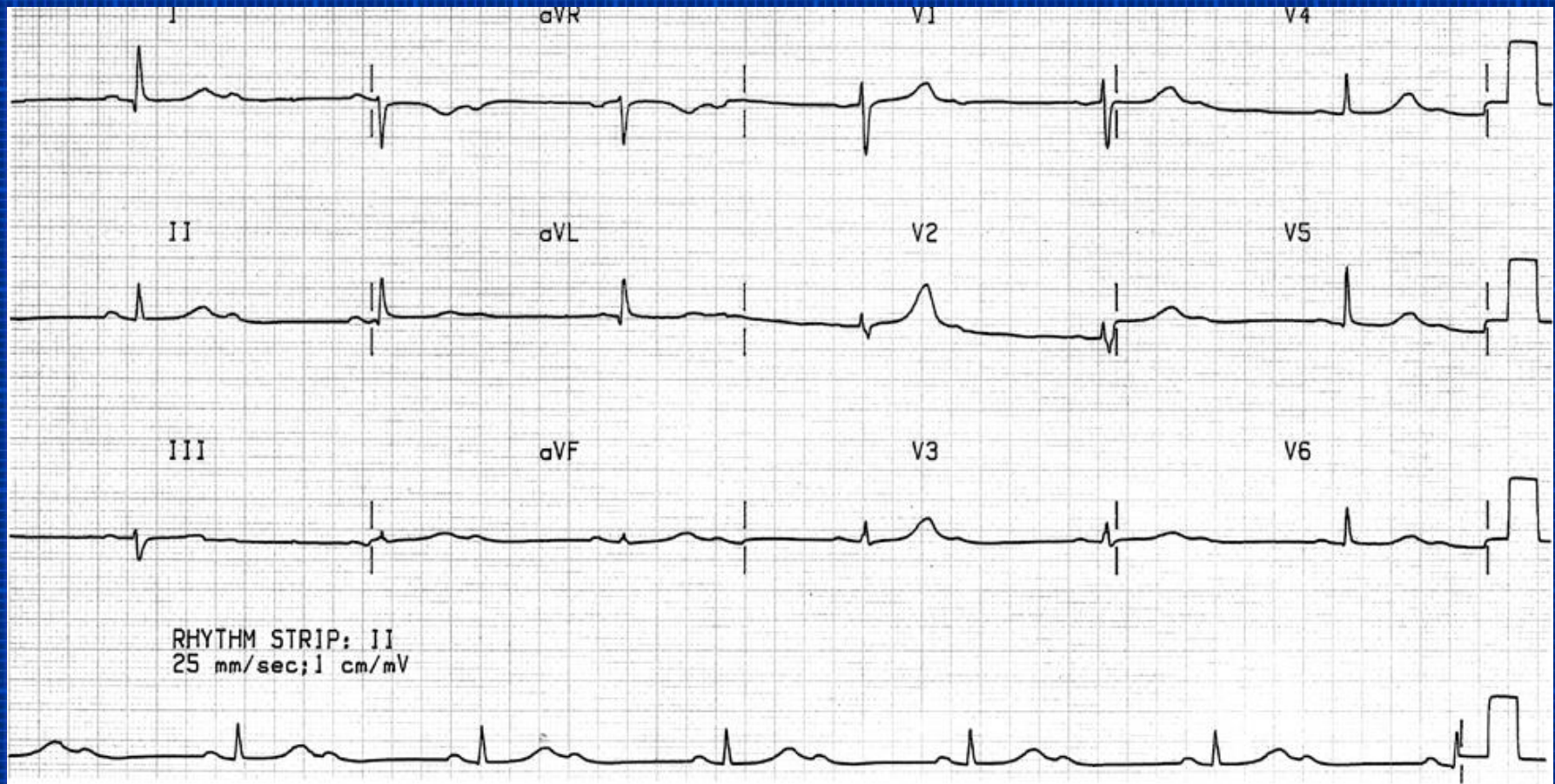




## 2. Derece AV blok Tip 2

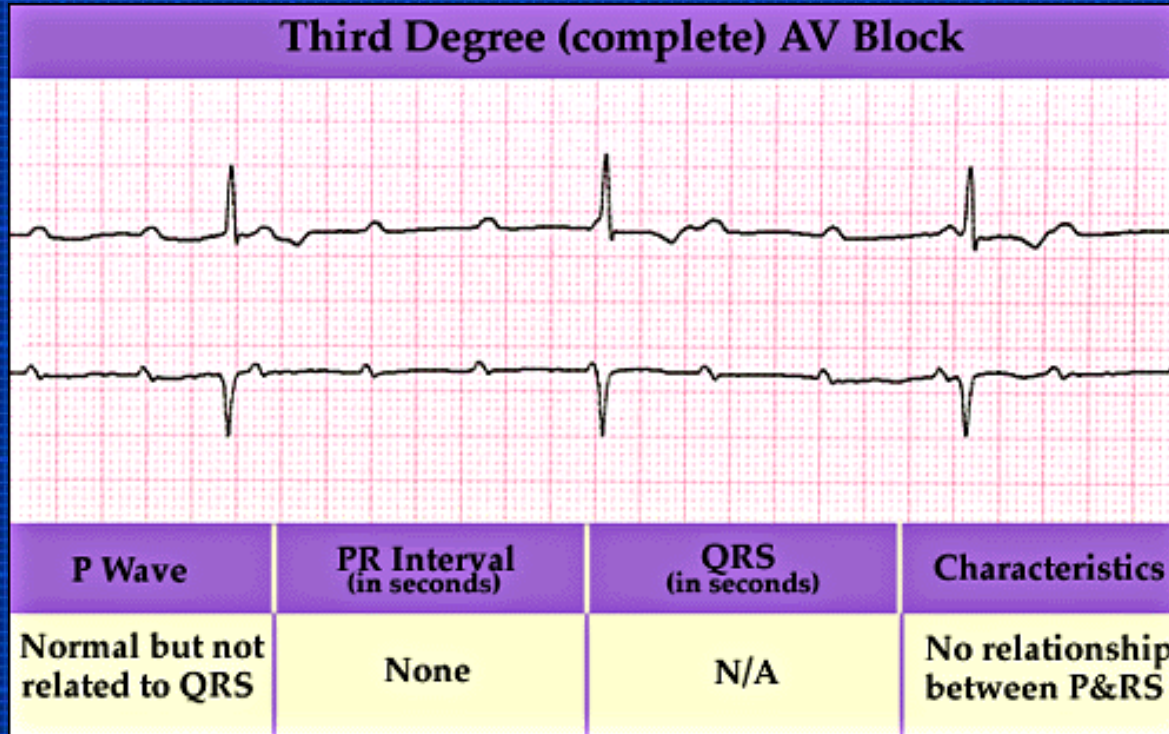
25 mm/sn 1mV / 10mm





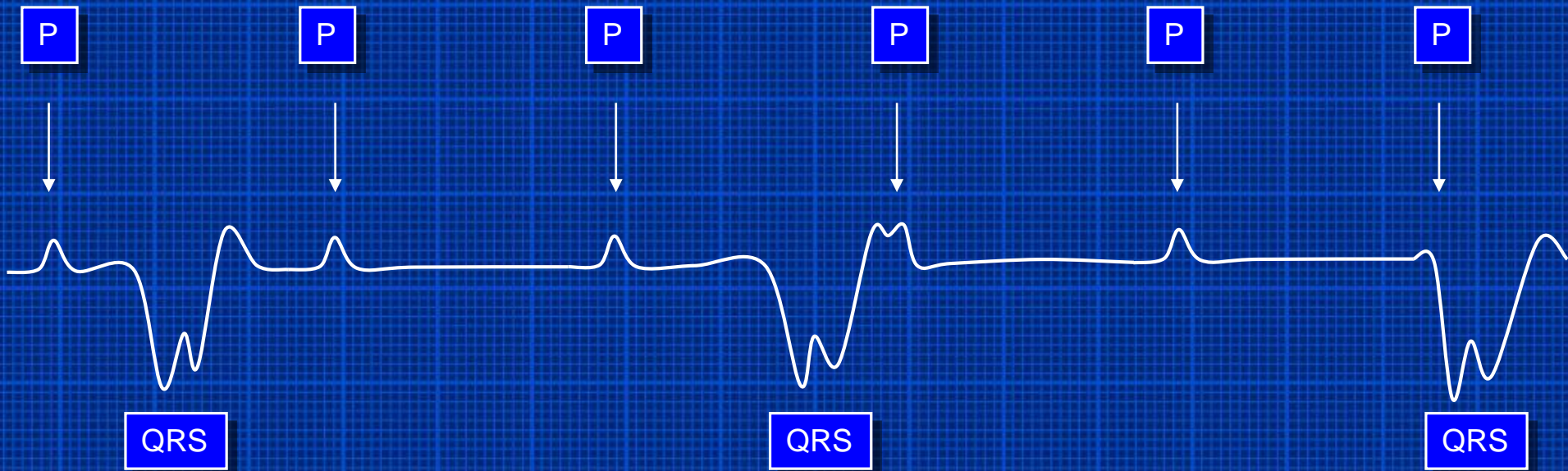
# AV Bloklar

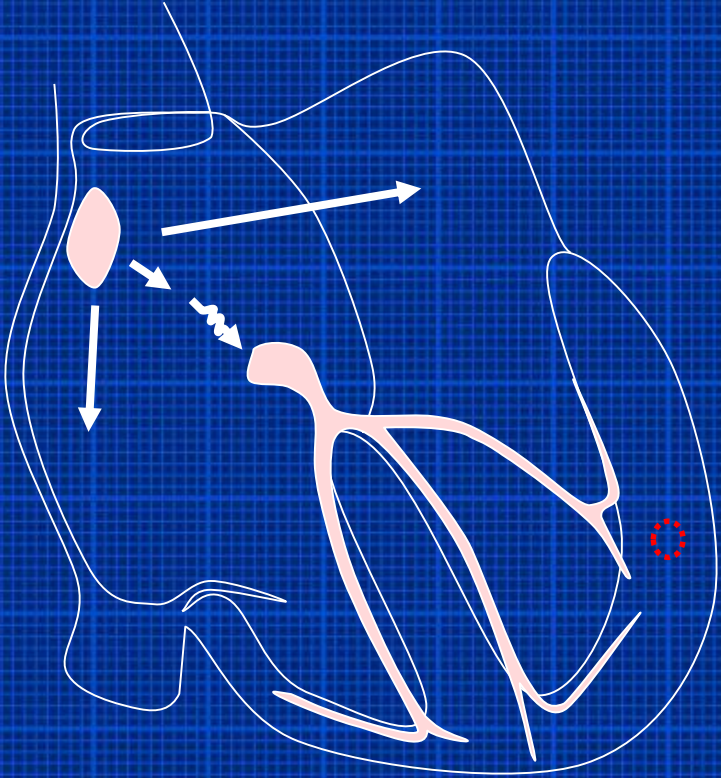
## 3.derece (AV tam blok)



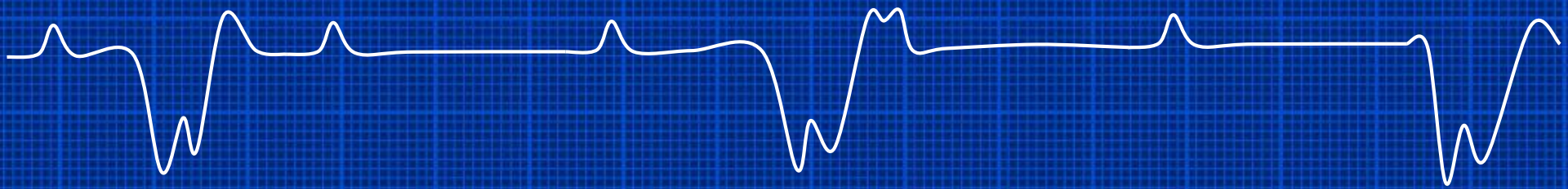
- AV disosiyasyon vardır, P hızı QRS hızından fazladır,
- Sıklıkla senkop veya presenkopla birlikte,
- Sıklıkla acil müdahale gerekir (pacemaker)

# 3. derece AV blok

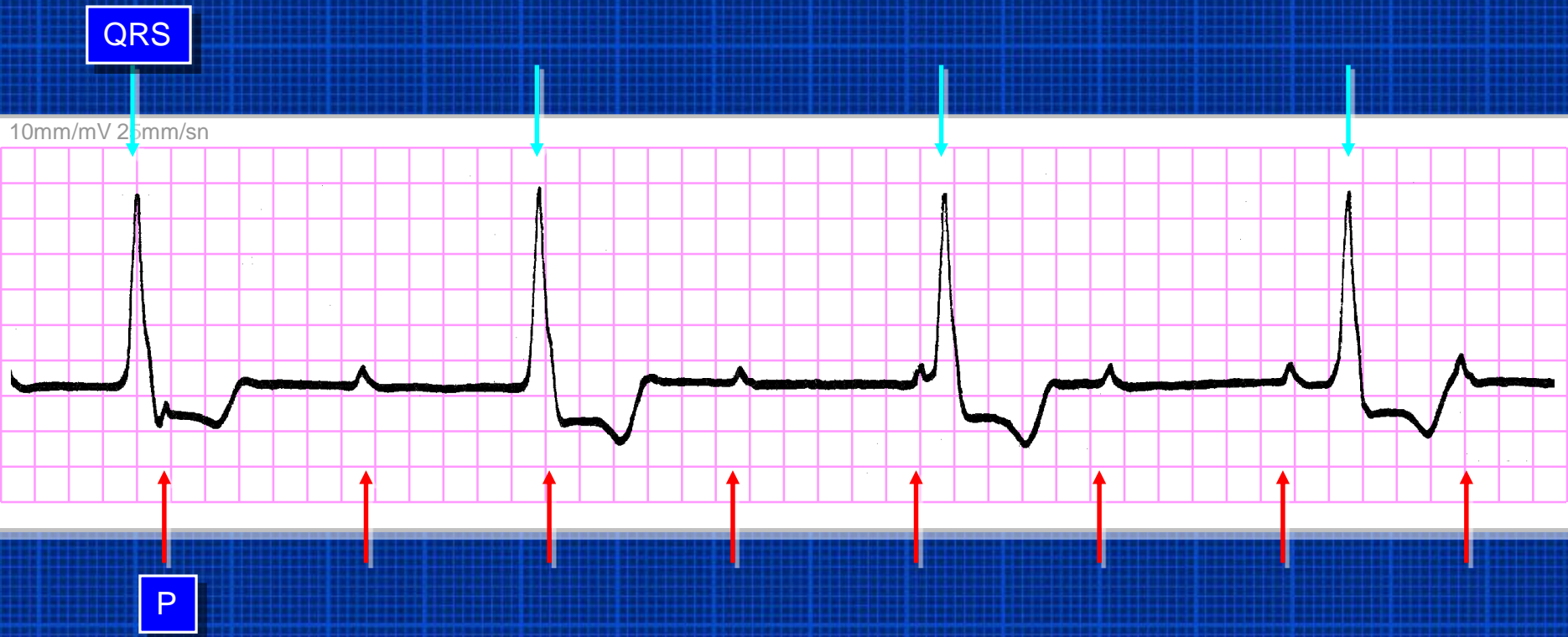




P ve QRS arasında ilişki yok  
P hızı QRS'den fazla  
QRS genellikle geniş

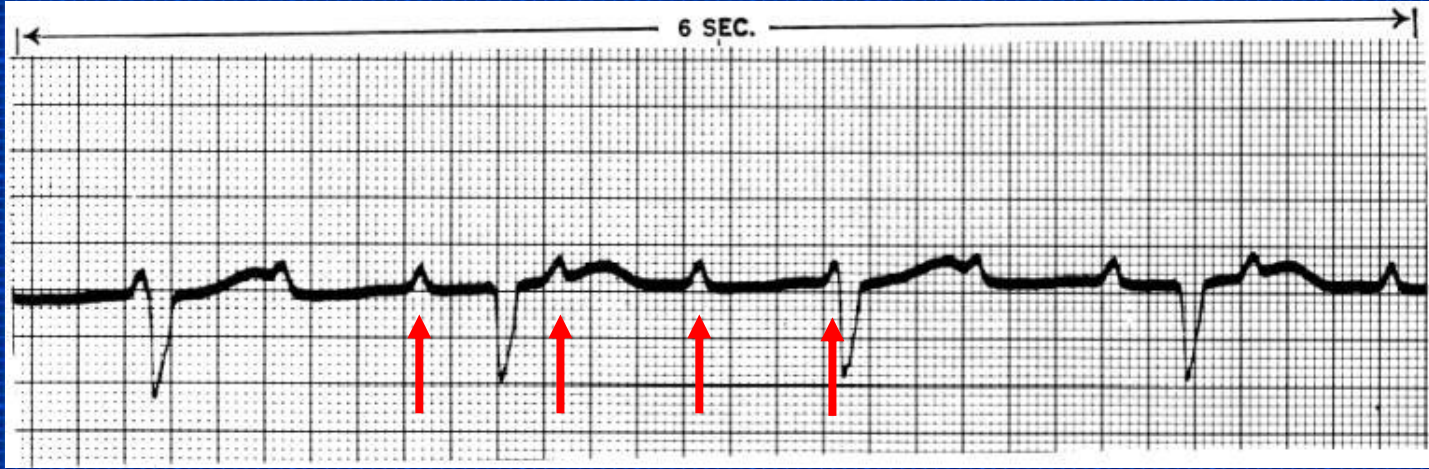


# 3. Derece AV Blok

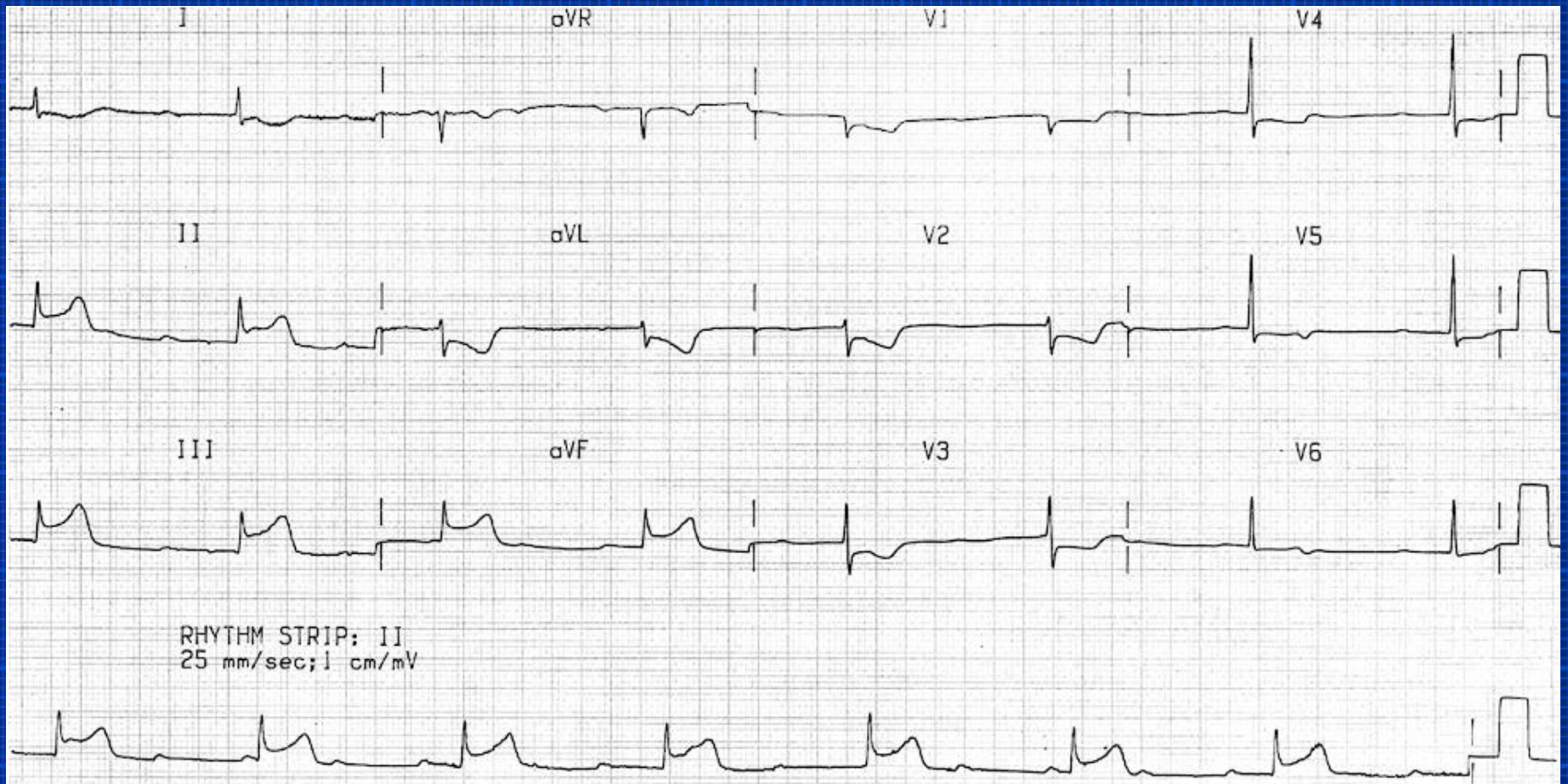


# AV Bloklar

## 3. derece (AV tam blok)



- Ventrikül ve atriyum birbirinden bağımsız çalışır, QRS dalgaları kaçış ritminin çıkış yerine göre geçişen oranda geniştir.





# Aritmiler (orijine göre)

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- Dal blokları

- Sol dal bloğu
  - LAFB
  - LPFB
- Sağ dal bloğu

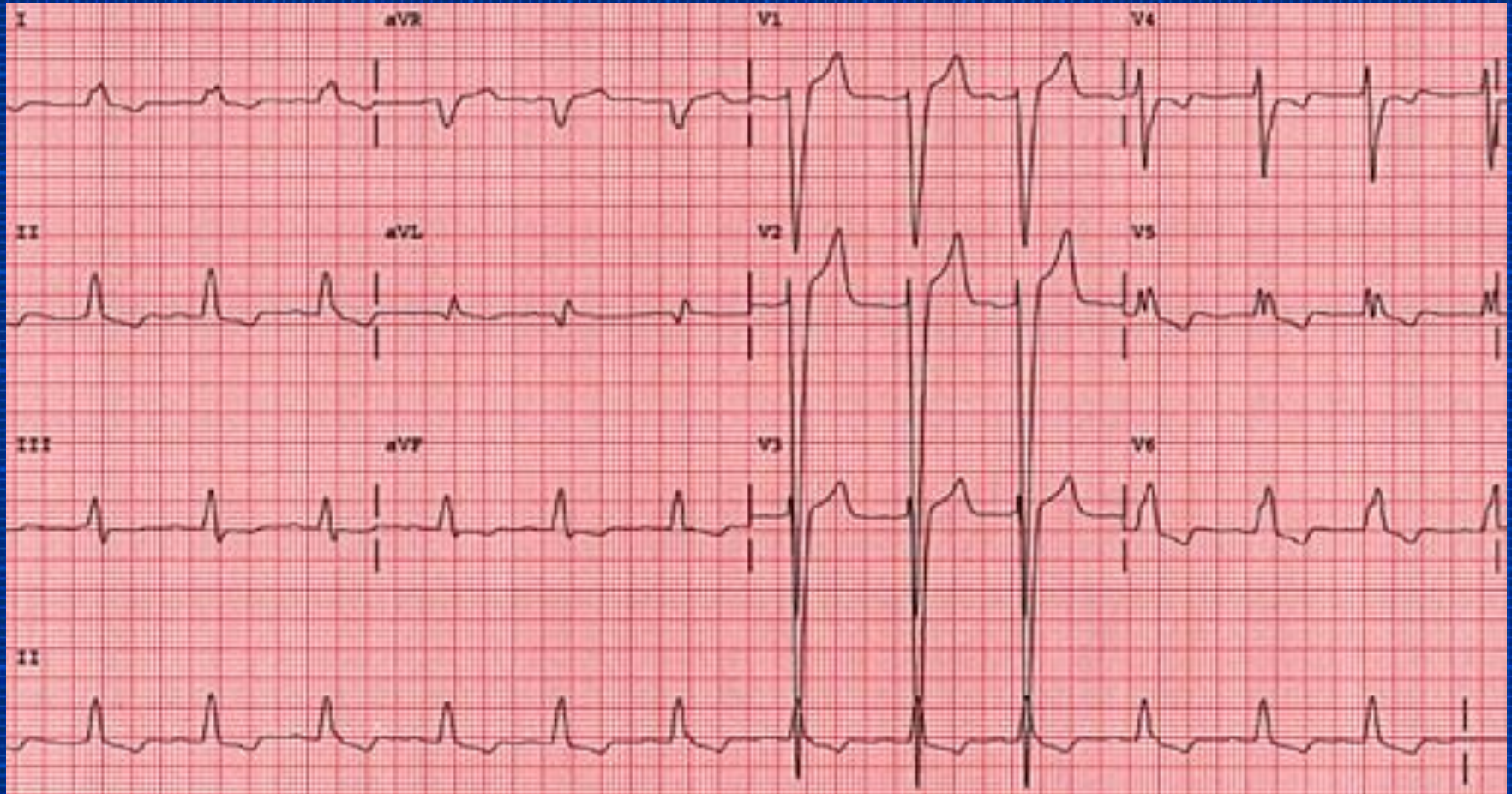
# LBBB

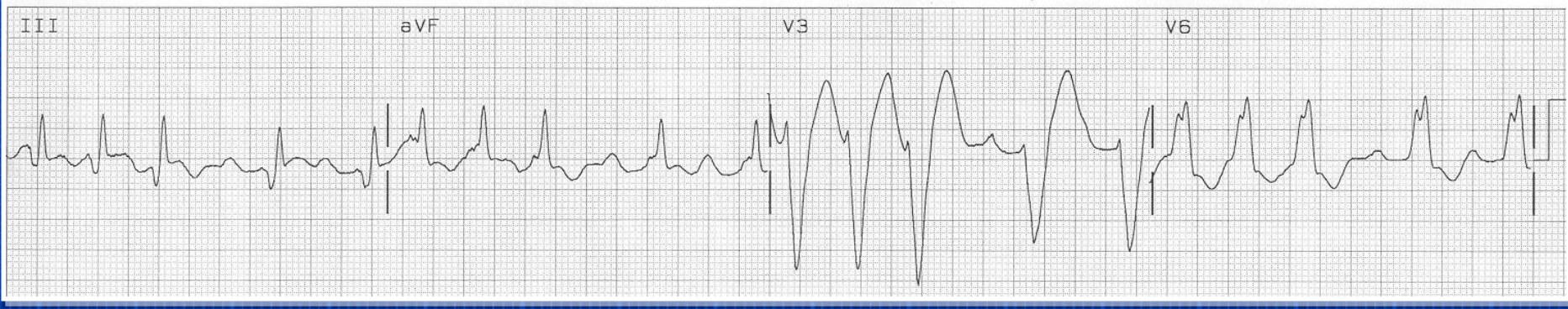
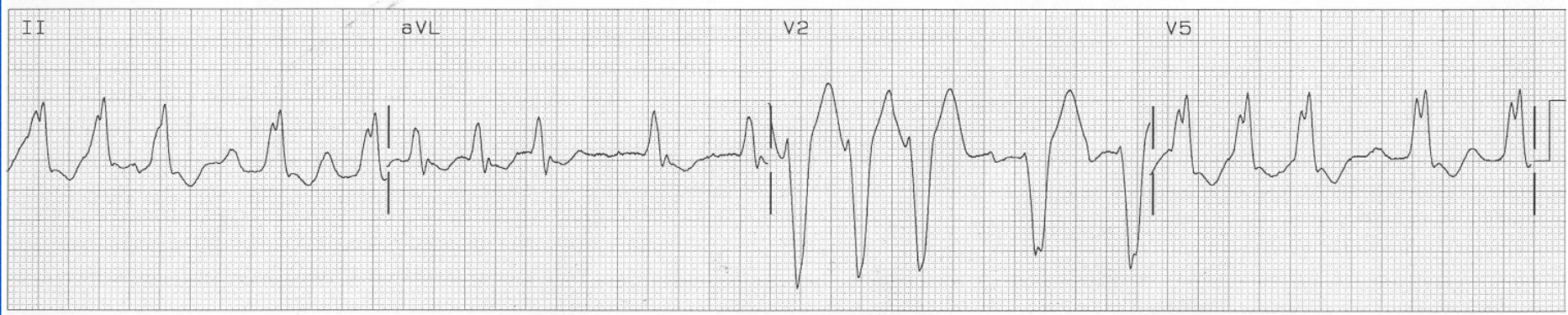
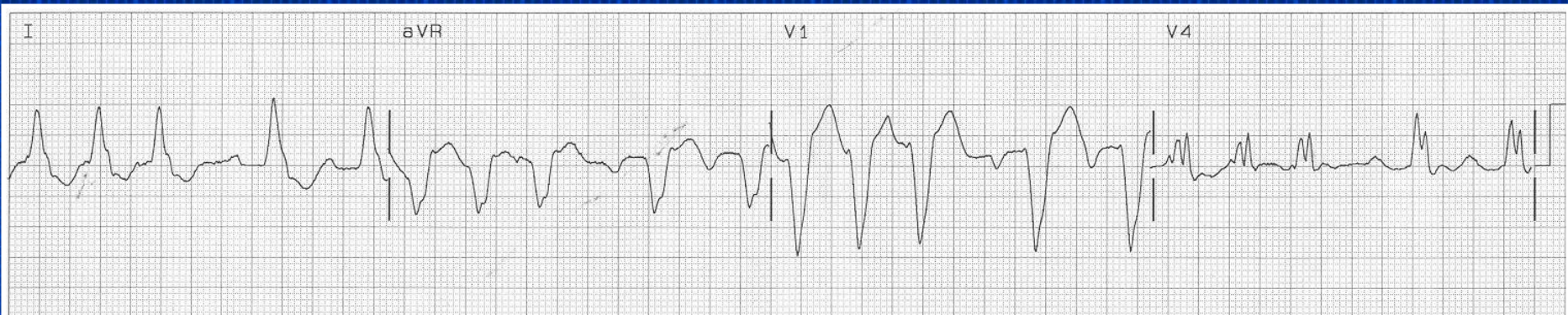
---

- QRS > 120 msn
- D1, aVL, V5-6 çentikli büyük R dalgası, ve septal q dalgası olmaması
- V1-2 küçük r yada QS dalgası
- Sol derivasyonlarda ST depresyonu ve T negatifliği.

# LBBB

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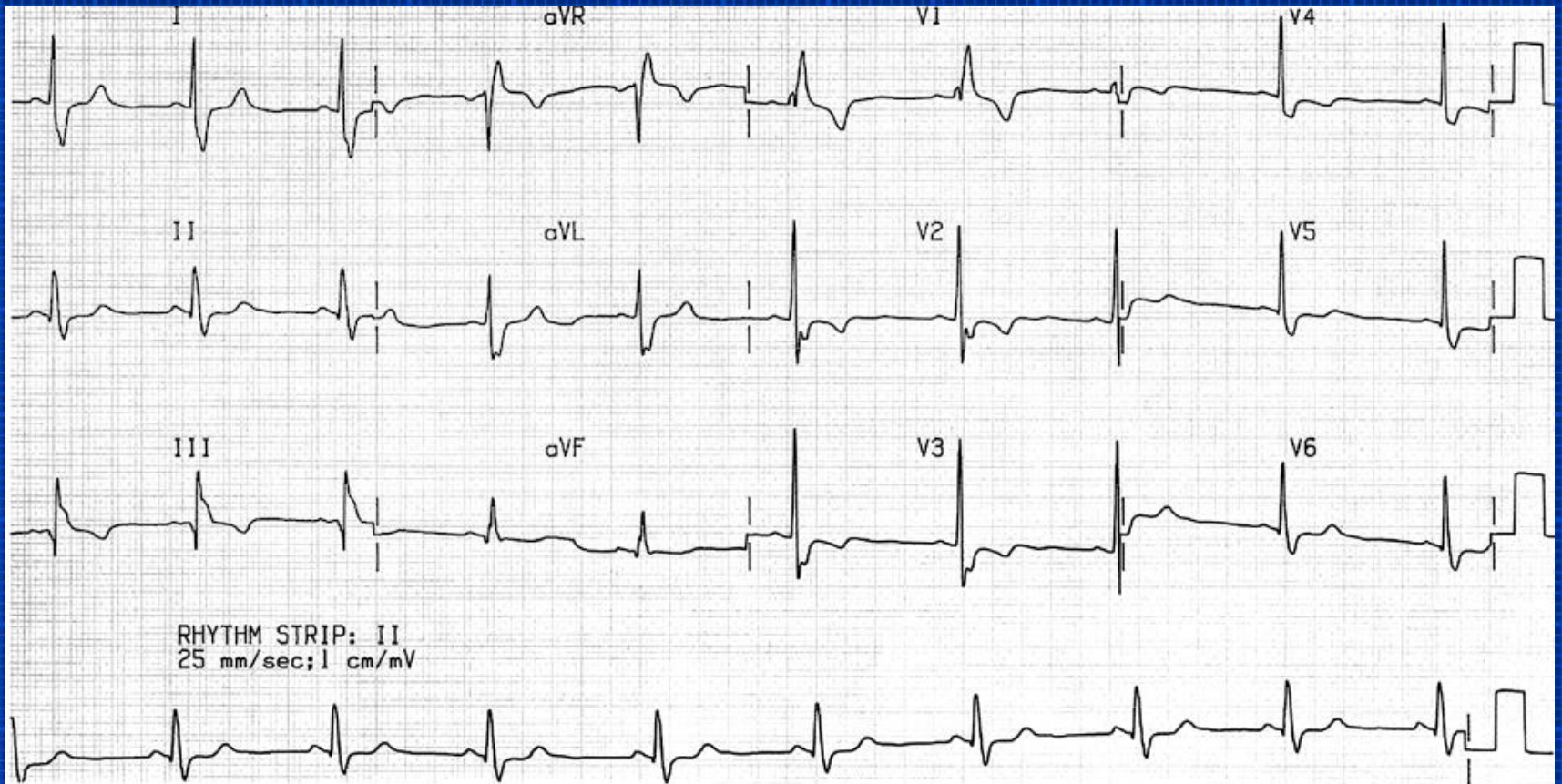


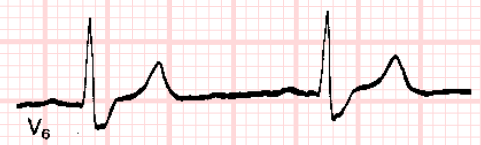
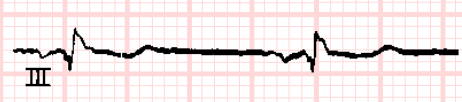
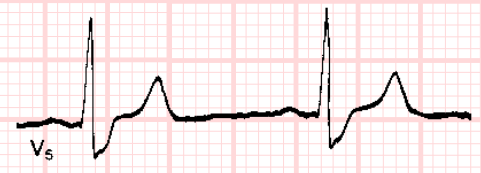
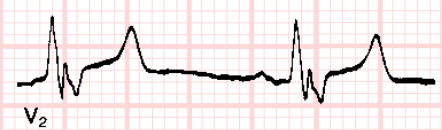
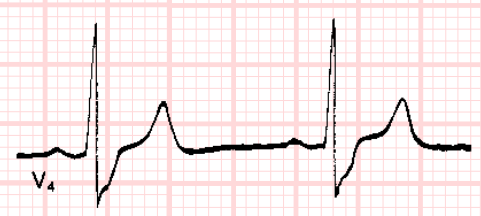
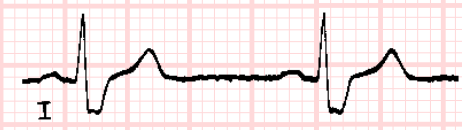
# RBBB

- QRS > 120 msn
- V1-2 çentikli R dalg ( Rsr, RsR...)
- D1, aVL, V5-6 derin geniş S dalgası
- V1-4 ST depresyonu, T negatifliği

# RBBB

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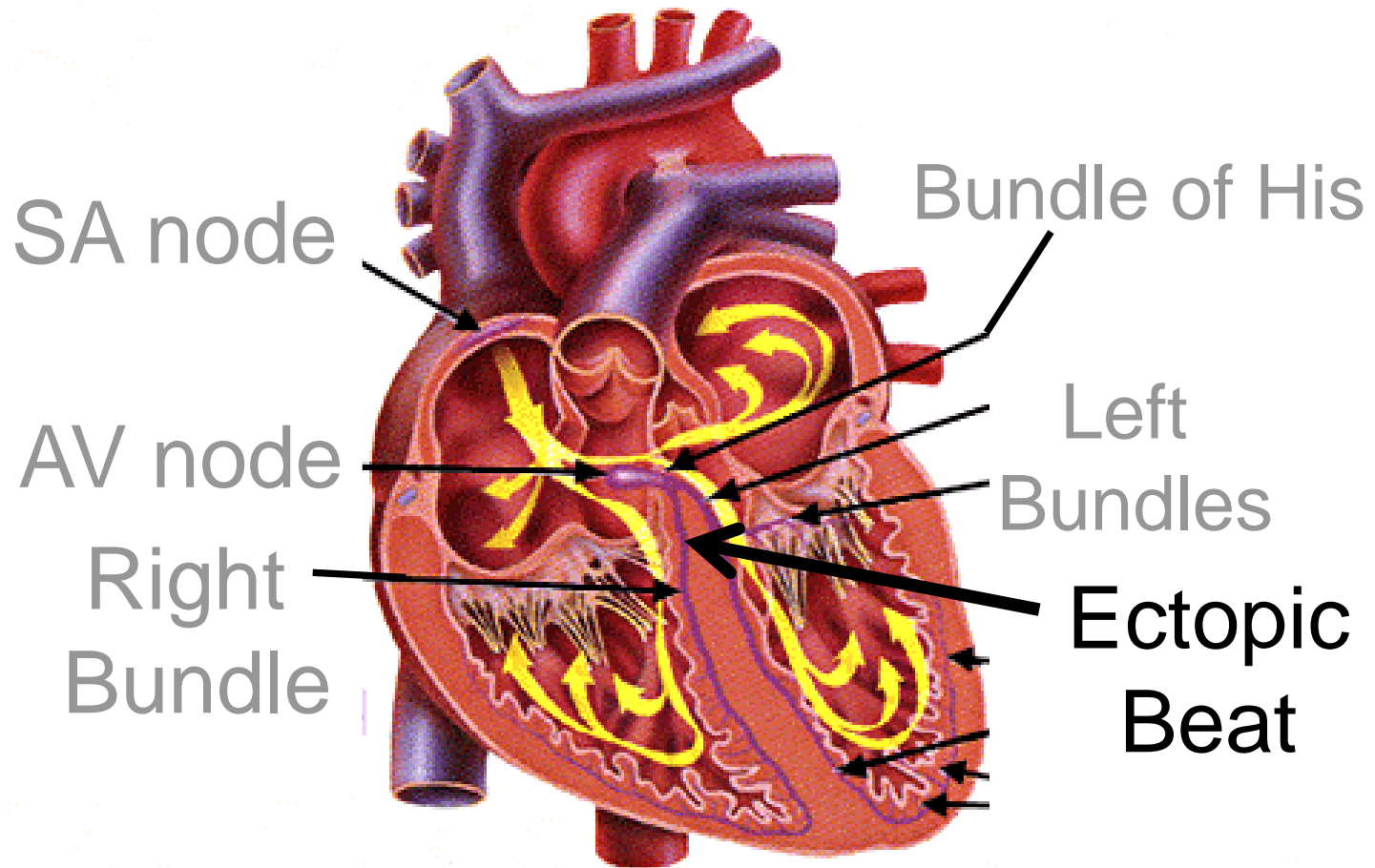
# Aritmiler (orijine göre)

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## • Ventriküler

- Ventriküler Prematüre kontraksiyon (VPS)
- Ventriküler takikardi
  - Non-sustained VT
  - Sustained VT
    - Monomorfik VT
    - Polimorfik VT
- Ventriküler flutter/fibrilasyon
- İdyoventriküler ritim
- Asistoli

# Ventriküler Aritmiler



Cardiac Conduction System

# VPS

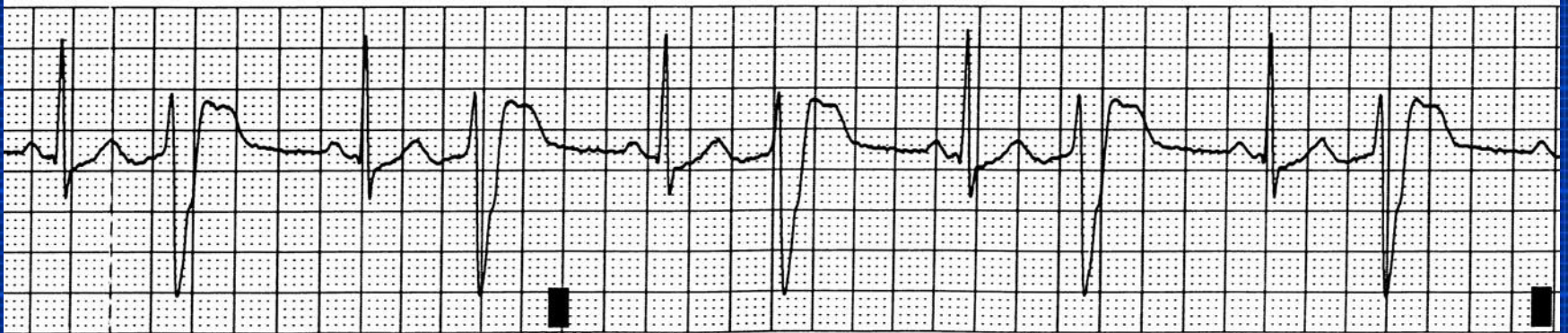
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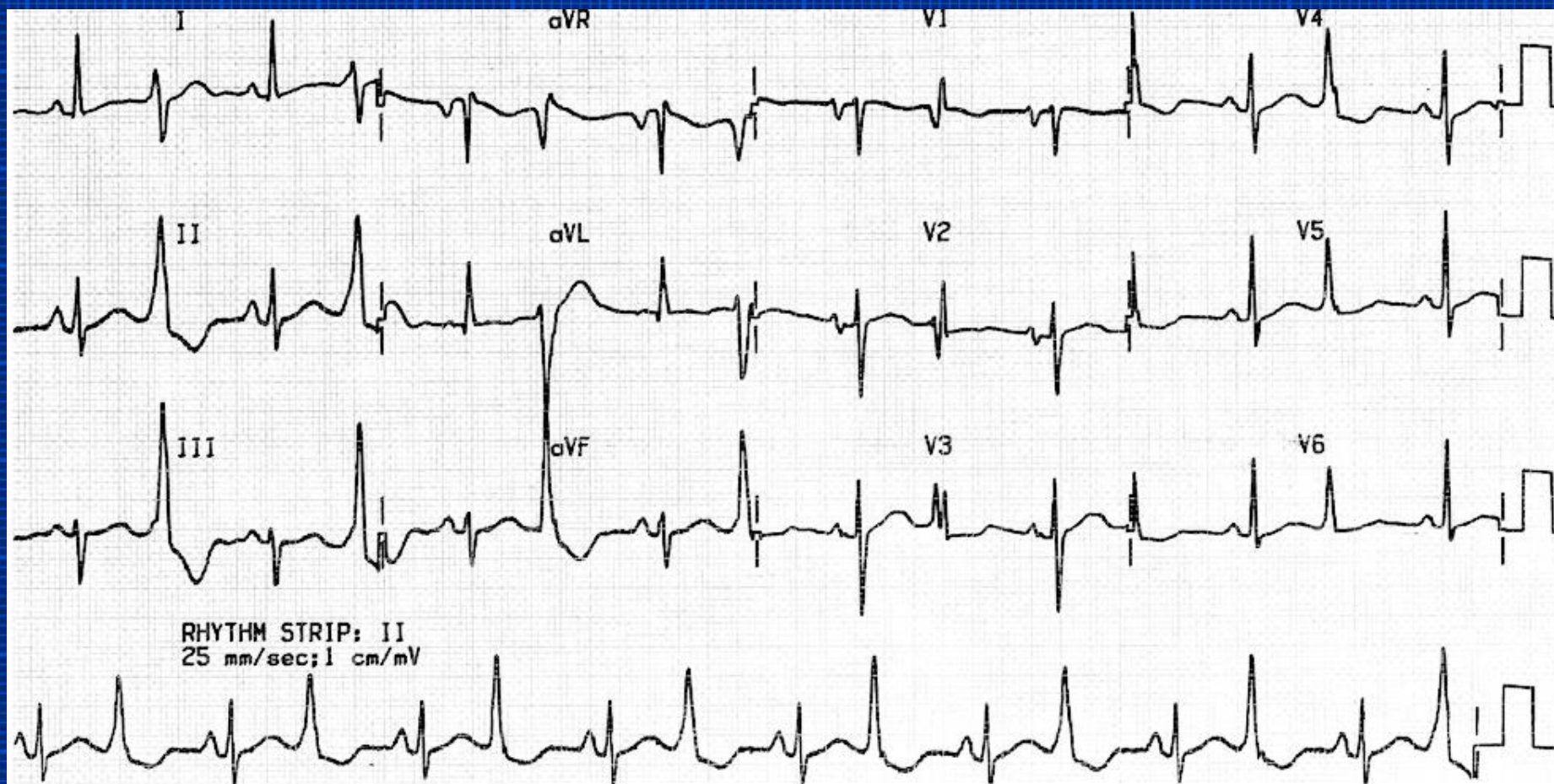
- Popülasyonda oldukça sık,
- Kalp hastalığı olabilir veya olmayabilir,
- Çoğunlukla semptom yok, ancak bazen semptomatik olabilir.
- Önünde P yok, QRS geniş ve morfolojisi farklı

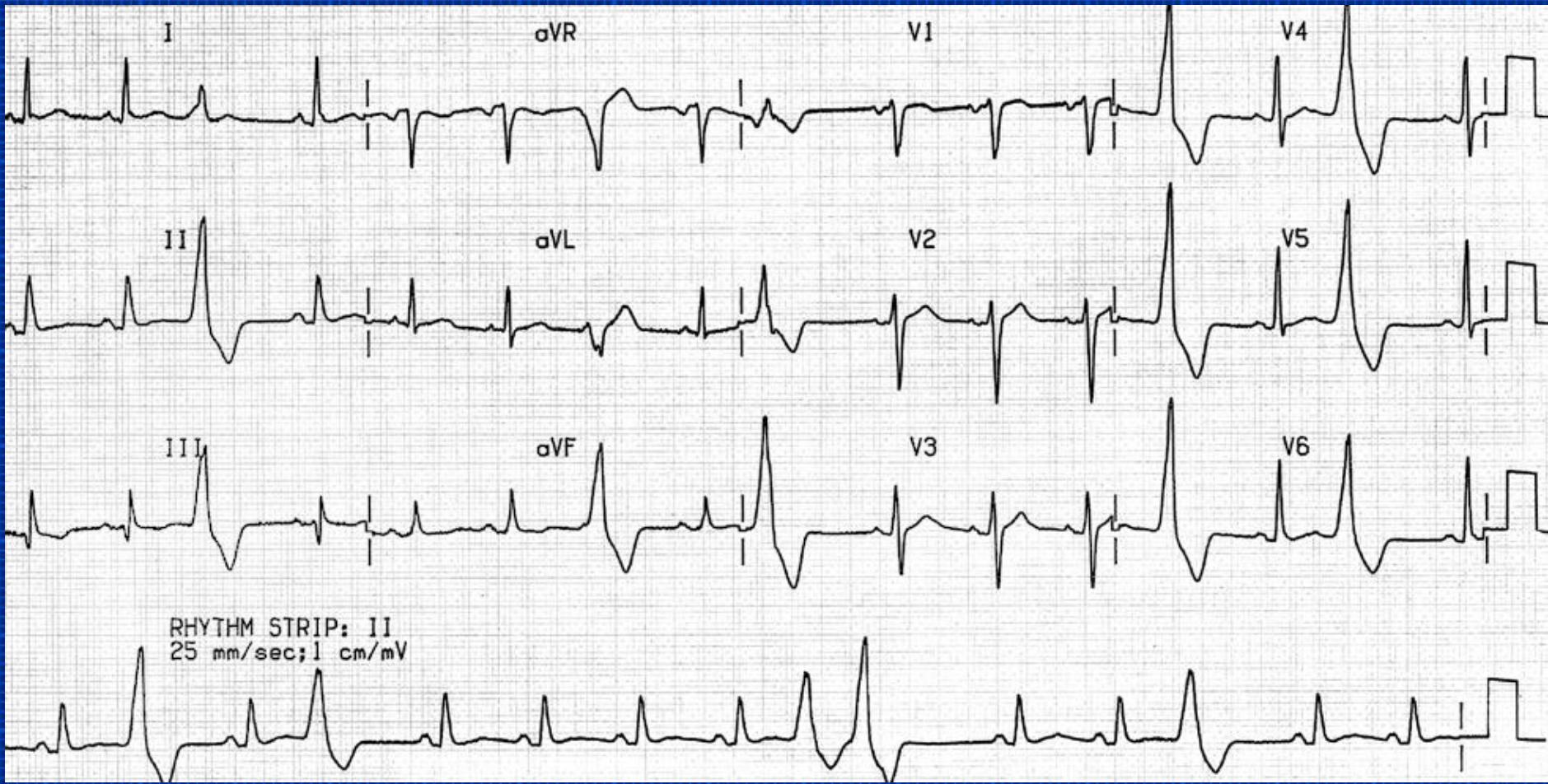
# VPS

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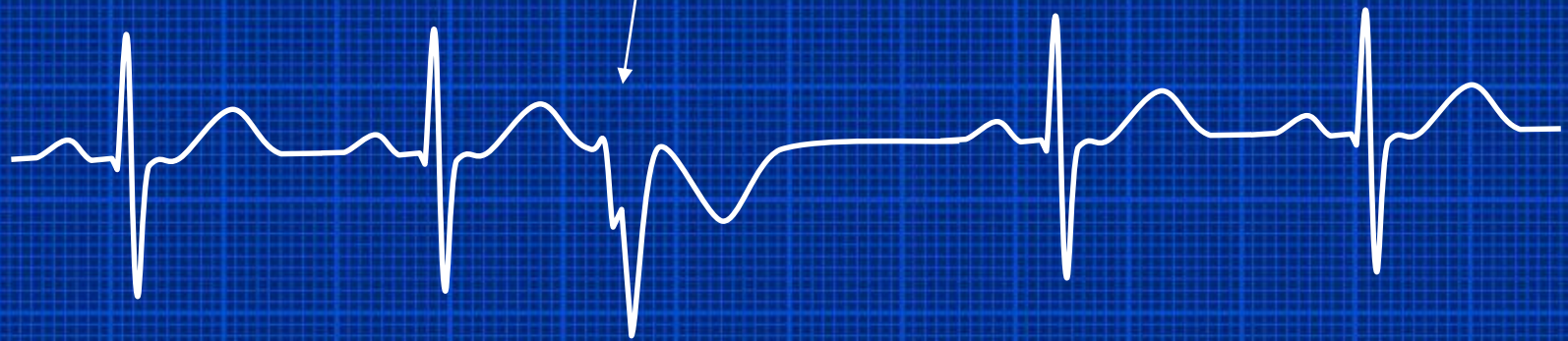


Bigemine ritim



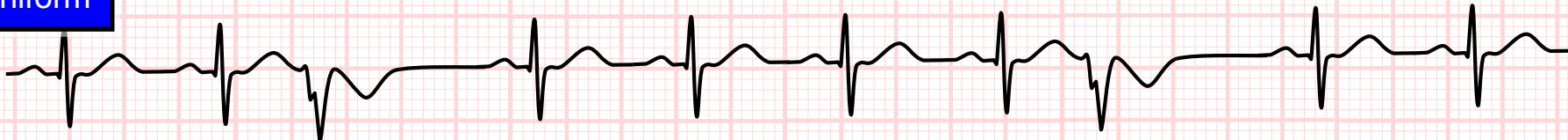


Ventriküler erken vuru

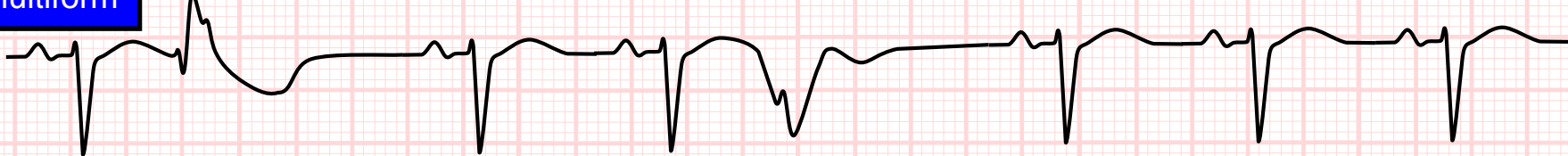


RR

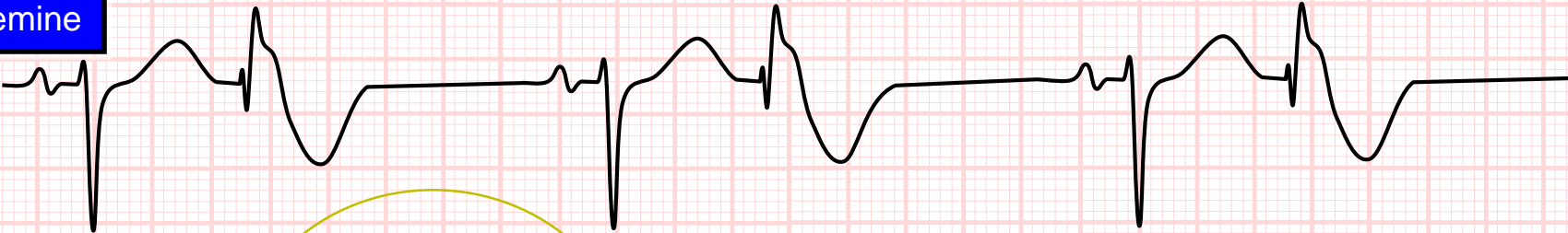
Uniform



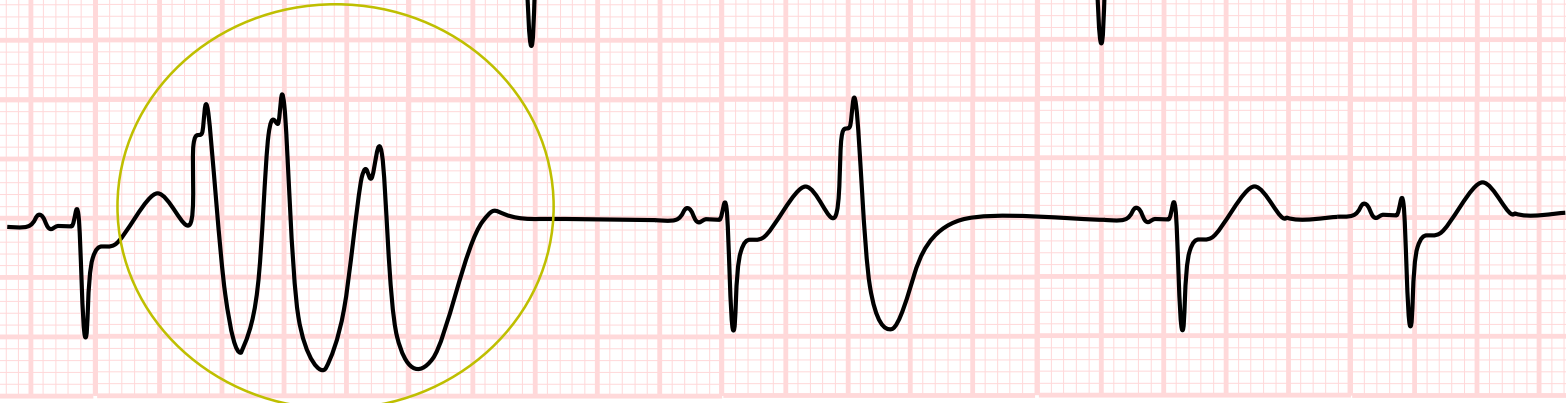
Multiform



Bigemine



VT





# Ventriküler takikardi

non-sustained (süreksiz)



**Nonsustained ventricular tachycardia** Nonsustained ventricular tachycardia in a patient with underlying atrial fibrillation. The ventricular arrhythmia consists of nine beats at an approximate rate of 170 beats/min. Courtesy of Ary Goldberger, MD.

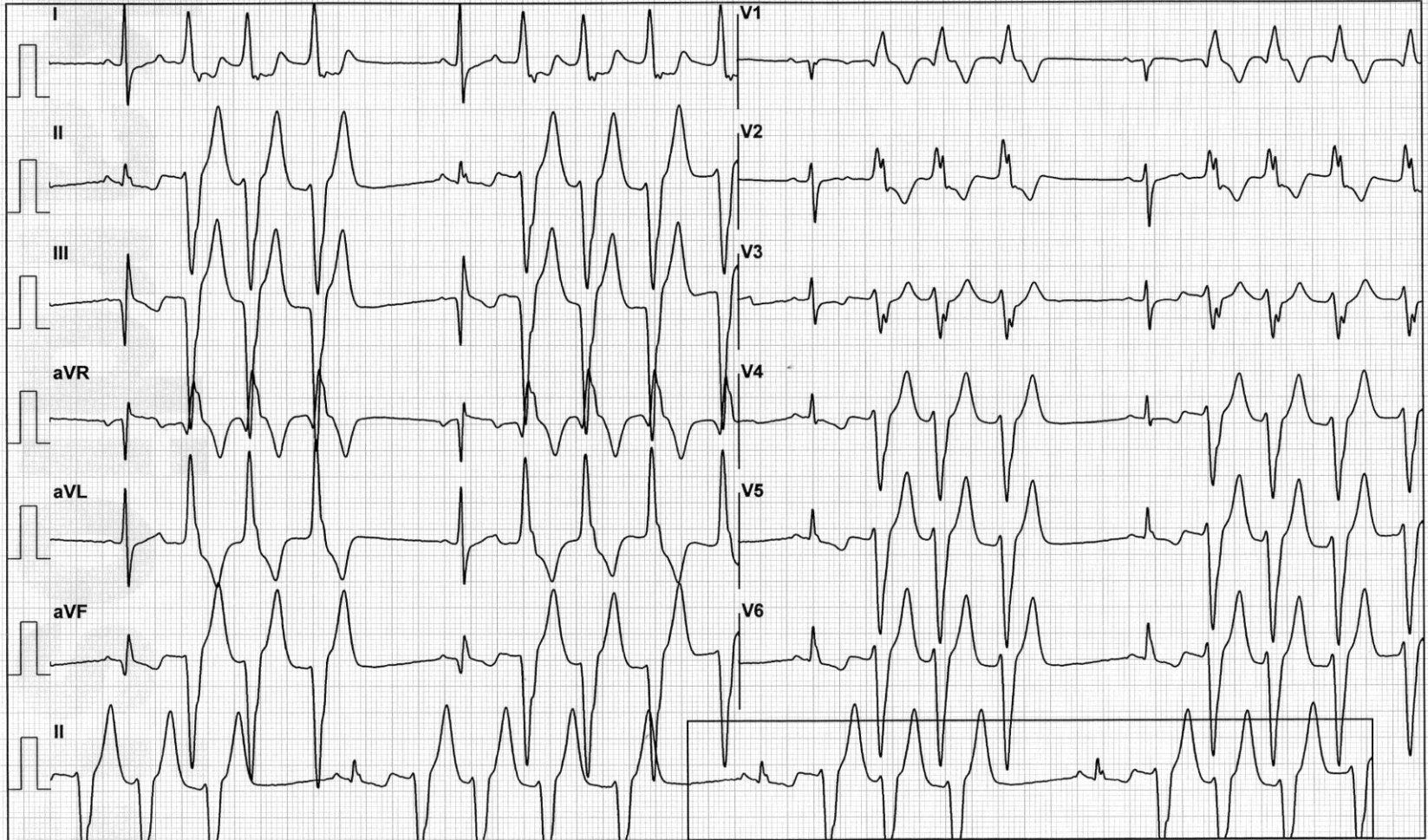
- Arka arkaya  $>2$  ventriküler atım
- Hız  $>120$  /dk
- Süre  $<30$  sn

Adı  
ID 1  
Kaydediliş 31.10.2011 10:00:36

#2 Olay Kaydı Rahatlama:7

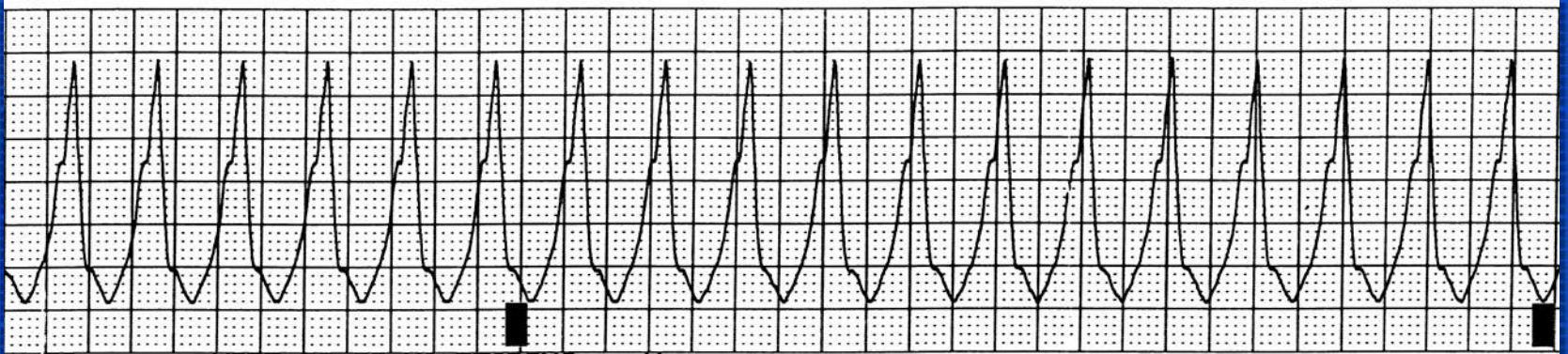
Nabız 122 bpm  
Zaman 0 sn  
Tansiyon 0/0 mmHg

18



# Ventriküler Takikardi

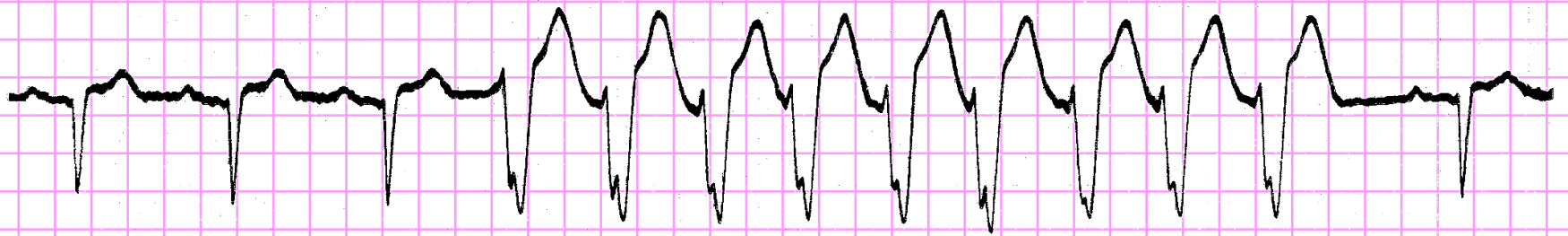
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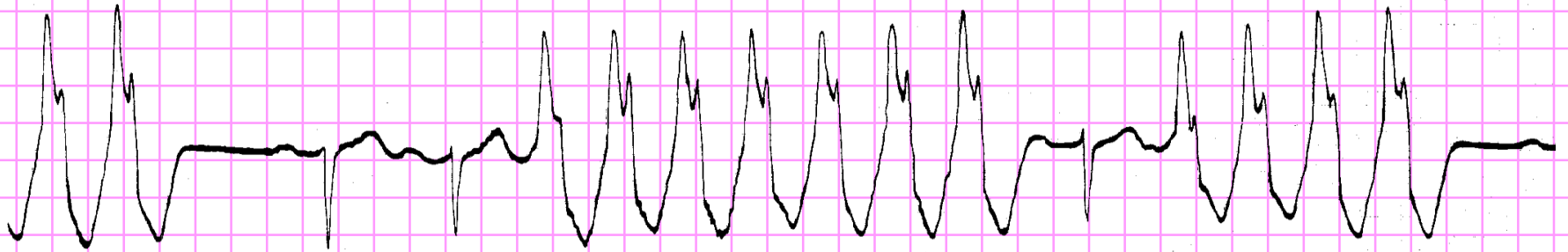
## Ventriküler Takikardi – Monomorfik

- P dalgası seçilemez
- Geniş QRS  $> 0.12$  sec, düzenli RR aralığı
- Hız 100 - 260

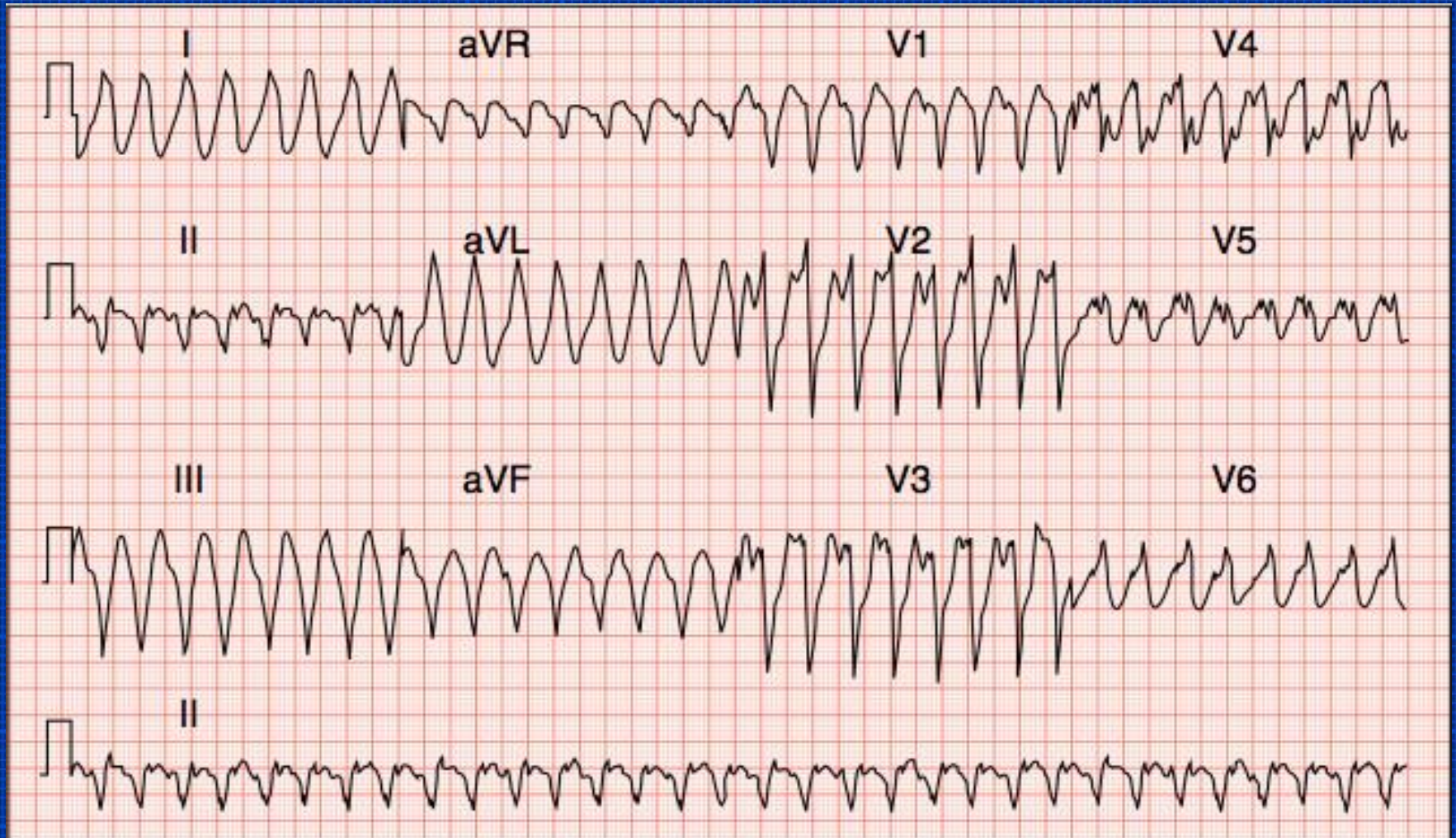
10mm/mV 25mm/sn



10mm/mV 25mm/sn

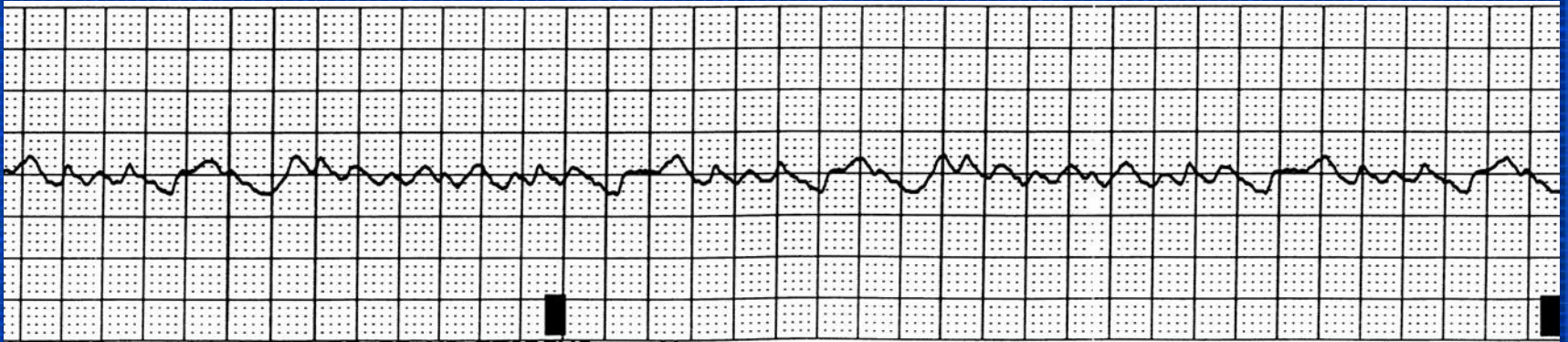


# Ventriküler takikardi



# Ventriküler fibrilasyon

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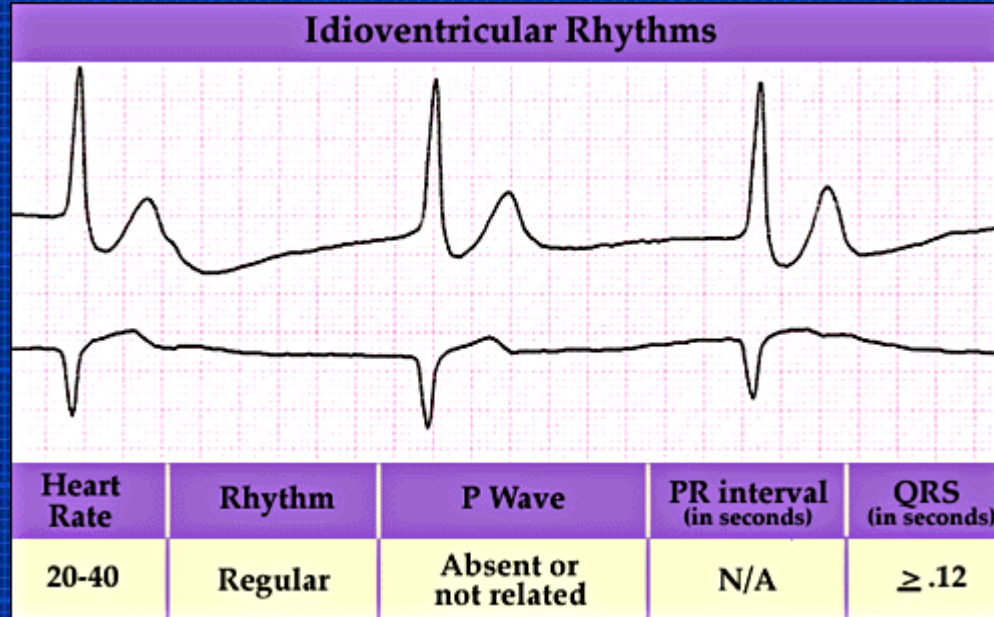
- Ölümcül
- P ve QRS dalgaları yok
- Düzensiz elektriksel aktivite

Courtesy of Jason E. Roediger, CCT, CRAT





# İdyoventriküler ritim



- Ventriküler kaçış ritmi, uyarı çıkaran daha yüksek merkezler ventrikülü uyarmada yetersiz kaldığında ortaya çıkan koruyucu bir kaçış mekanizmasıdır.
- Hız yavaş, geniş QRS geniş ve P dalgaları yok,
- Prognoz kötü,

# Asistoli

ECGBLOG.COM

