

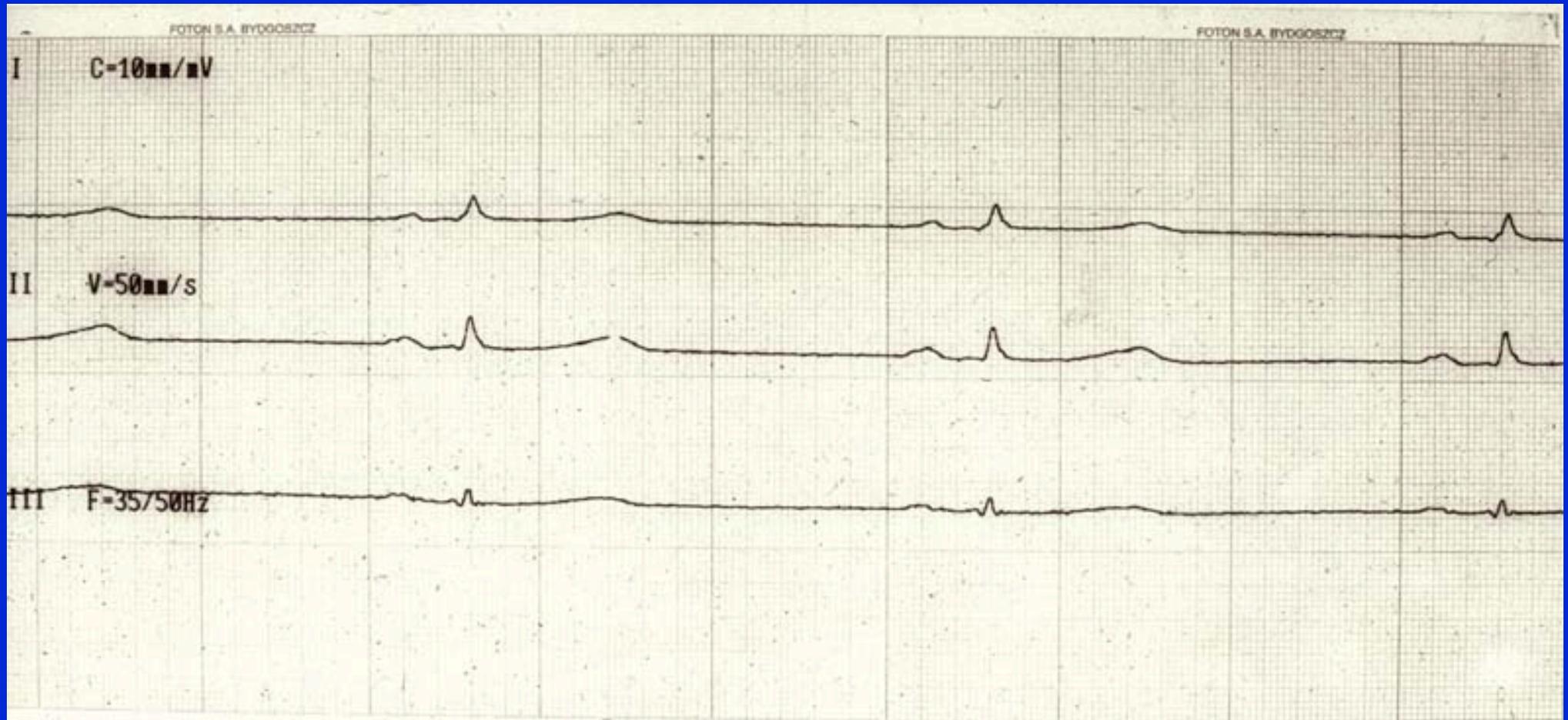
Management of bradycardia

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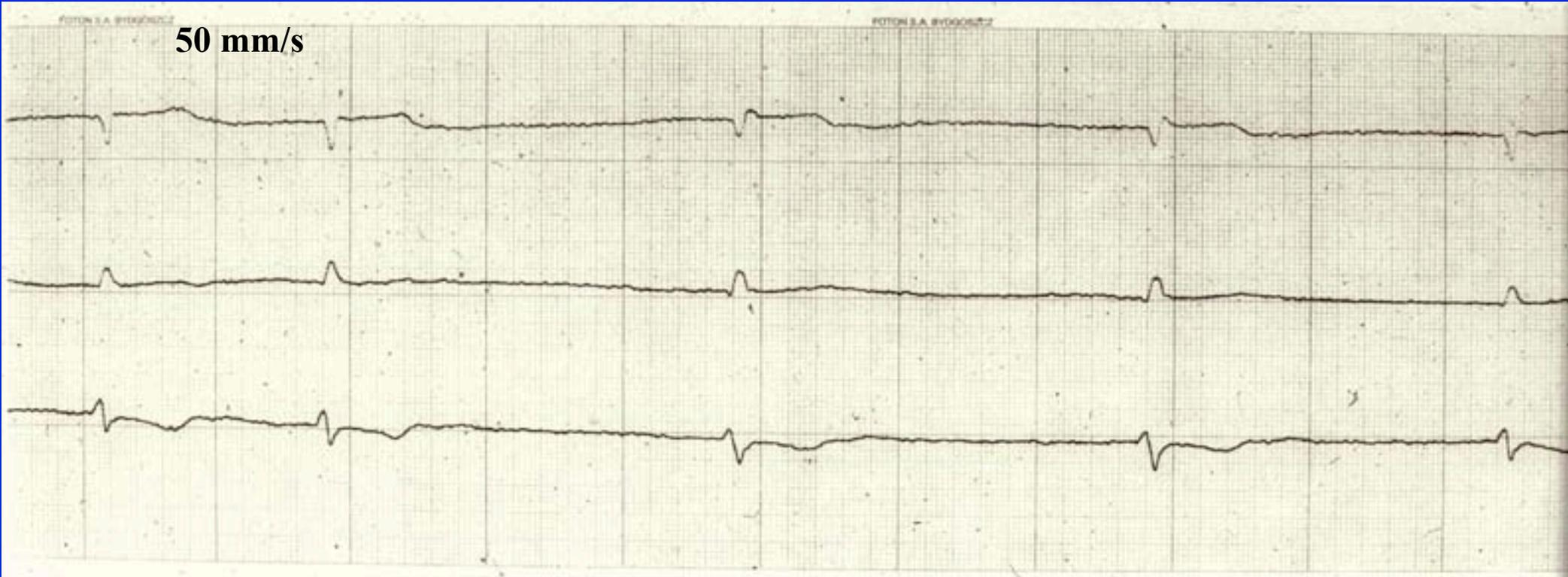
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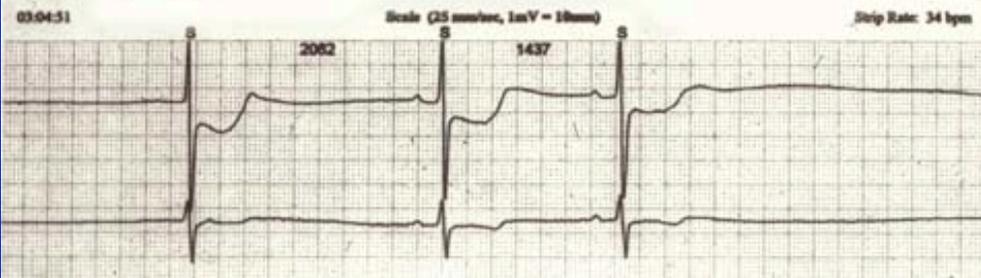
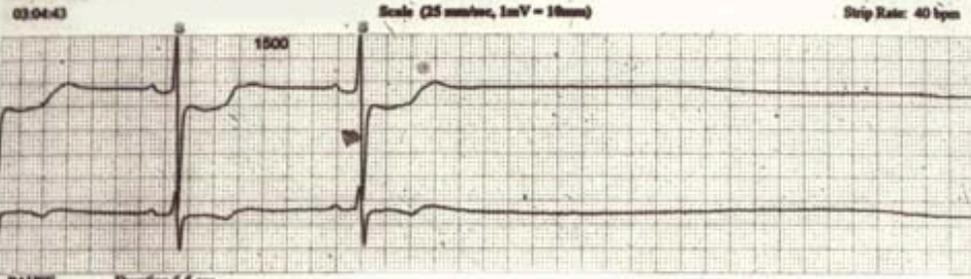
Bradycardia



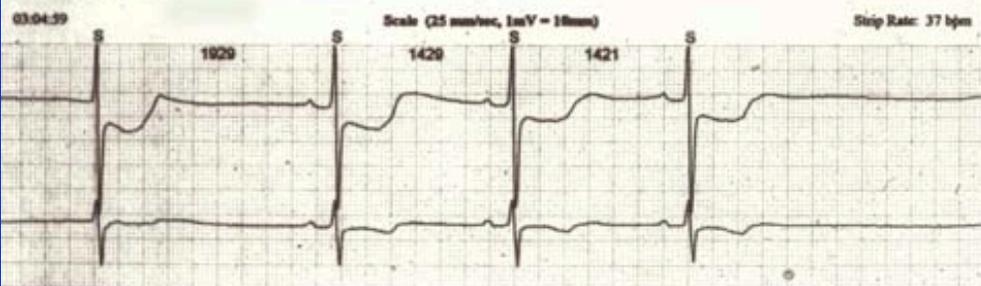
Bradyarrhythmia

50 mm/s

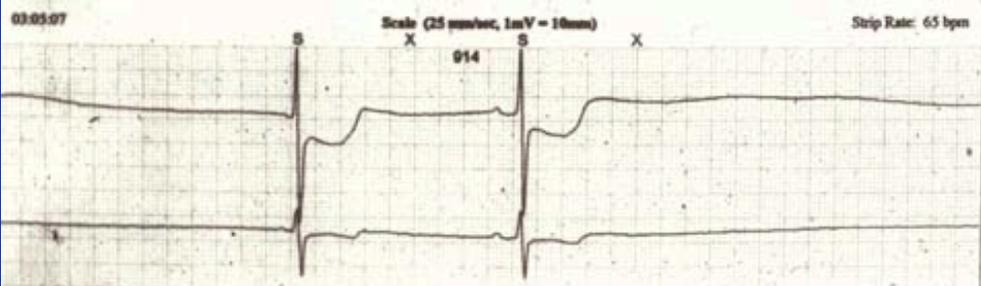




SEARCH STRIP



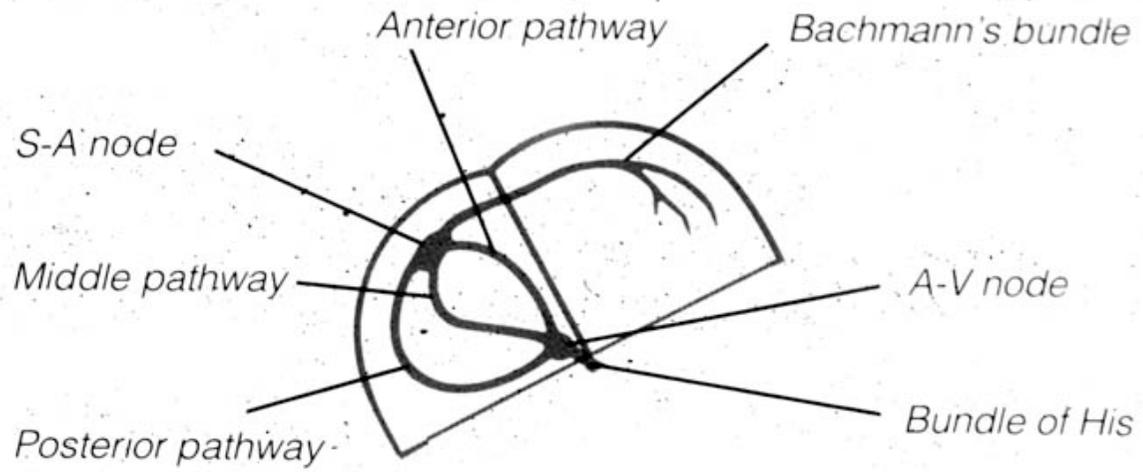
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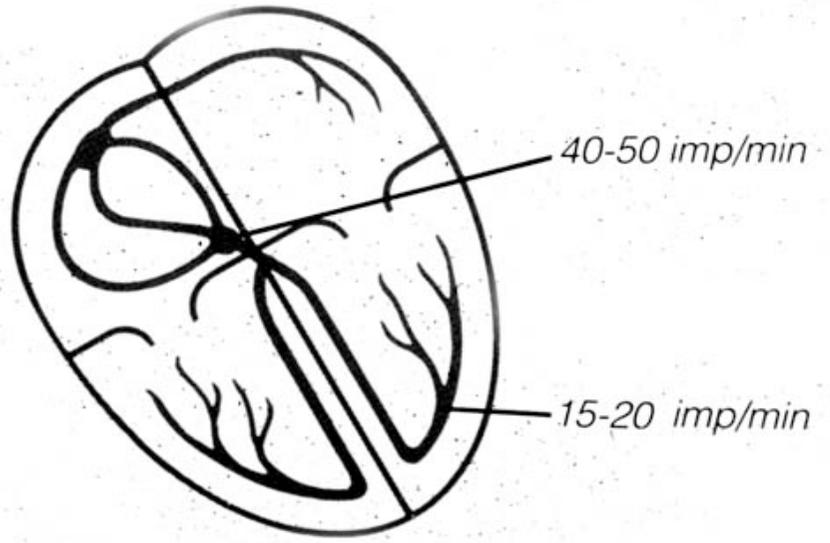
SEARCH STRIP

Evaluation of bradycardia

1. Anamnesis
2. Physical examination
3. Basic laboratory data
4. Electrocardiography
5. Holter monitoring
6. Echocardiography
7. Exercise stress test
8. Tilt-up test
9. Transesophageal Atrial Pacing (Sinus Node Recovery Time. Sino-Atrial Conduction Time „Wenckebach Point”)
10. Invasive electrophysiological study
11. Electroencephalography
12. Doppler examination of jugular and vertebral arteries



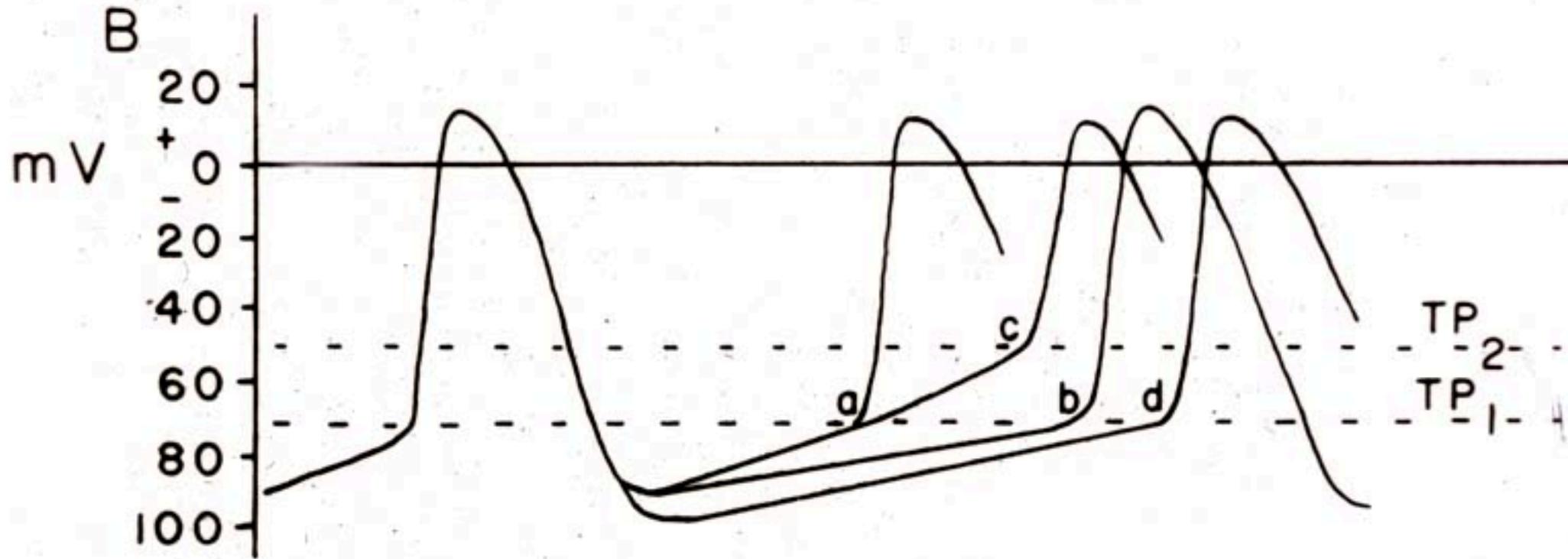
The conduction system in the atria



The spontaneous impulse rate in different parts of the conduction system.

*Bachmann, Andreas R. (1601-1656), practicing physician in Leipzig, subsequently a professor of physiology and botany.

Pacemaker cell



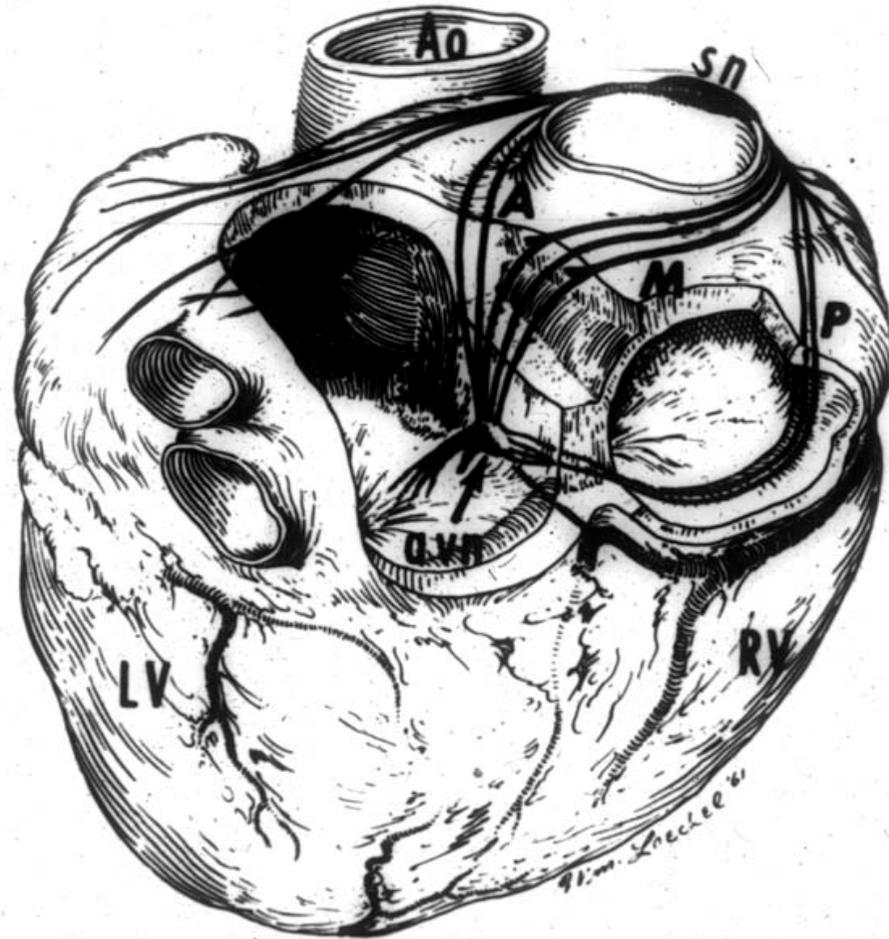
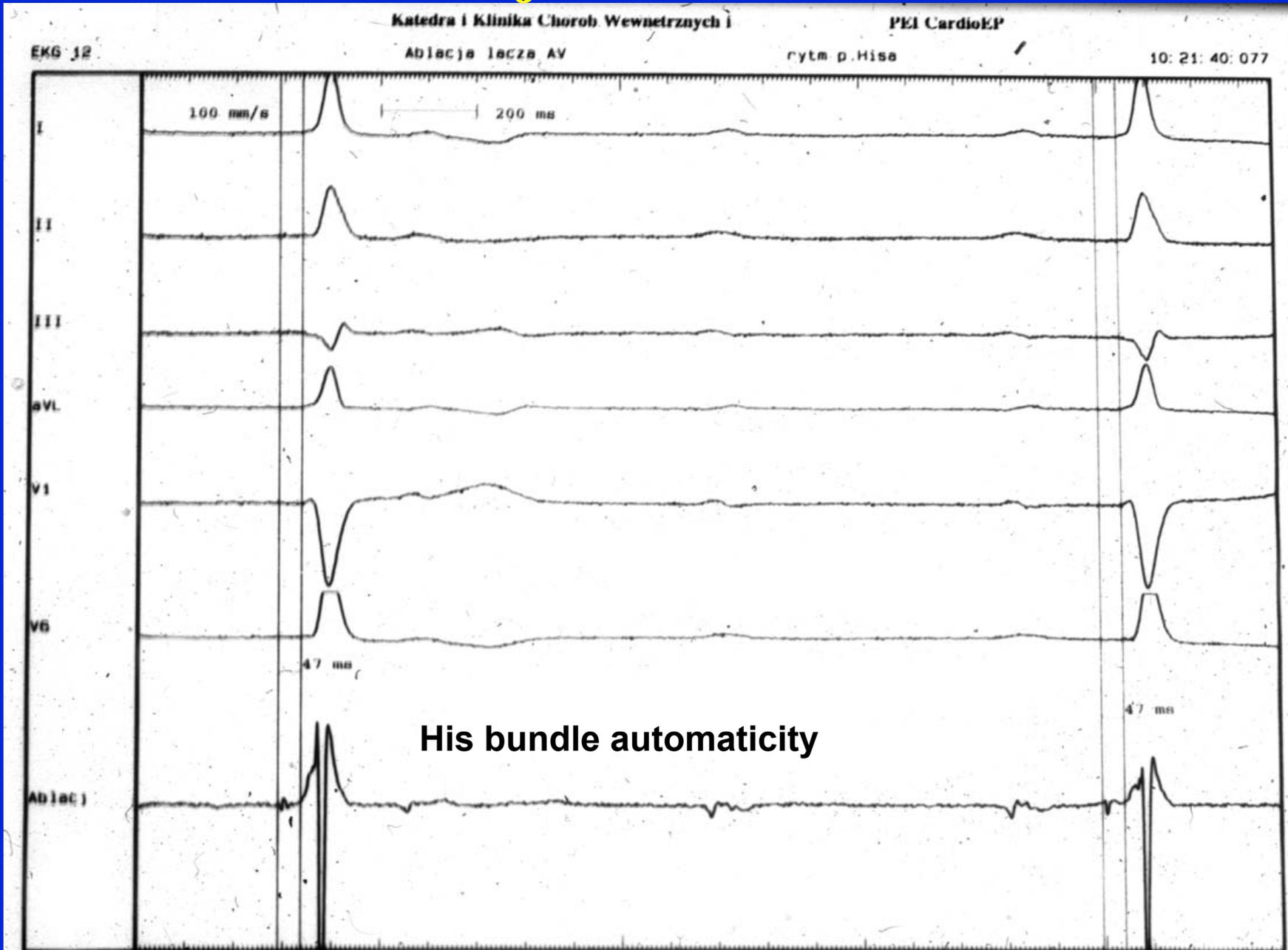


Figure 1. Drawing of the 3 internodal pathways. The heart is viewed from above and behind the left atrium. A = anterior internodal tract; M = middle internodal tract; P = posterior internodal tract; LV = left ventricle; RV = right ventricle; Ao = aorta; sn = sinus node; avn = A-V node.

A-V junction ablation



Normal automaticity in the heart

- ➔ Sinus node
- ➔ Atrio-ventricular node
- ➔ Automatic cells surrounding the A-V node and coronary sinus
- ➔ Purkinje-like cells of internodal tracts and Bachmann's bundle
- ➔ His bundle
- ➔ His bundle branches
- ➔ Peripheral Purkinje fibers

REMEMBER:

Among a variety of the secondary automatic centers in the heart only His bundle automaticity is sufficiently strong as a life-saving natural pacemaker.

It means that this center is able to maintain a stable rhythm usually of more than 30 beats per minute needed to maintain cardiac output in sufficient level

ACC/AHA guidelines for implantation of cardiac pacemakers and arrhythmia devices

(Circulation 1998, 97, 1325)

„Symptomatic bradycardia” is defined as a documented bradyarrhythmia that is directly responsible for the development of syncope or near-syncope, transient dizziness or light-headedness, and confusional states resulting from cerebral hypoperfusion attributable to slow heart rate

Fatigue, exercise intolerance and frank congestive heart failure may also result from bradycardia.

These symptoms may occur at rest or with exertion

Definite correlation of symptoms with a bradyarrhythmia is a requirement to fulfill the criteria of symptomatic bradycardia

Sinus bradycardia (1)

Acute (potentially reversible causes)

1. Extreme generalized hypoxia:

- respiratory failure of different mechanism
- pulmonary embolism
- carbone oxyde intoxication

2. Coronary ischemia and infarction

3. Drug intoxication

- digitalis
- antiarrhythmics overdose

CLASS I B and C (quinidine, procainamide, disopyramide, ajmaline, prajmaline, flecainide, lorcainide,)

CLASS III (amiodarone, sotalol)

CLASS IV (Ca entry blockers (verapamil, gallopamil)

- beta-adrenolytic drugs (**CLASS II**)

Sinus bradycardia (2)

- 4. Carotid sinus syndrome**
- 5. Vaso-vagal syndrome**
- 6. Neurocardiogenic Vaso-Vagal syndrome**
- 7. Reflex bradycardia (vagal reflex):**
 - endotracheal intubation**
 - esophagoscopy, bronchoscopy**
 - eye surgery**
 - coronarography and interventional procedures (PTCA, stenting)**

Sinus bradycardia

Chronic

1. Progressive fibrosis of sinus node
2. Chronic ischemia
3. Other causes (rare):
 - degenerative and autoimmunological processes
 - myxoma
4. Physiological:
 - trained individuals
 - sleep

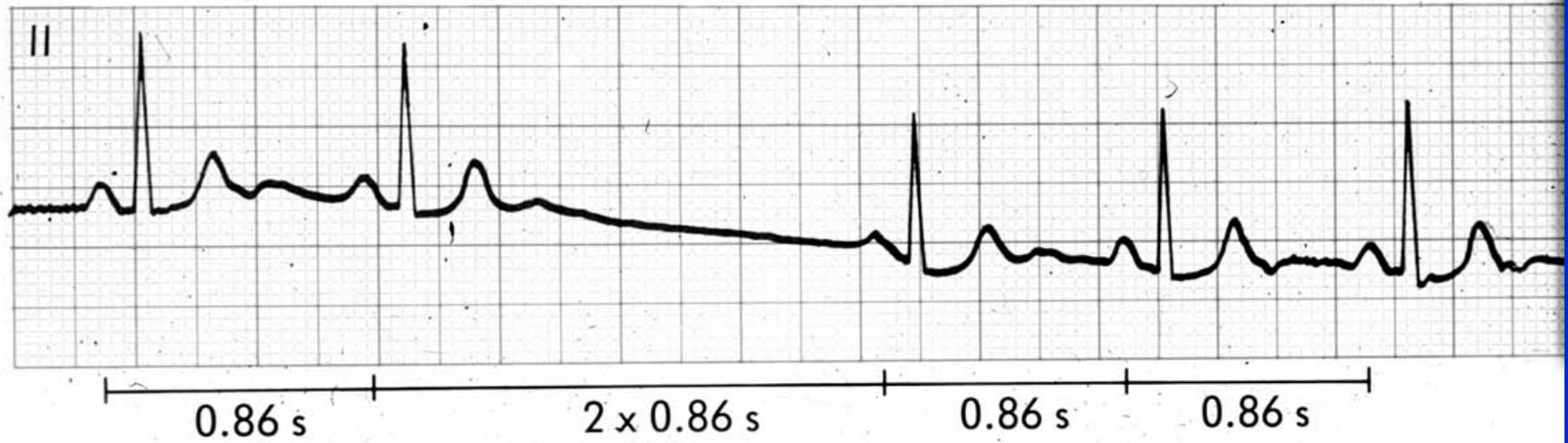


Fig. 11.2
Second degree SA block type II with dropout of a PQRST complex

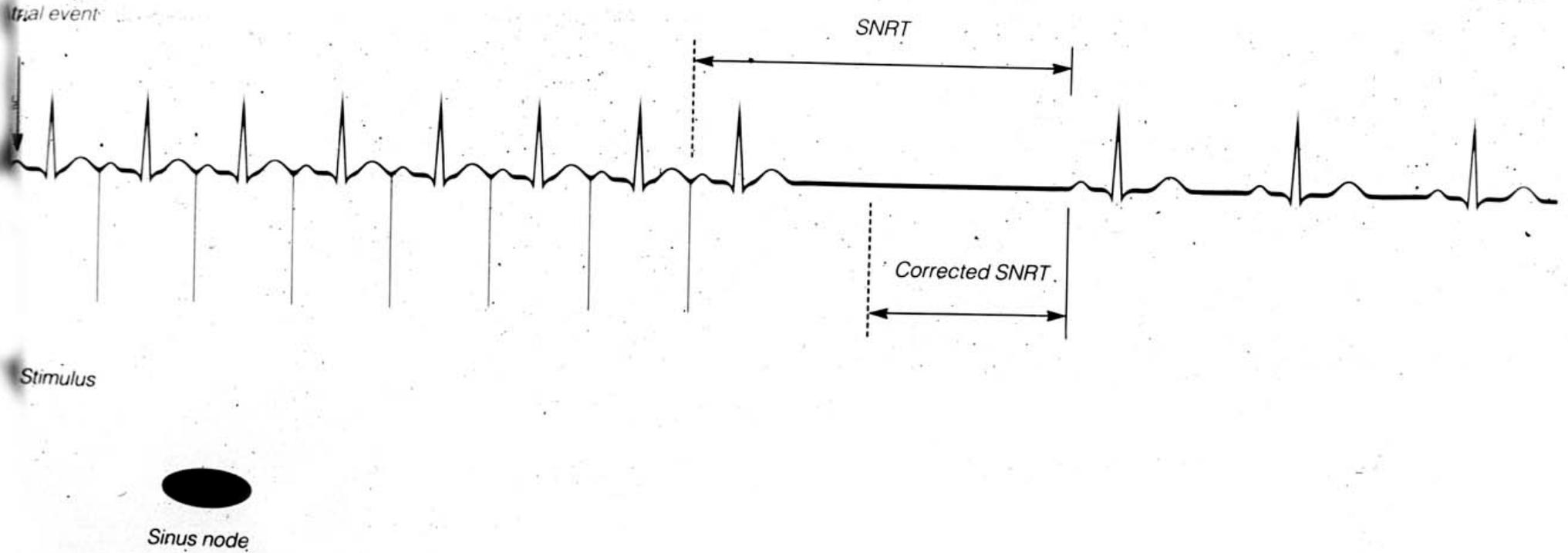


Fig. 11.4
Advanced SA block and third degree SA block

ECG from a 73-year-old female with episodes of dizziness and fainting during the previous month. During 2 weeks of telemetric ECG monitoring there were repeated episodes like the one shown above associated with dizziness and occasional fainting. The symptoms disappeared with the implantation of a pacemaker.

Overdrive suppression

Electrocardiogram, ECG



Neurocardiogenic vaso-vagal syndrome

TILT-UP test (Westminster Protocol, Angle 60°)

Types of syncope (VASIS classification)

- ➔ **Mixed**
- ➔ **Cardiodepressive**
- ➔ **Vasodepressive**

Positive result of the test: syncope or a symptomatic drop of the arterial pressure (near syncope) and/or significant bradycardia

Positive result for cardiodepressive type of syncope:

- ventricular asystole of 3 seconds or more or:**
- bradycardia less than 40 bpm for at least 10 seconds**

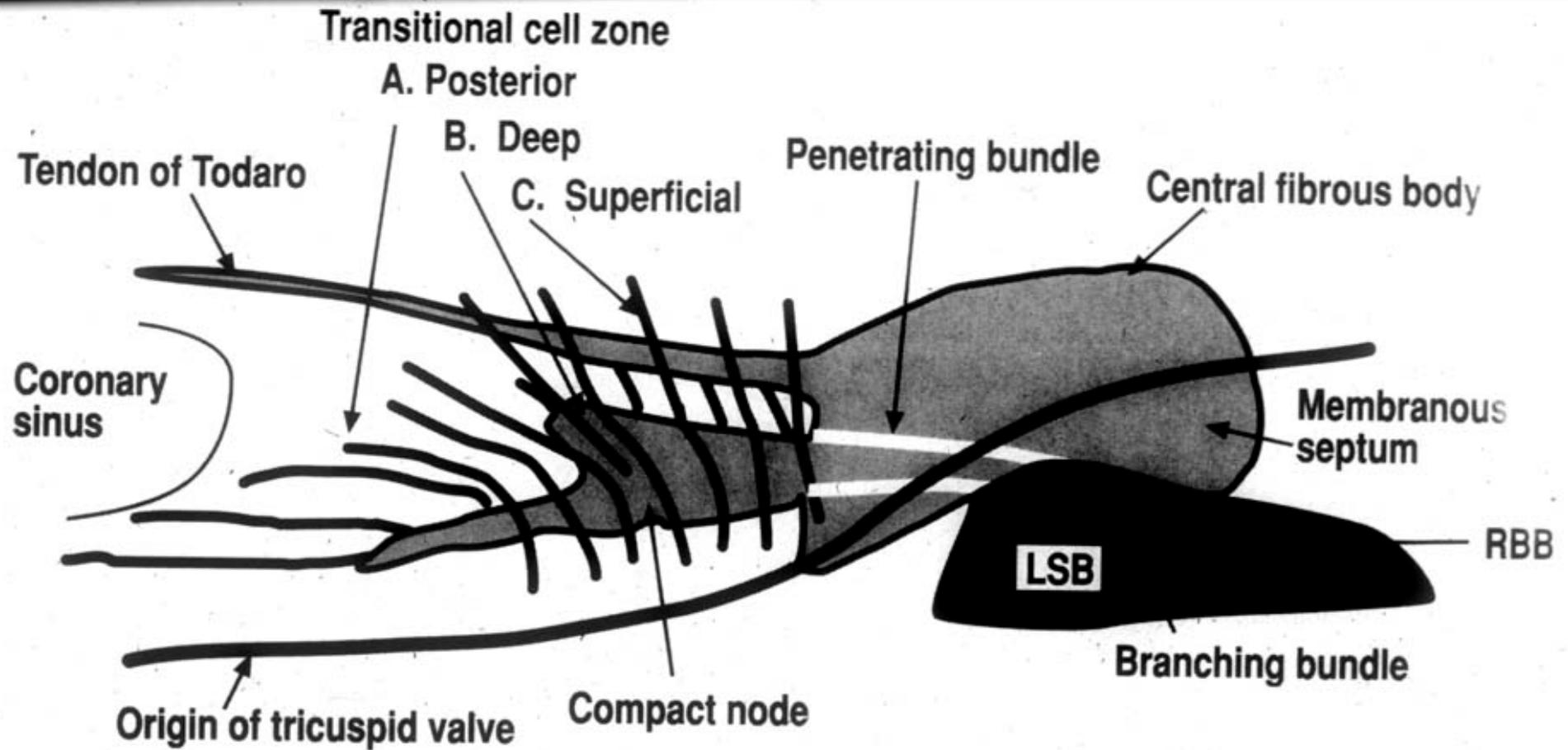


Figure 11.1. Anderson's anatomic concepts of the anatomy of the atrioventricular junction in 1975. The superficial transitional zones provide anterior and posterior inputs into the AV node. The common bundle penetrates the central fibrous body and branches anteriorly as the right bundle branch (RBB) and to the left as the left superior bundle (LSB). By targeting the compact node with a 4-mm-tip radiofrequency ablation catheter, conduction is interrupted between the AV node–His junction with subsequent junctional escape beats arising from the upper His bundle. Reproduced with permission from Anderson RH et al. (43) and Becker AE and Anderson RH (44).

Acute A-V block

1. Myocardial infarction
2. Myocarditis
 - rheumatic
 - viral
 - parasitic (Chagas disease)
3. Mechanical damage:
 - heart surgery
 - cardiac catheterization

Chronic A-V block

- ➔ Congenital
- ➔ Chronic fibrosis
 - coronary atherosclerosis
 - hypertension
 - diabetes
- ➔ Idiopathic
 - Lenegr'e disease
 - Lev's disease
- ➔ Chronic myocarditis
- ➔ Cardiomyopathy
- ➔ Degenerative and autoimmunological processes
- ➔ Progressive muscular dystrophy
- ➔ Emery-Dreifuss syndrome

Recognizing bradycardia

(site of damage within the conduction system)

1. Sinus node disease

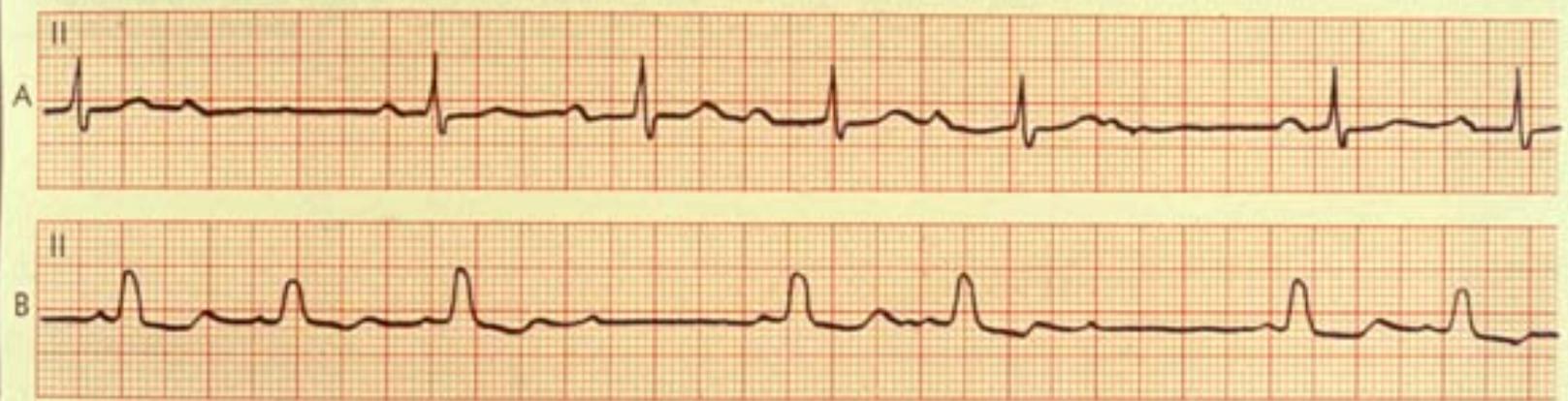
- disorders of impuls formation (body of the sinus node)
 - cardiac arrest, bradycardia
- disorders of sino-atrial conduction (perinodal tissue)
 - sino-atrial block

2. Disorders of atrio-ventricular and intraventricular conduction

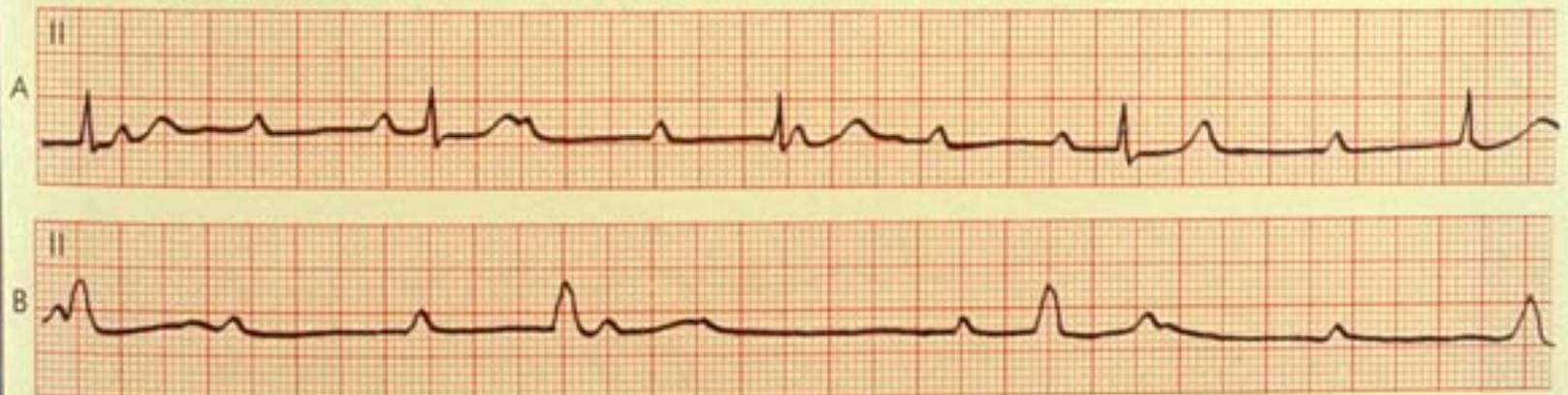
- A-V node
 - (Wenckebach type A-V block, MOBILZ I)
- Atrio-ventricular bundle (His bundle):
 - (MOBILZ II type A-V block)
- Bundle branches and fascicles:
 - bundle branch block
 - bifascicular block
 - trifascicular block (MOBILZ II type A-V block)



1 First degree AV block associated with (A) normal intraventricular conduction and (B) bundle branch block



2 Second degree AV block (A) Mobitz type I (5:4 conduction) associated with normal intraventricular conduction and (B) Mobitz type II with bundle branch block



3 Third degree AV block with (A) AV nodal escape rhythm and (B) ventricular escape rhythm

Treatment of acute bradycardia

Atropine 1 to 2 mg i.v. (bolus)

Isoprenaline

Dopamine

Dobutamine

Adrenaline

i.v. infusion in saline
(drop rate depending
on the effect)

Cardiac pacing

→ transthoracic

→ intracardiac

Indications for pervenous temporary pacing in acute myocardial infarction

- sinus bradycardia and intermittent sinus arrest not responding to atropine
- A-V block of 2-nd degree
- complete A-V block
- acute bifascicular block (RBBB + LAH,
RBBB + LPH,
LBBB + LAD)
- atrial fibrillation with slow ventricular response
(less than 50 bpm.)

Temporary electrical pacing of the heart in the treatment of an acute bradycardia and/or cardiac arrest

- Intravenous route (subclavian vein, cephalic vein)
- Transthoracic pacing (easy to arrange)
- Transesophageal pacing (left atrial or left ventricular)

Remember:

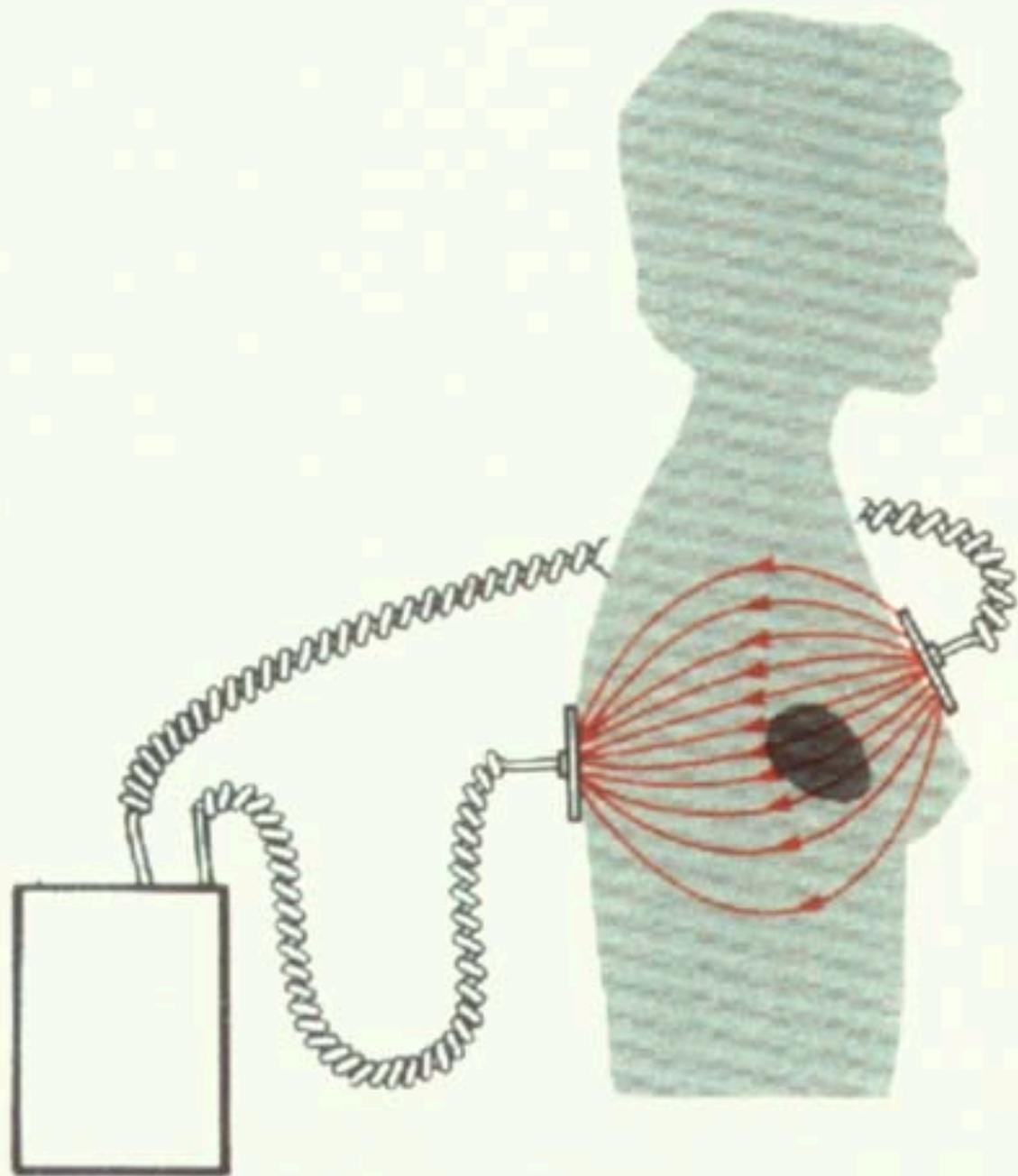
If you use any type of cardiac pacing in patient with extreme bradycardia or cardiac arrest, electrical stimulation should be effective hemodynamically, that is the pulse has to be palpable in great arteries.

In case of electrical depolarization of the ventricle not accompanied by mechanical function, the cardiac massage should be continued and electrical stimulation temporarily stopped or abandoned.

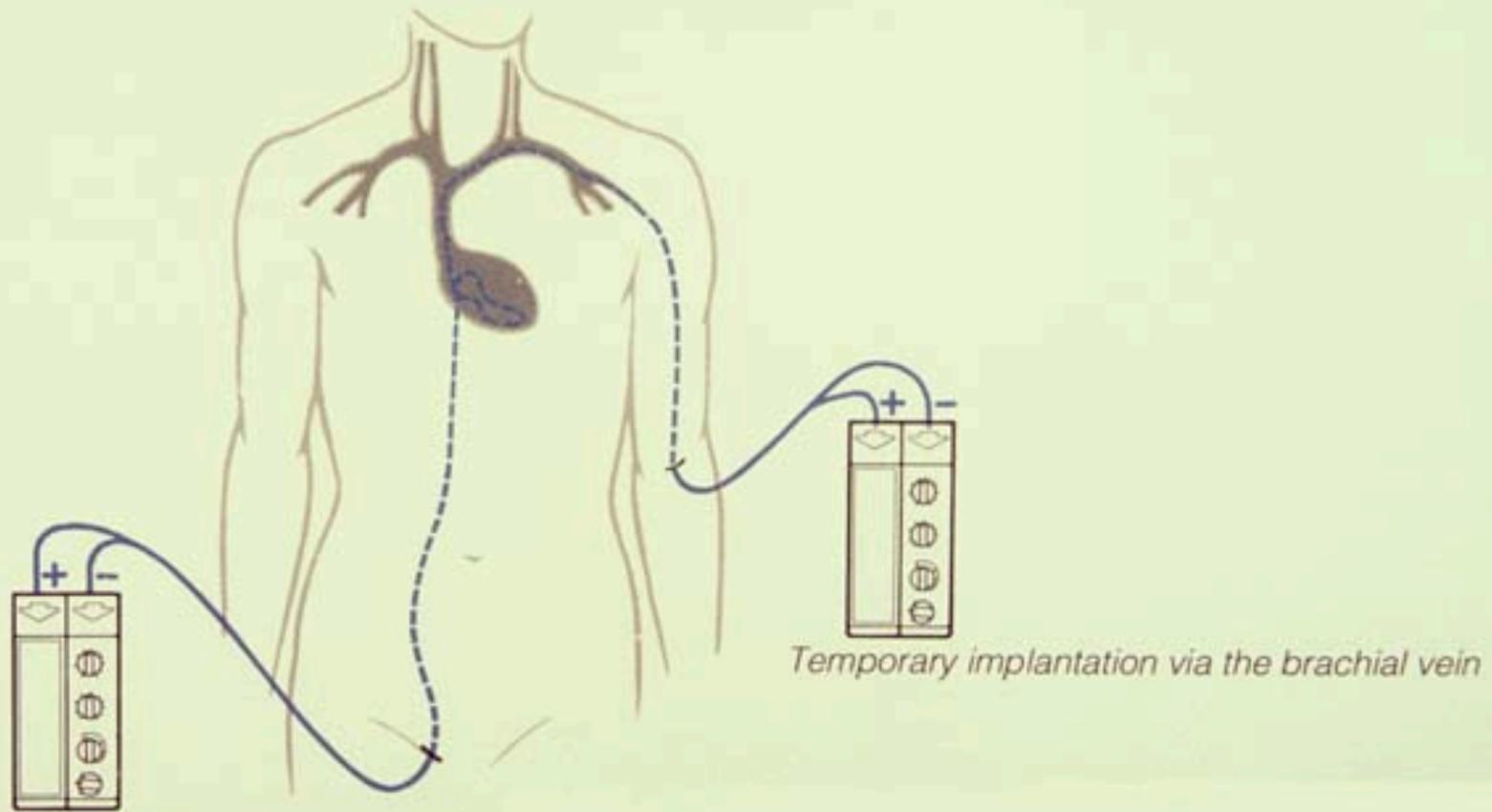
Preventive temporary stand-by pacing

Examples:

1. Electrical cardioversion of atrial fibrillation
2. Acute surgical noncardiac procedures in patients with bradycardia
3. Replacement of a pacemaker in pacemaker-dependent patients
4. Radiofrequency ablation of junctional structures in patients with nodal tachycardia or with atrial fibrillation with rapid ventricular response (modification of atrio-ventricular junction)



Temporary electrodes



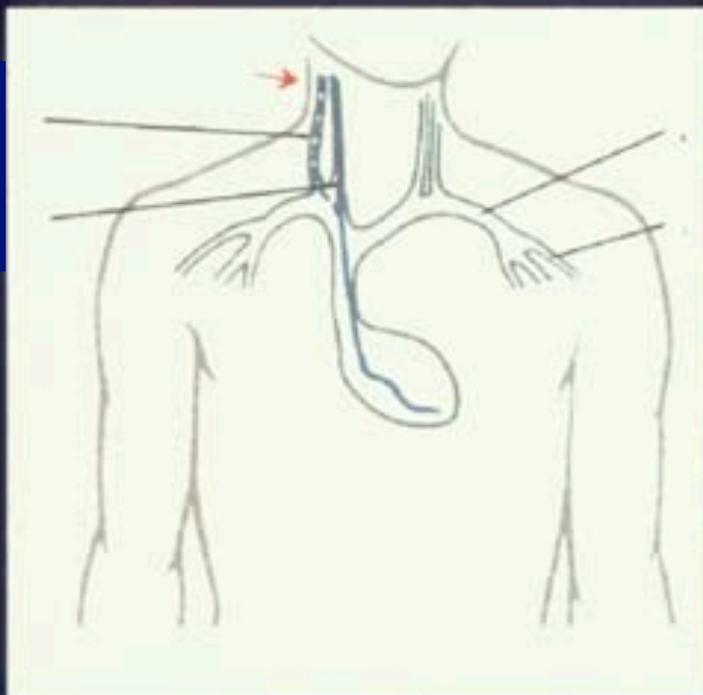
*Temporary implantation
via the femoral vein*

Temporary implantation via the brachial vein

Venous routes for introduction of permanent pacing electrodes

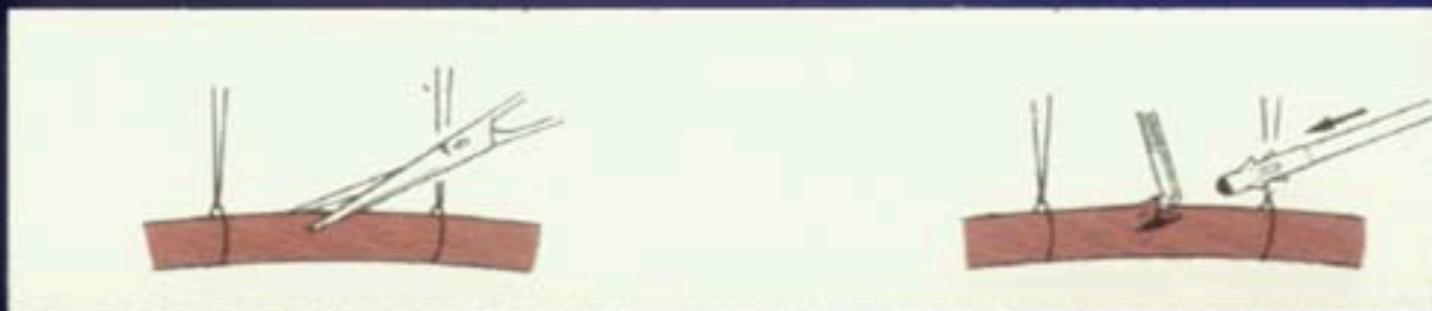
External jugular vein

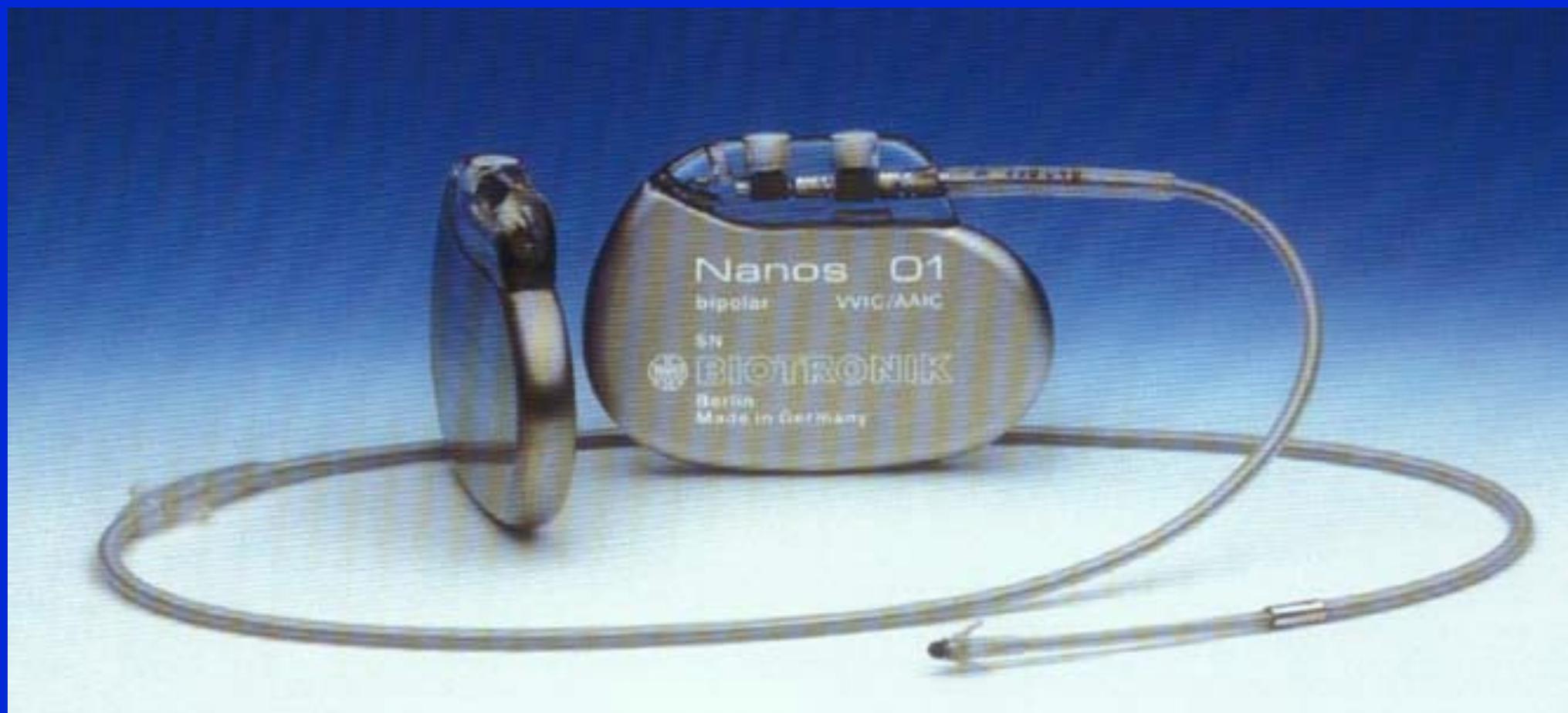
Internal jugular vein



Subclavian vein

Cephalic vein





Nanos 01

bipolar VVI/AIC

SN



BIOTRONIK

Berlin

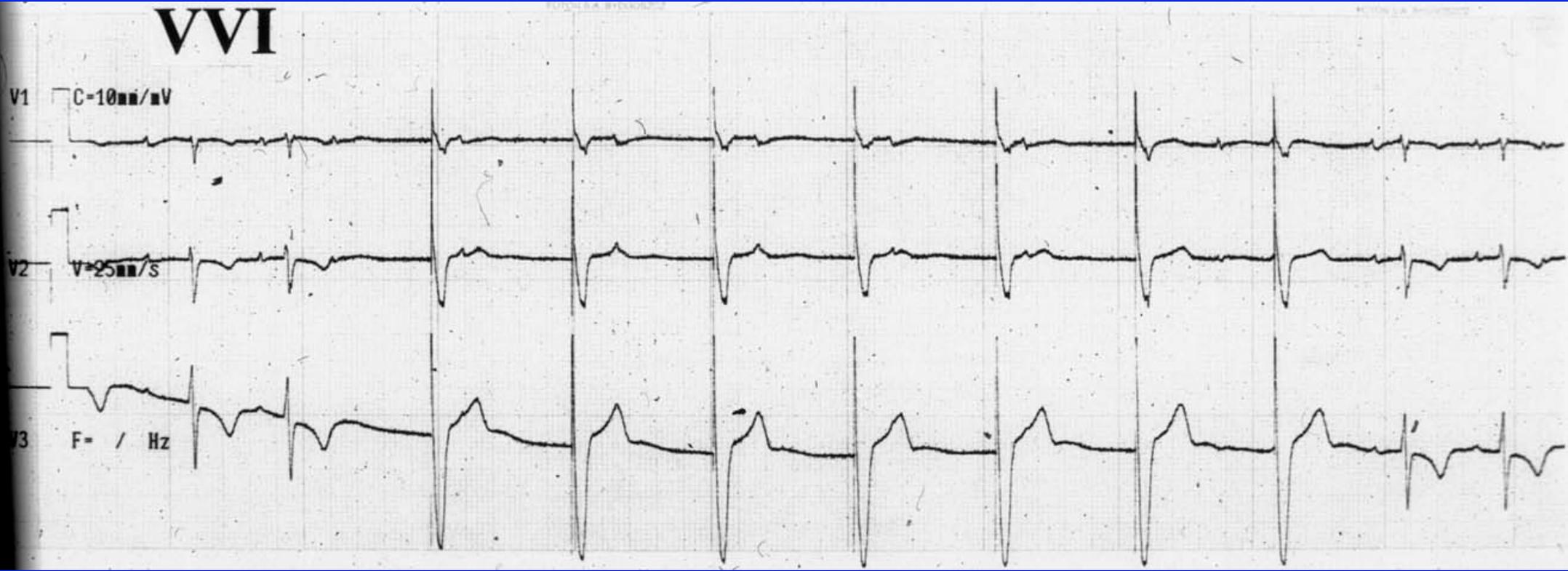
Made in Germany

VVI

V1 C=10mm/mV

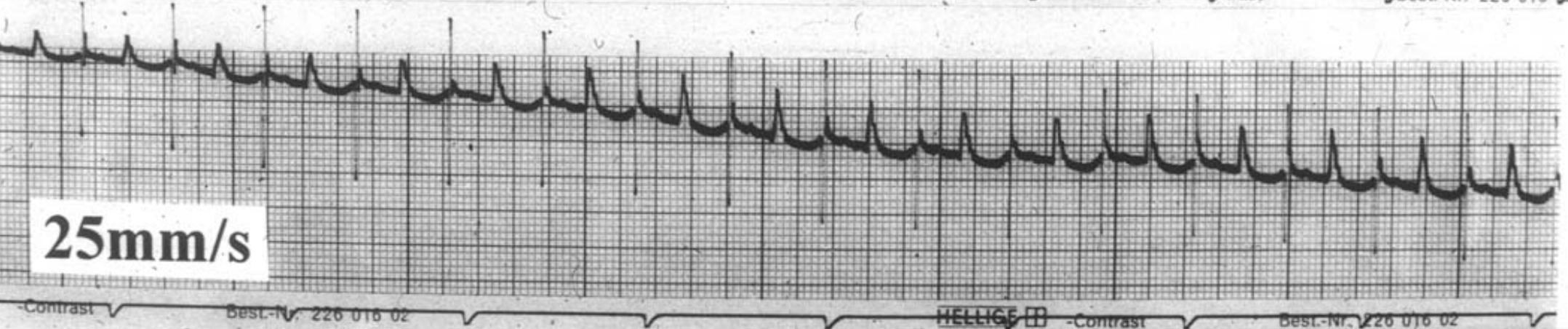
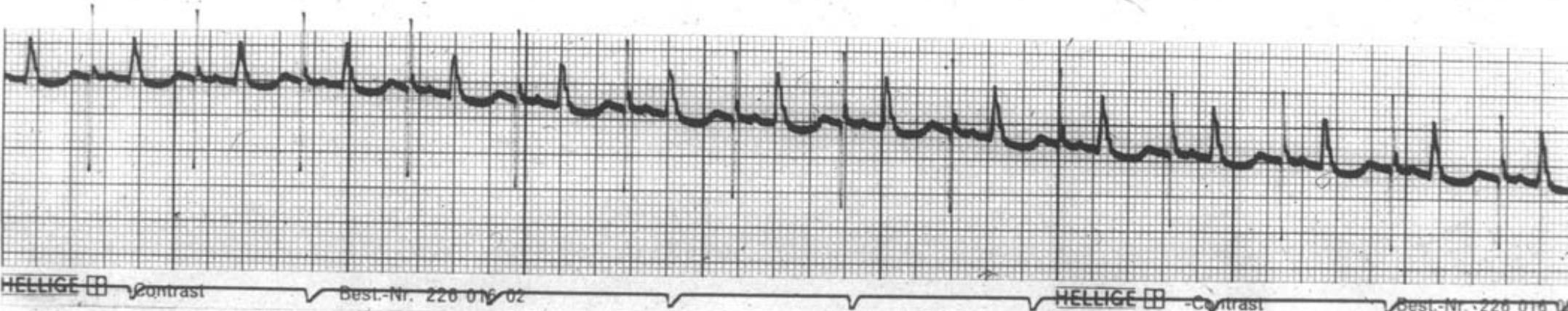
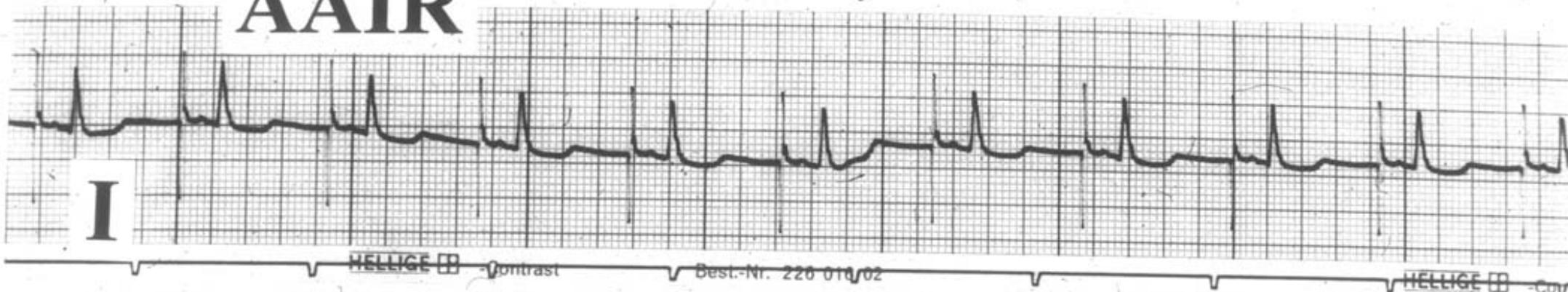
V2 V=25mm/s

V3 F= / Hz



AAIR

I



25mm/s



Biplos 06
DDD/CP

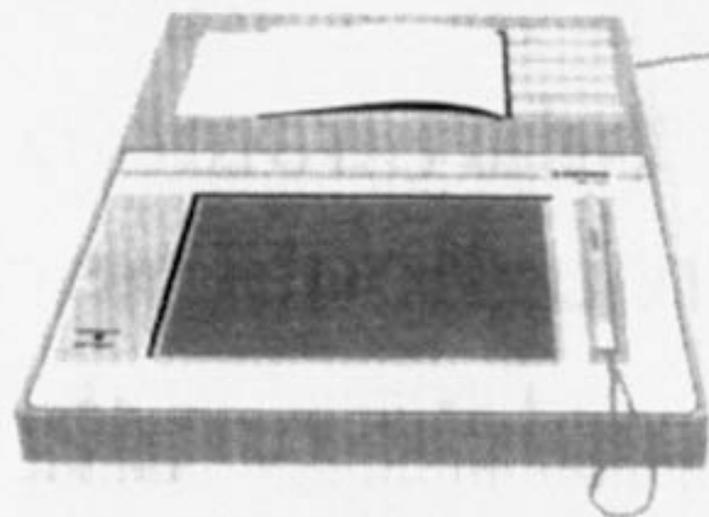


unipolar/bipolar
1.75



BISTRONIK

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Made in Germany



Programmer
PMS 1000

Pacemaker

