Chronic forms of coronary artery disease

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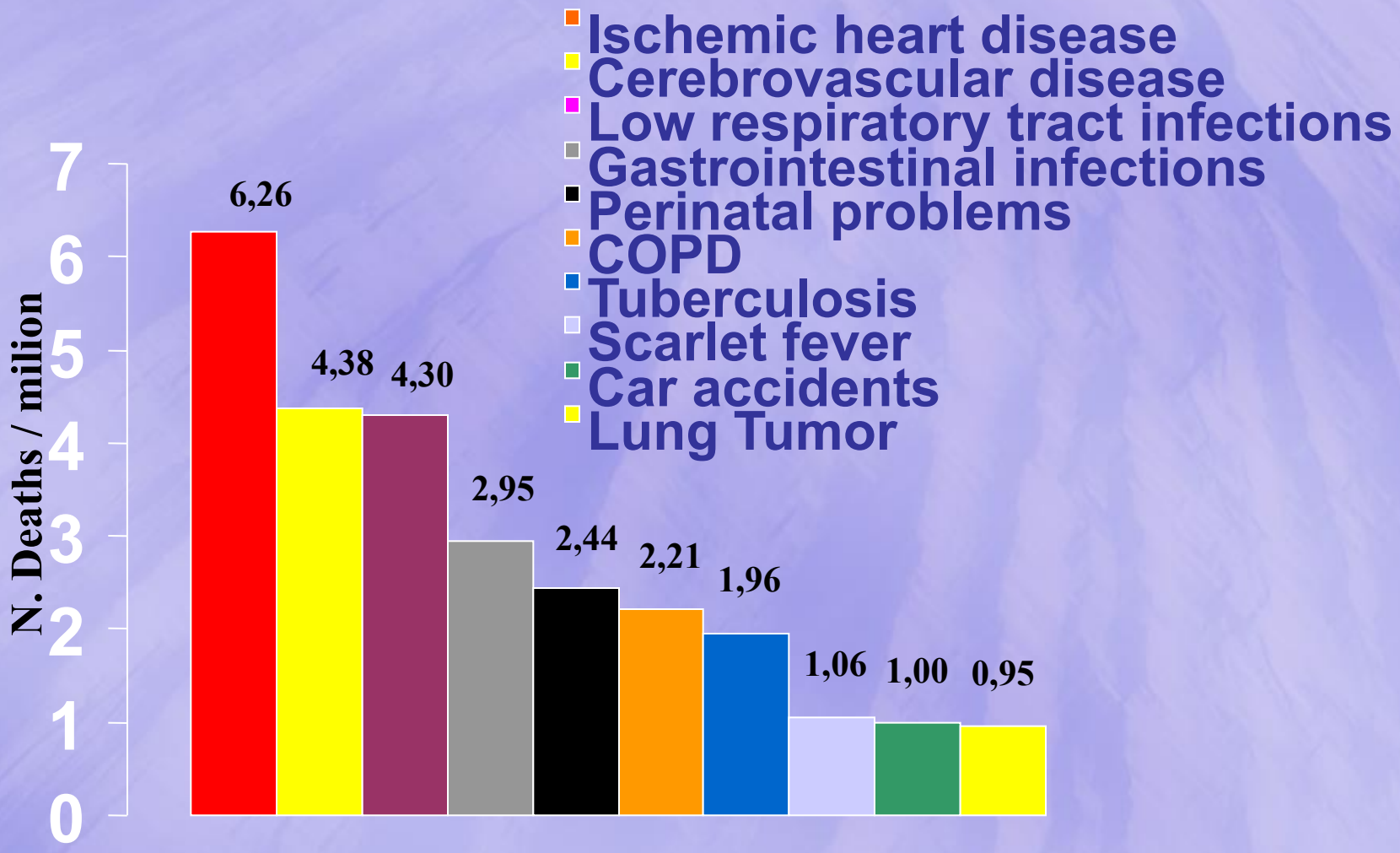
CAD is the first cause of death



Murray & Lopez. Lancet. 1997;349:1269-1276

Pathophysiology

Vascular resistance

(metabolic control, humoral and neural factors)

Coronary blood flow

(duration of diastole / pressure gradient)

Oxygen demand

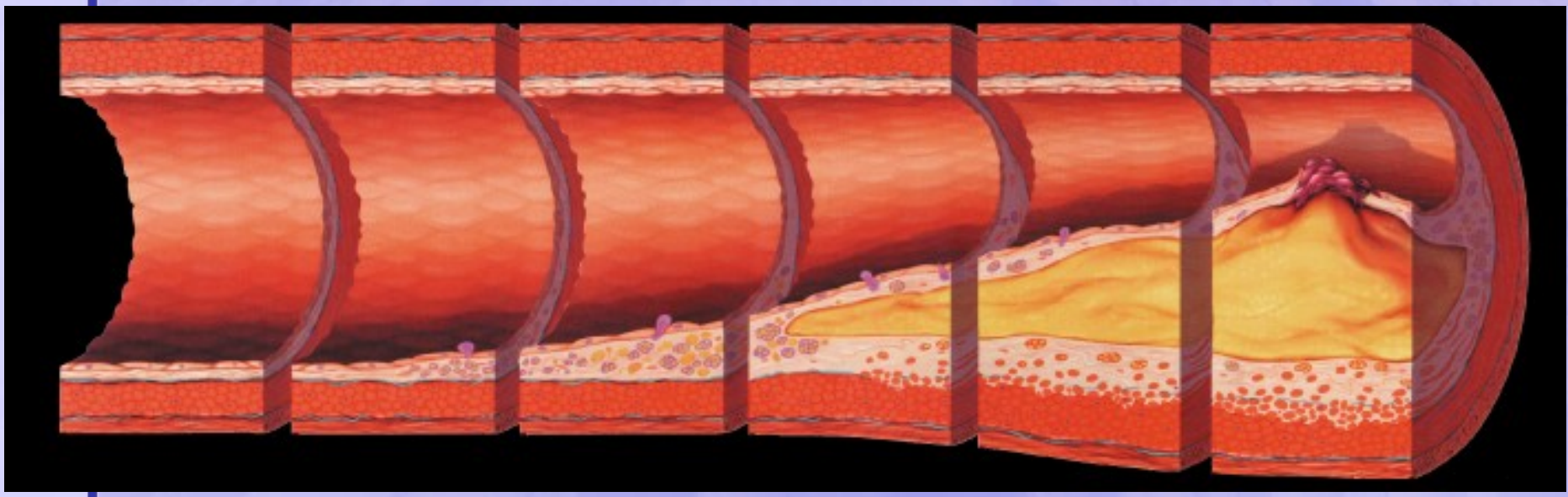
Oxyge

- **Heart rate**
- **Contractility**
- **Systolic wall stress**

Timeline

Foam Cells

Complicated Lesion/ Rupture



Endothelial Dysfunction

From First Decade	From Third Decade	From Fourth Decade

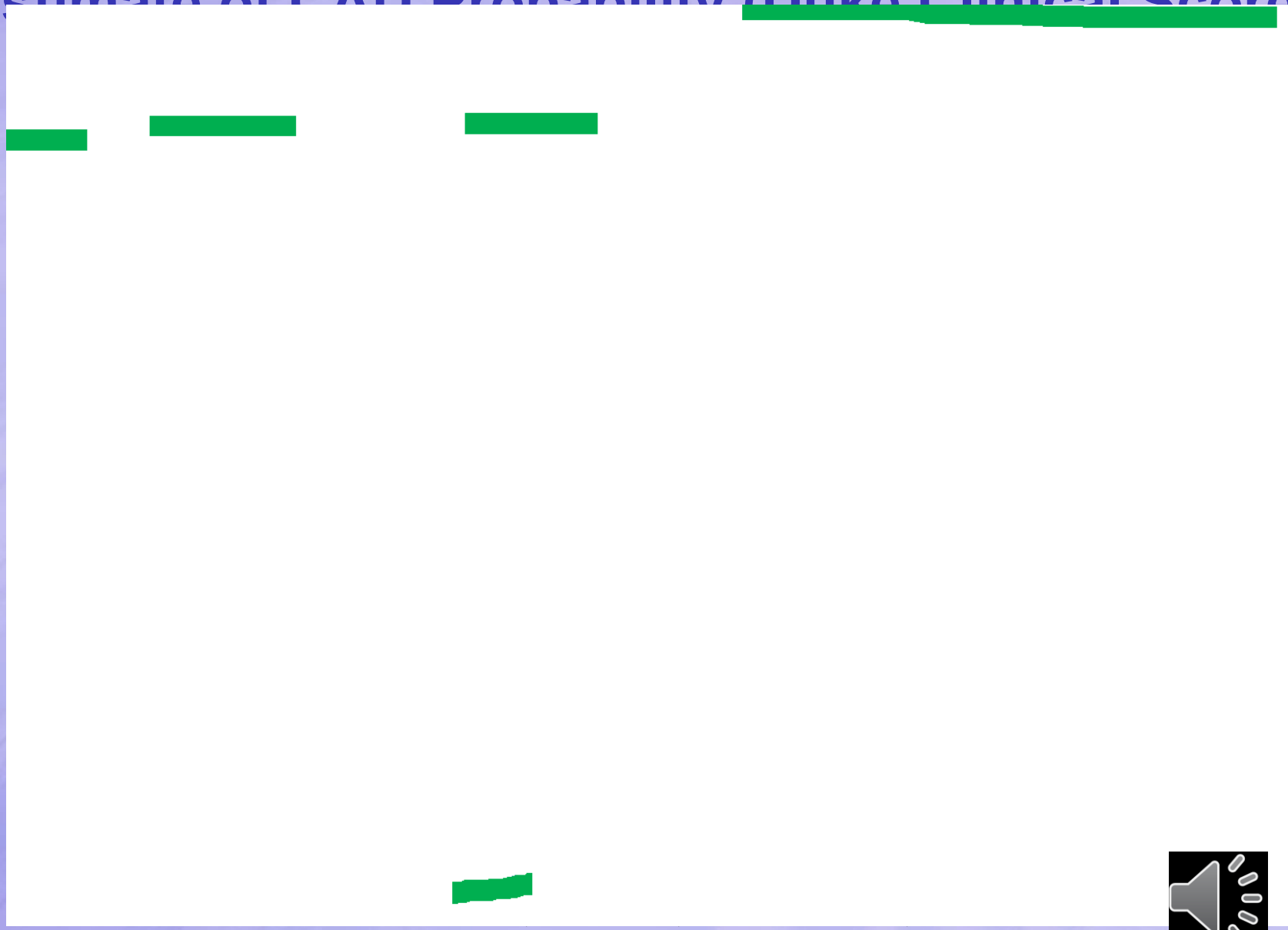
Adapted from Pepine CJ. *Am J Cardiol.* 1998;82(suppl 104).

Diagnosis

- History of patient

- Risk assessment (low, probable, high)

Estimate of CAD Probability (Duke Clinical Score)



Ann Intern Med 1993;118:81-90

Estimate of CAD Probability

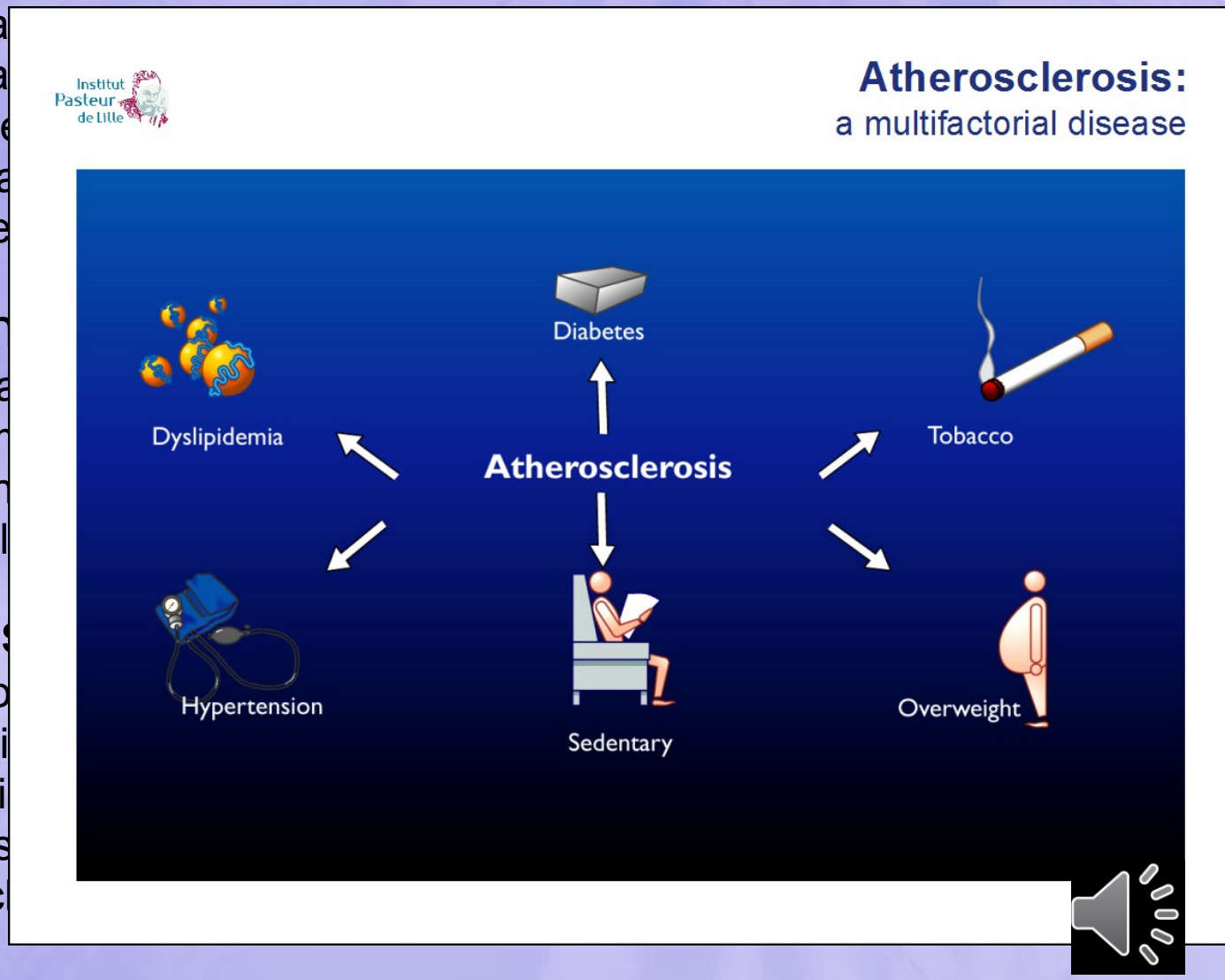
- a [redacted] has
- a 94 % likelihood of having significant CAD

- a 32-year-old woman with nonanginal chest pain has
- a 1 % chance of CAD

N Engl J Med 1979;300:1350-8

Risk factors

- Major independent risk factors
  - Adva
  - Toba
  - Diabe
  - Eleva
  - Hype
- Condition
  - Eleva
  - Inflar
  - Proth
  - Smal
- Predispos
  - Abdo
  - Ethni
  - Fami
  - Obes
  - Psyc



Angina pectoris

- Typical angina (definite)
  - 1. [redacted] aracteristic quality ar[redacted]
  - 2. [redacted] ess and
  - 3. [redacted]
- Atypi[redacted]
  - M[redacted]
- Nonc[redacted] fort in the [redacted] as caused by [redacted] to the heart muscle.
  - Me[redacted]

J Am Coll Cardiol. 1983;1:574, Letter

Pain - descriptio

(1)

(2)

(3)

(4)

(5)

the pain

Grading of Angina of Effort by the Canadian Cardiovascular Society

I. "… angina," such as trenuous or rapid or

II. "ing or climbing stairs bing after meals, or in or only during the few 2 blocks on the level ry stairs at a normal

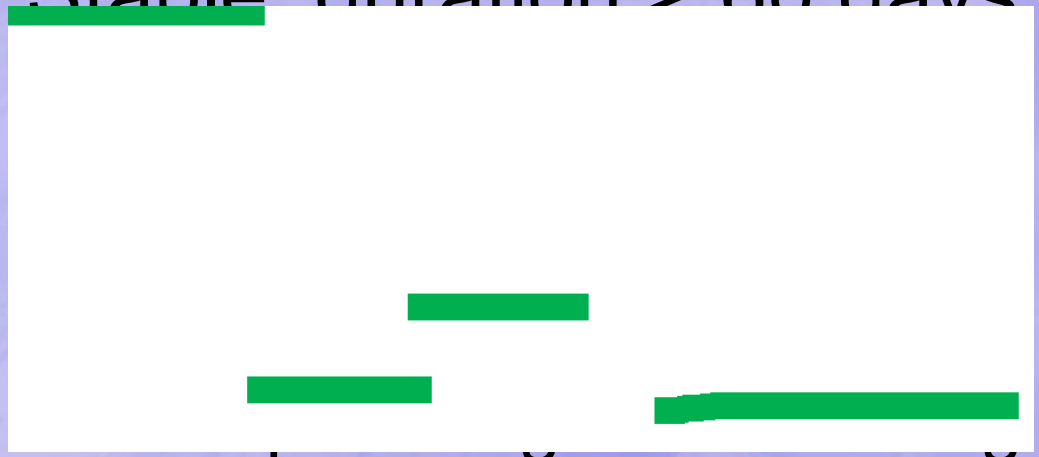
III. "vity." Walking one to two of stairs in normal

IV. "ithout discomfort -- anginal syndrome *may be* present at rest."

Circulation 1976; 54:522-523

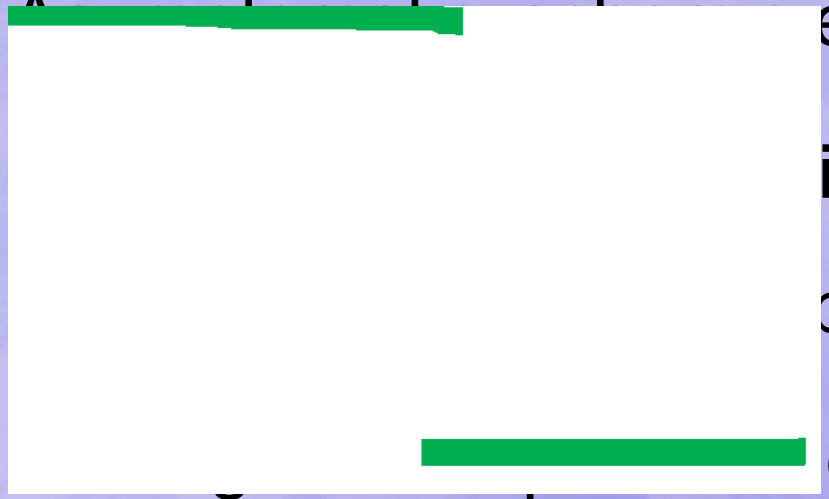
Stable / Unstable angina

- Stable: duration > 60 days
- na
  - in severity
    - the acute coronary syndromes of unstable angina and non–ST-segment elevation myocardial infarction were linked
    - Now. ACUTE CORONARY SYNDROME



Silent ischemia

- episodes
- imates 40 percent in
- ble angina
- on ECG monitoring
- Pathophysiology of Silent Ischemia: neuropathy (diabetic patients) or less severe ischemia?



Diagnosis – tests I.

- Resting 12-lead ECG (normal in 50% pts)
  - 
- Ech
  -
  -

ID: 391206 Examined: 05/01/06 09:22

Judge < - >

<< No Diagnosis >>

Name: stp QIMDS

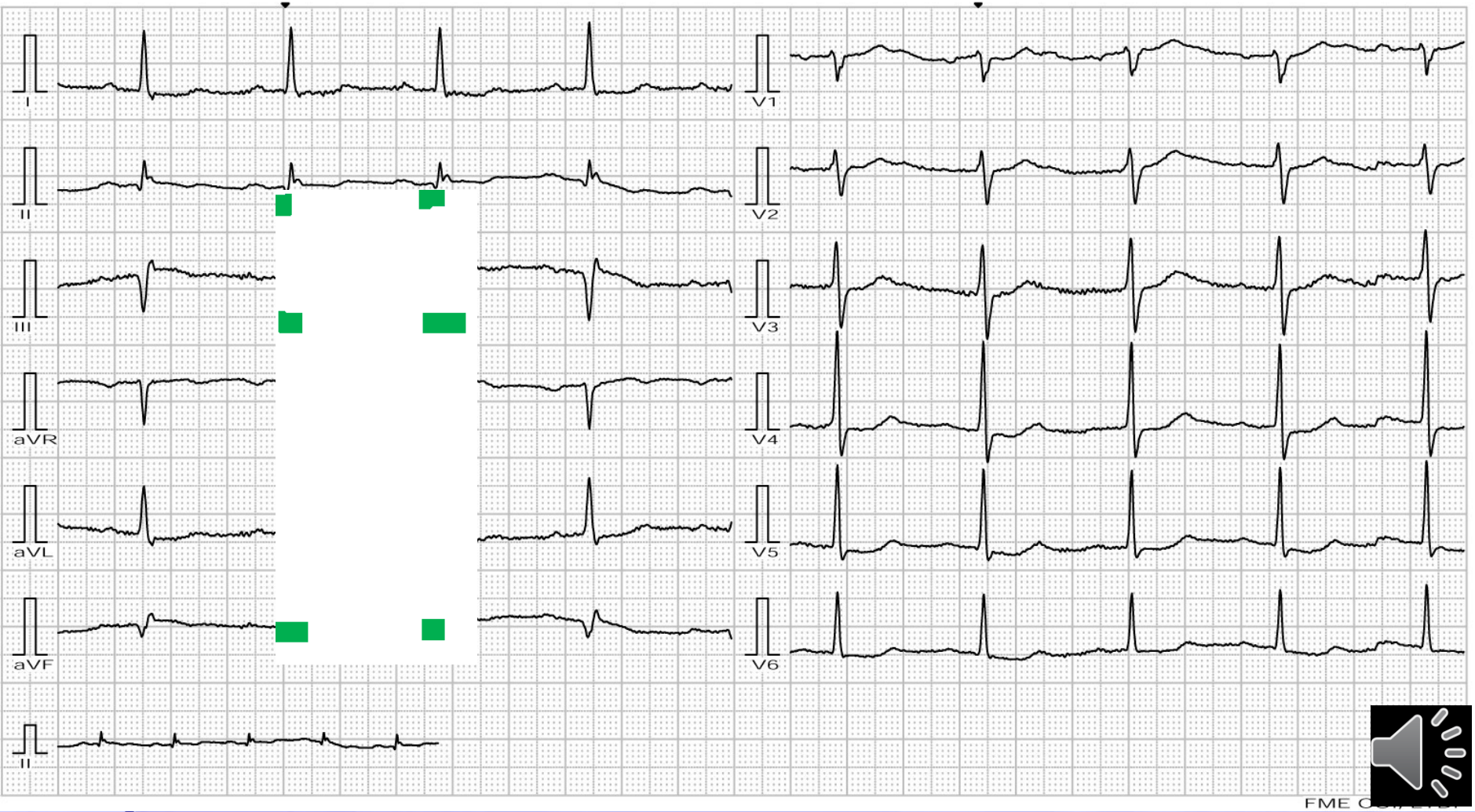
HR: 57 BPM Axis: -11 <

QRS: 93 ms QTc: 470

PQ: 267 ms RV5+SV1: 18.8mm

Comments:

M.D.



ID: 470612 Examined: 05/01/27 16:20

Judge < - >

<< No Diagnosis >>

Name: QS AL

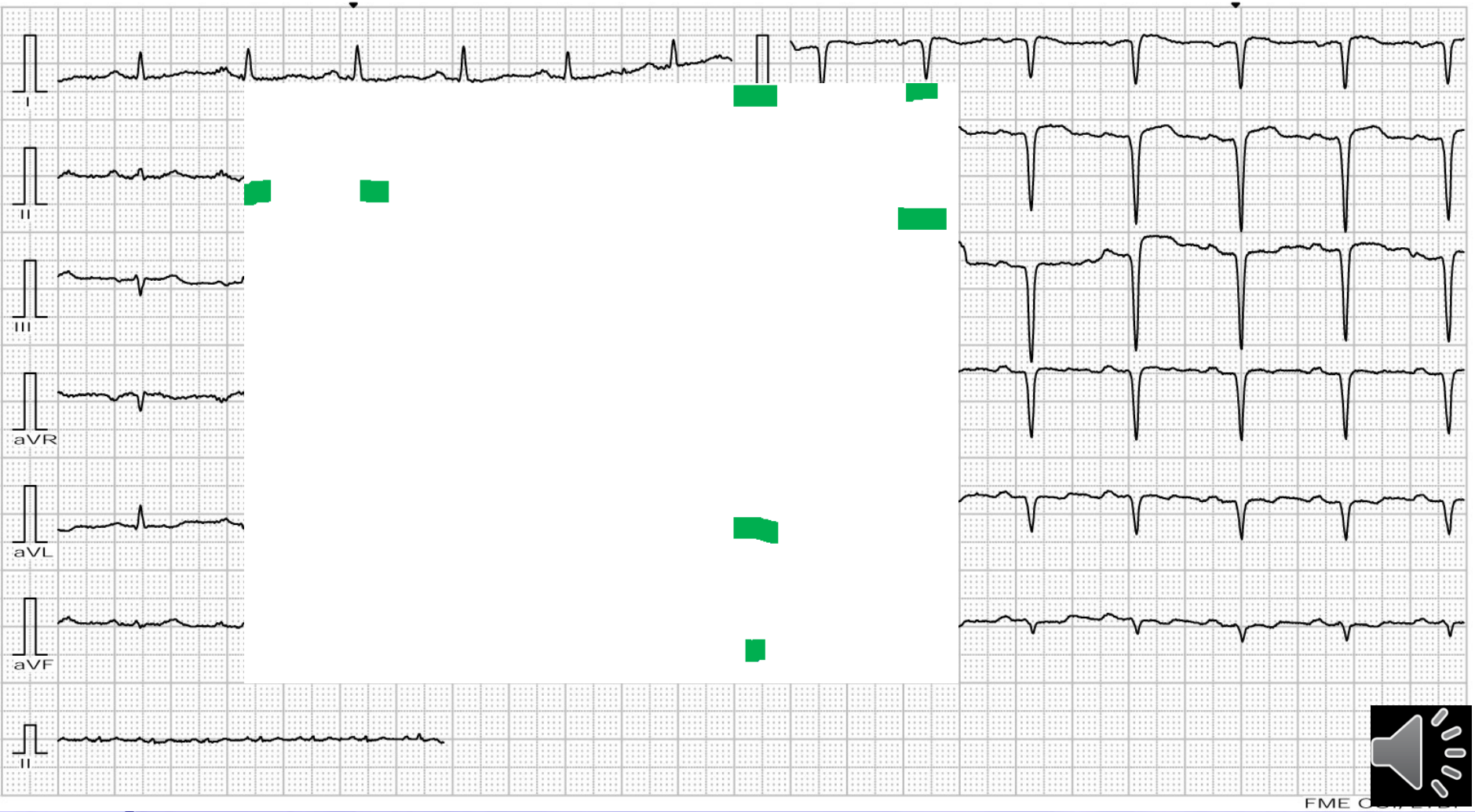
HR: 80 BPM Axis: -6 <

QRS: 80 ms QTc: 400

PQ: 203 ms RV5+SV1: 8.3mm

Comments:

M.D.



ID: 440502 Examined: 05/01/13 10:01

Judge < - >

<< No Diagnosis >>

Name: LBBB 2

HR: 65 BPM Axis: -13 <

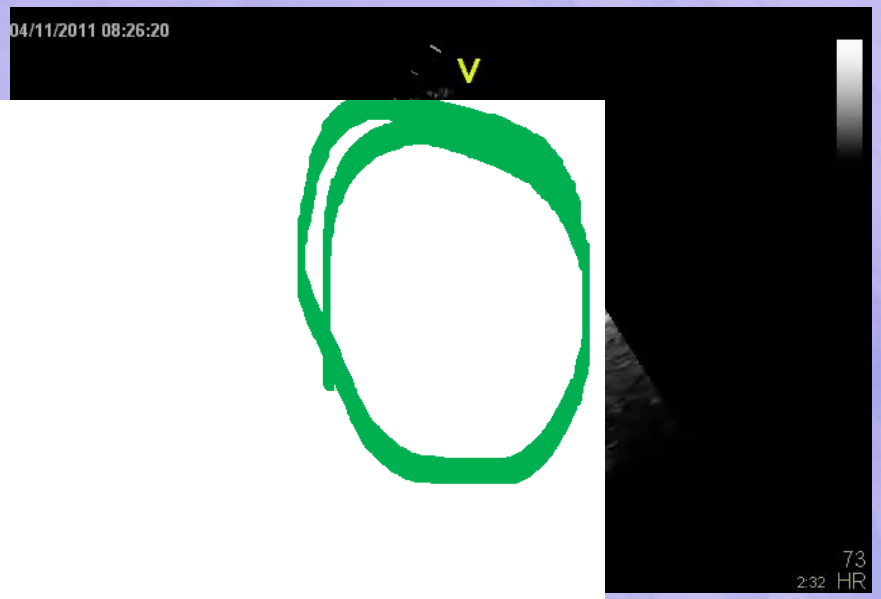
QRS: 137 ms QTc: 470

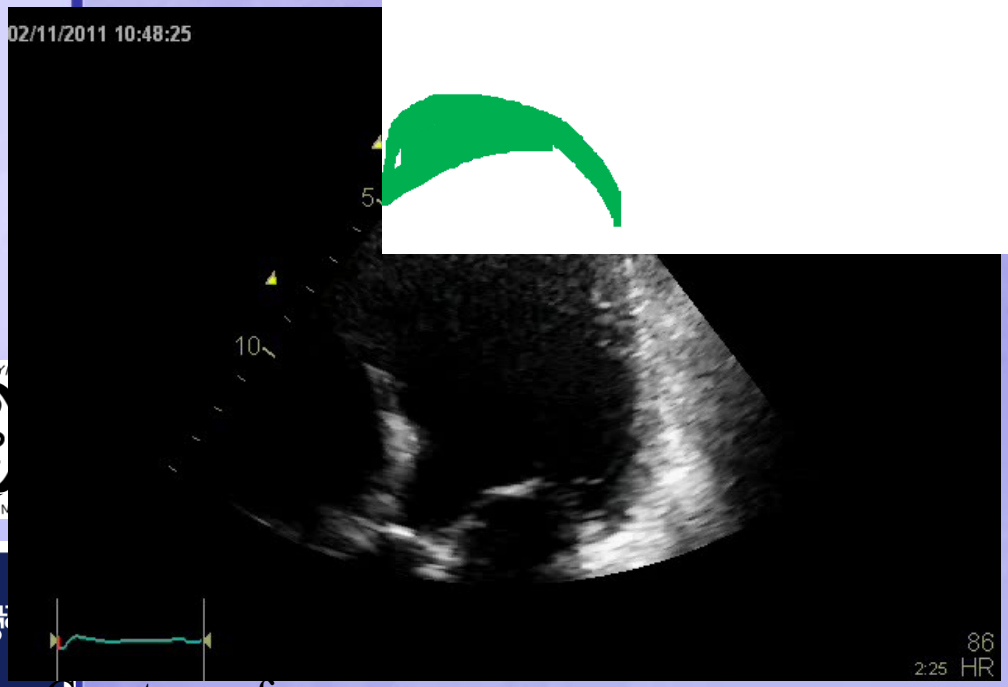
PQ: 187 ms RV6+SV1: 30.7mm

Comments:

M.D.

Echocardiography – anterior wall

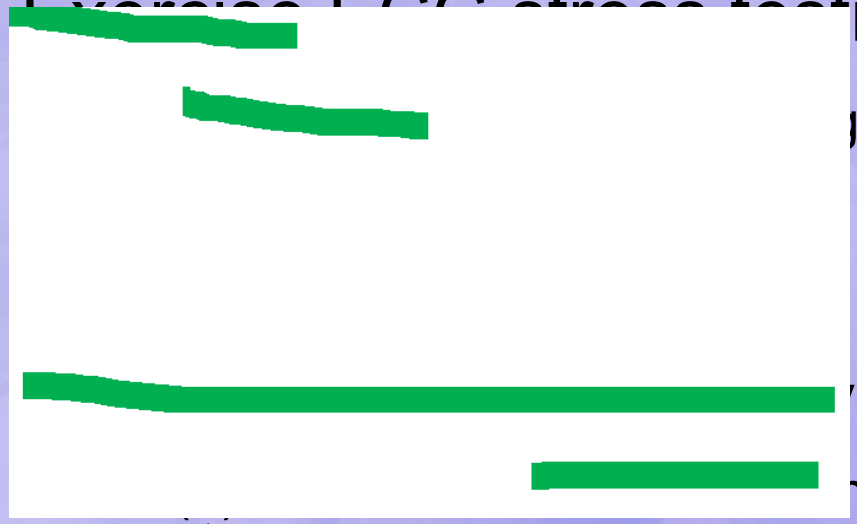




Courtesy of:
MUDr. Jan Maňoušek

Diagnosis – tests II

- Exercise ECG stress testing ing
  - grip
- - dobutamine
  - n one or more LV segments with stress
    - (2) diminution in systolic wall thickening in one or more segments during stress, and
    - (3) compensatory hyperkinesis in complementary (nonischemic) wall segments
- Myocardial Perfusion Imaging
  - thallium -201 (201Tl); technetium-99m (99mTc)
  - single-photon emission computed tomography (SPECT)

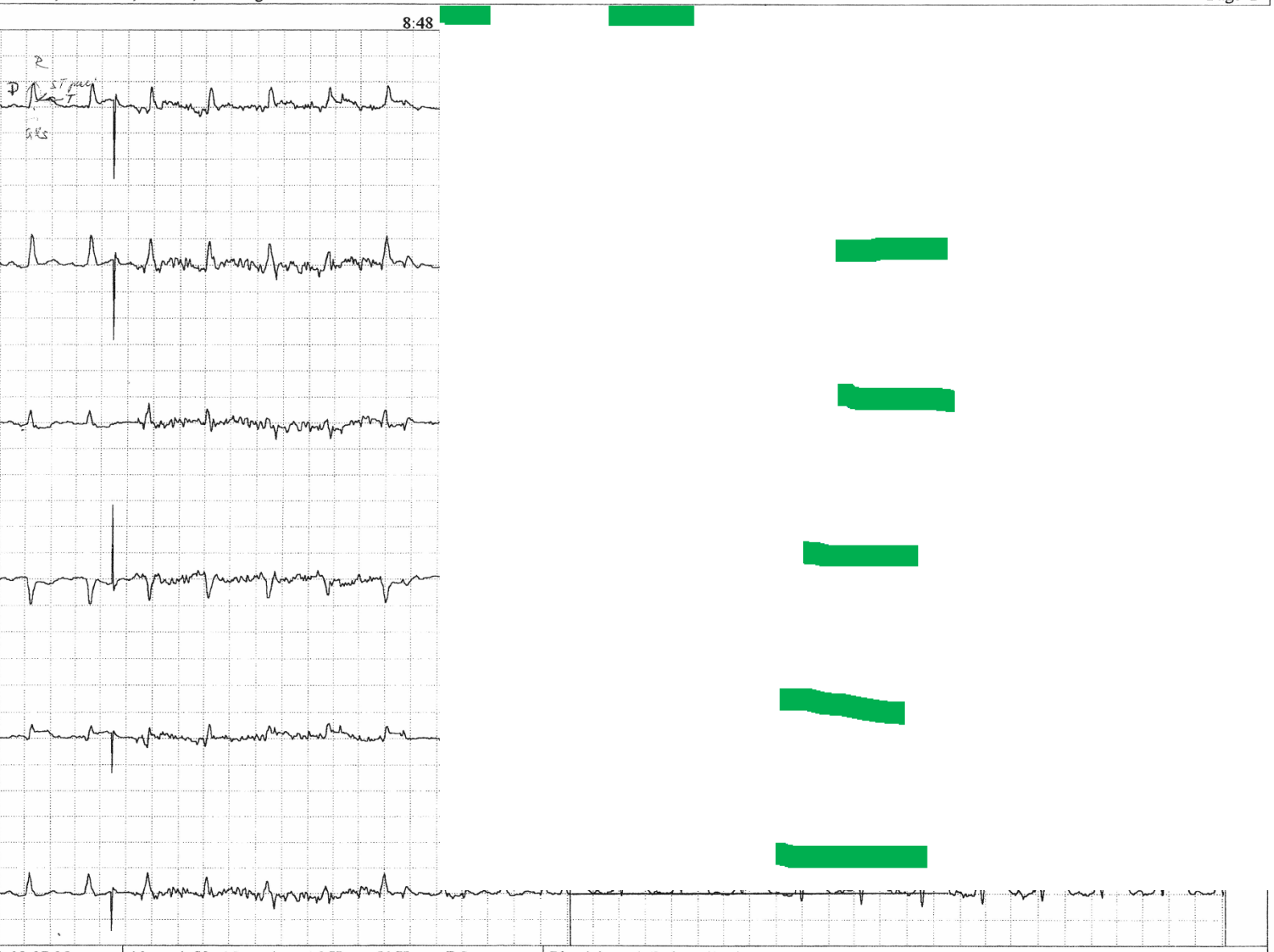


Karel Králík
23.04.1947 (59 y.)
Male, Caucasian, 178 cm, 110.0 kg

EXERCISE TEST / Stored ECG
Patient ID 470423/500

HELLIGE CardioSoft V2.51

Page 2



09:07:25 | 10 mm/mV 25 mm/s 35 Hz 50 Hz ADS | Physician: dr.Dokoupilová | User: FN Brno-Bohunice

E CardioSoft V2.51

Page 1

Name: Jan Burda

Jan Burda
e of Birth: 01.01.1948 (57 y.)
Male, 174 cm, 83.0 kg

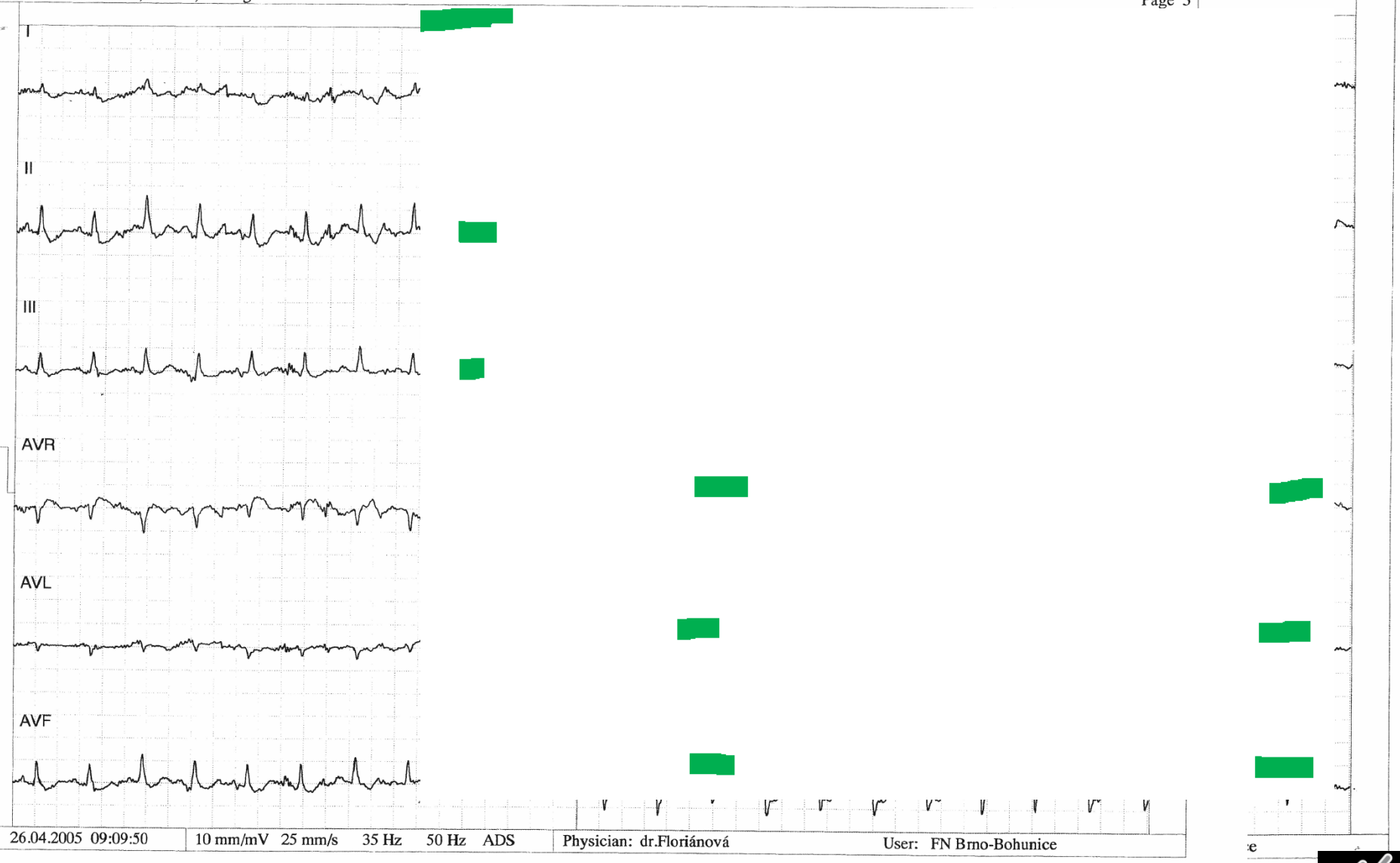
EXERCISE TEST / Stored ECG
Patient ID 480101/440

HELLIGE CardioSoft V2.51

Page 3

EXERCISE TEST / Stored ECG
HELLIGE CardioSoft V2.51

Page 1



26.04.2005 09:09:50 | 10 mm/mV 25 mm/s 35 Hz 50 Hz ADS | Physician: dr.Floriánová | User: FN Brno-Bohunice

Comparison of Stress Tests

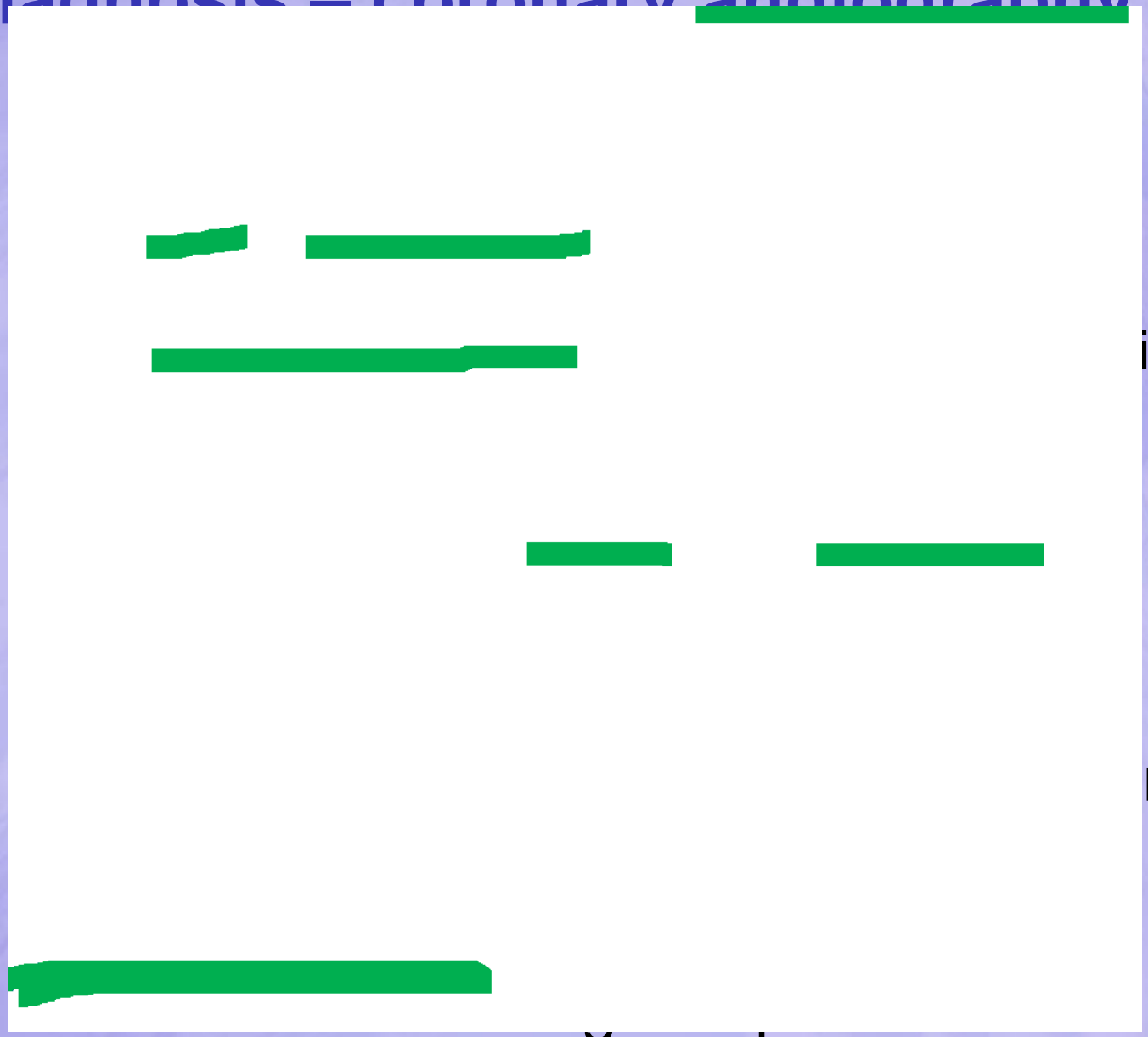
- **meta-analysis on 44 articles (published between 1990 and 1997)**

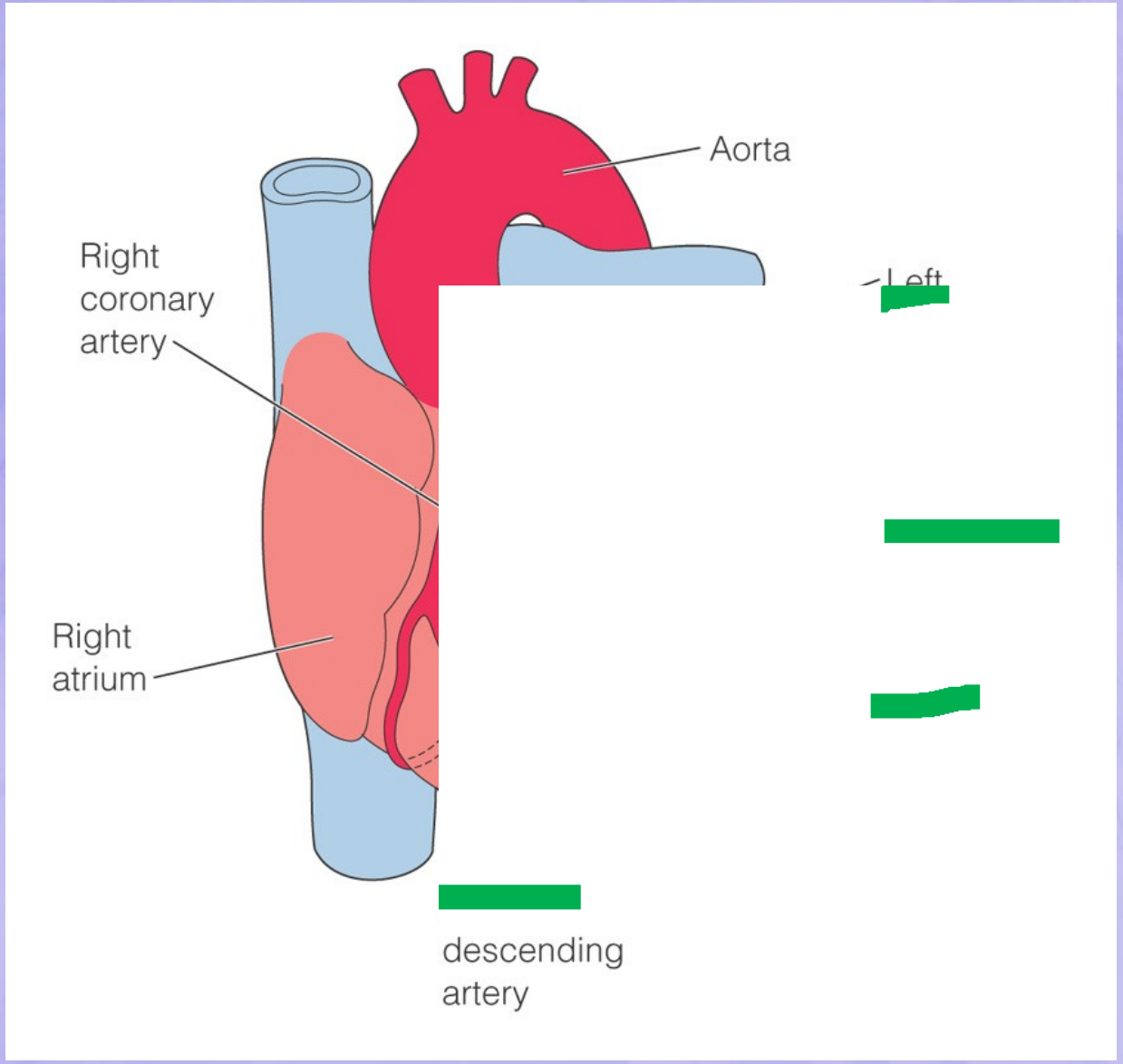
	Sensitivity	Specificity
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Scintigraphy	**87%**	**64%**

exercise echocardiography had significantly better discriminatory power than exercise myocardial perfusion imaging

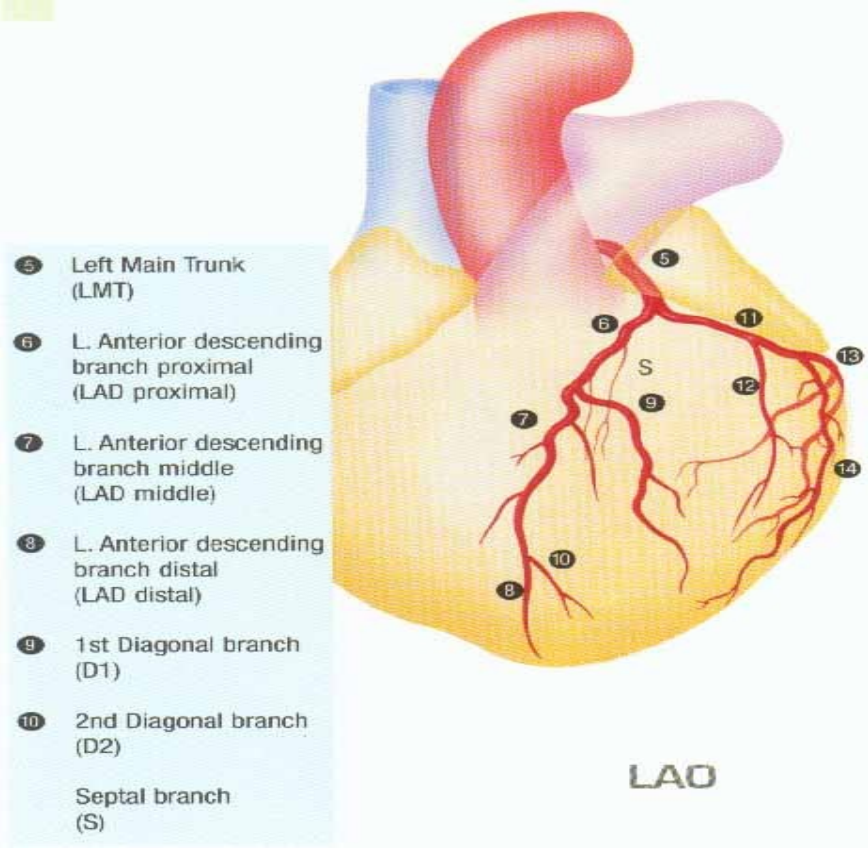
JAMA 1998;280:913-20

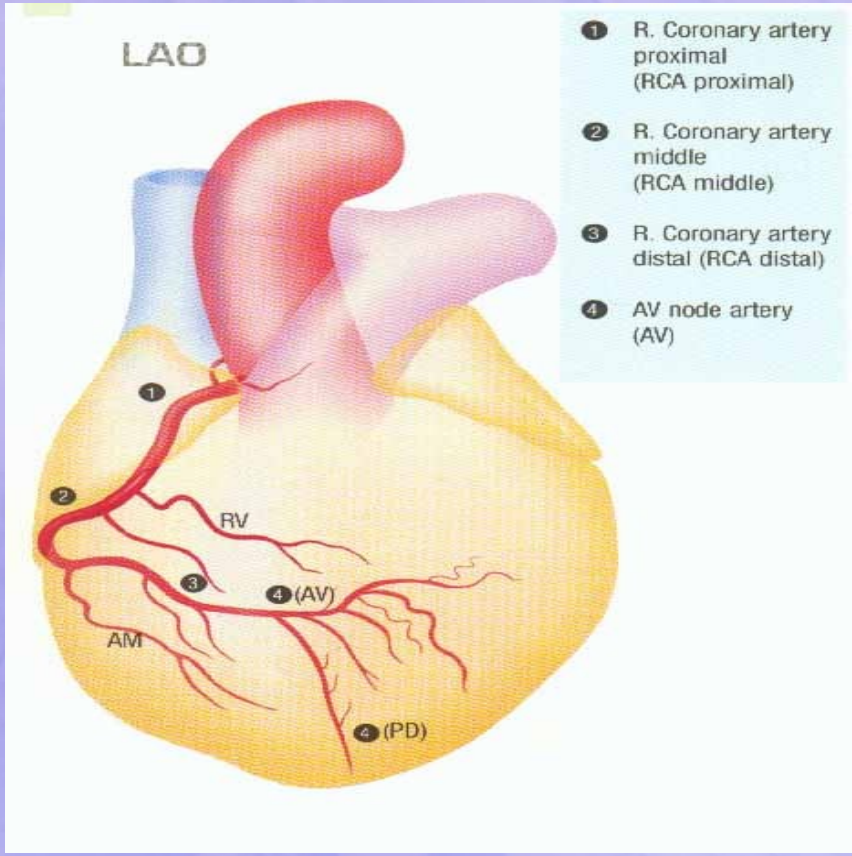
Diagnosis – coronary angiography

- 
- iliar
- n whom


Aorta
Right coronary artery
Right atrium
descending artery

Coronary Angiography





Chronic Stable Angina
Treatment Objectives

- To reduce the risk of mortality and morbid events
- To reduce symptoms
  - anginal chest pain or exertional dyspnea
  - palpitations or syncope
  - fatigue, edema or orthopnea

Treatment

- Non – pharmacological
  - Nitroglycerin / nitrates
  - (Calcium – antagonist)

Indications of revascularisation

1. To be candidate for revascularization procedure, one [redacted] of ischemia.

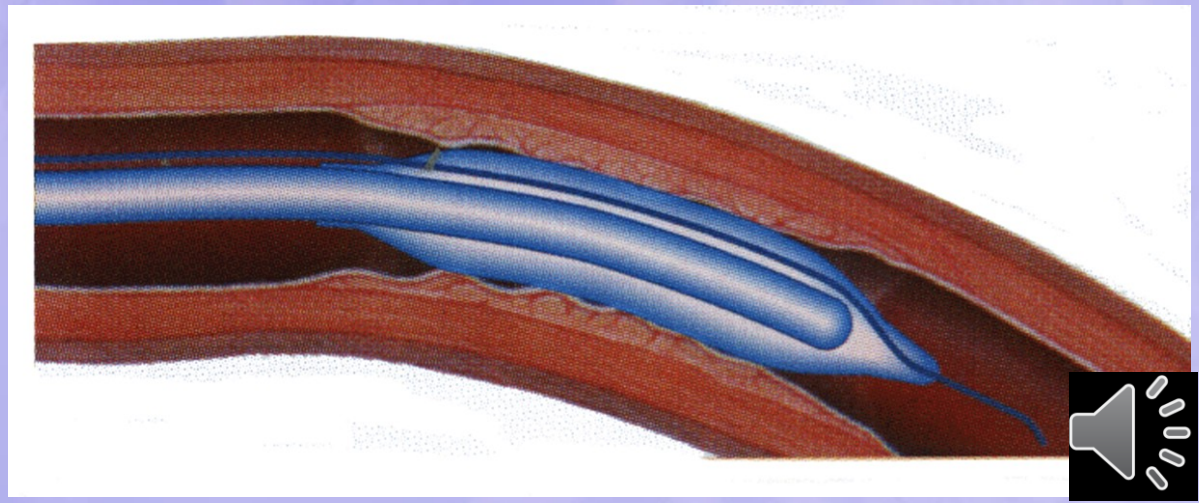
2. [redacted] **Intervention** ([redacted] coronary [redacted] **ypass Graft** ([redacted]) may vary from one center to another according to experience, skills and results.

3. Definite indications for CABG: 3 VD with proximal stenosis, LM disease.

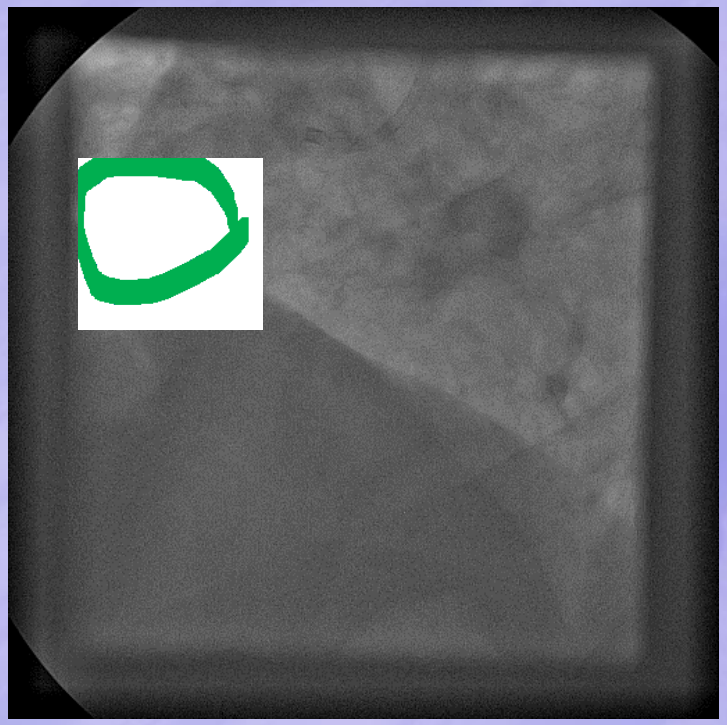
4. Definite indications for PCI: SVD (apart from ostial LAD), favourable morphology .

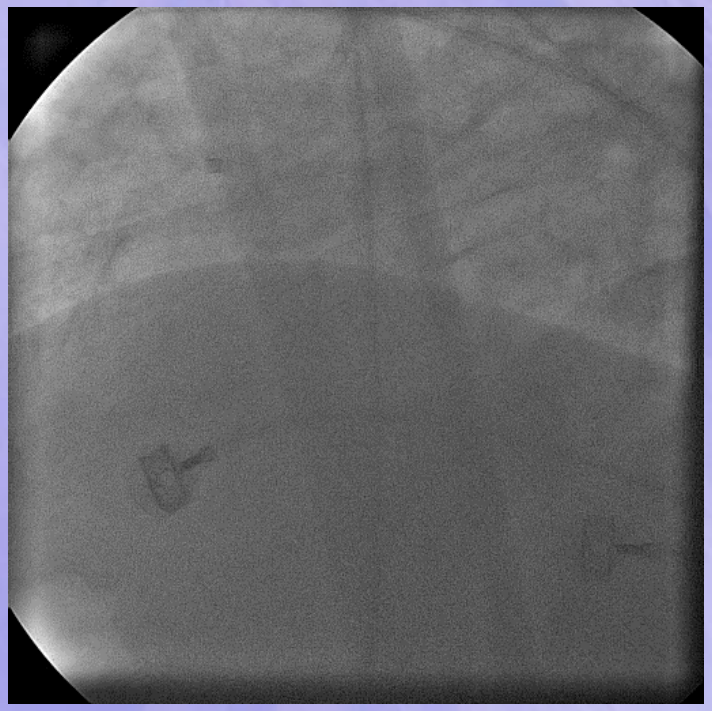
Procedure

- Sheath in femoral, radial or brachial artery
- diameter sheath (usually 6F, but also 5 to 8)
- guiding catheter
- guide wire 0.014 inch
- balloon
- stent



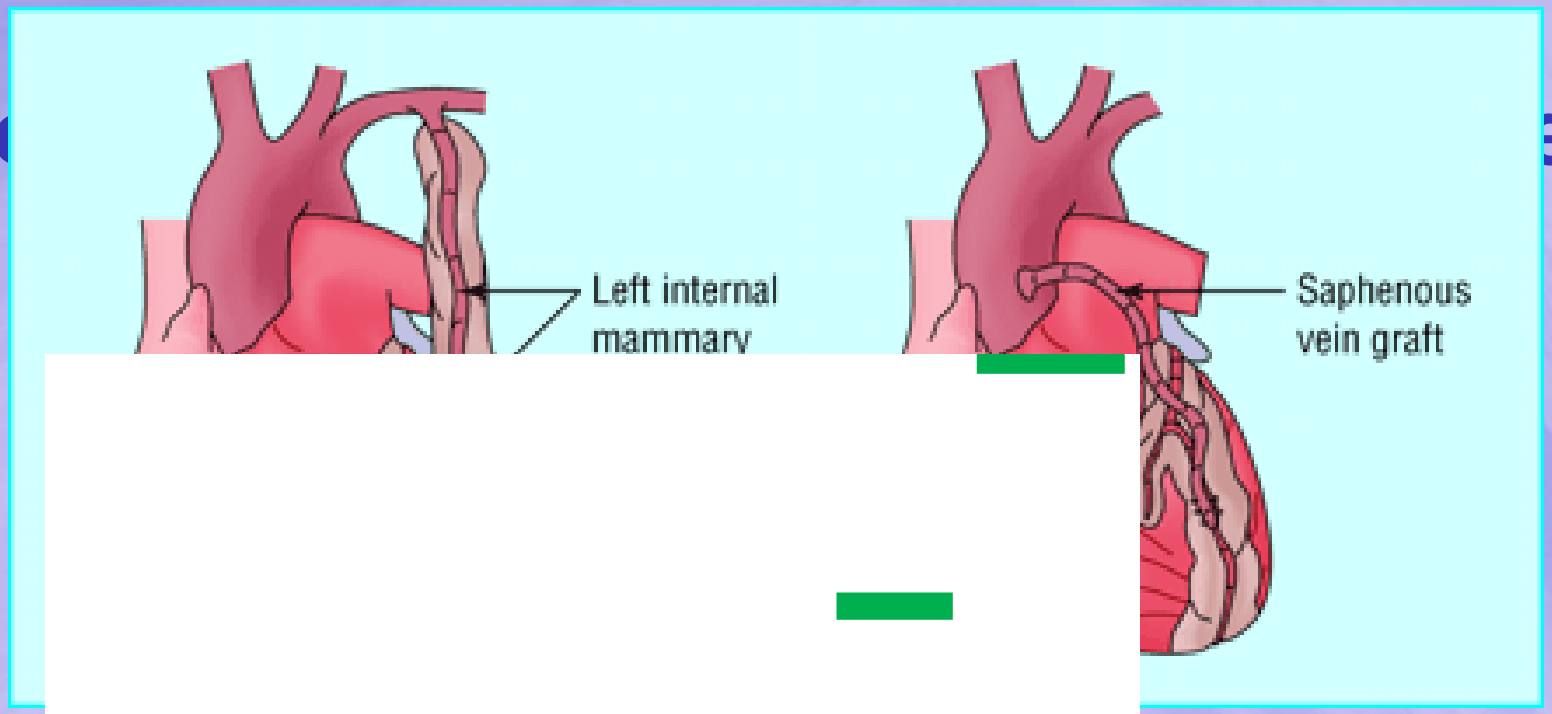
PCI - ACD





Courtesy of: MUDr. Roman Miklík, Ph.D.

Co ery

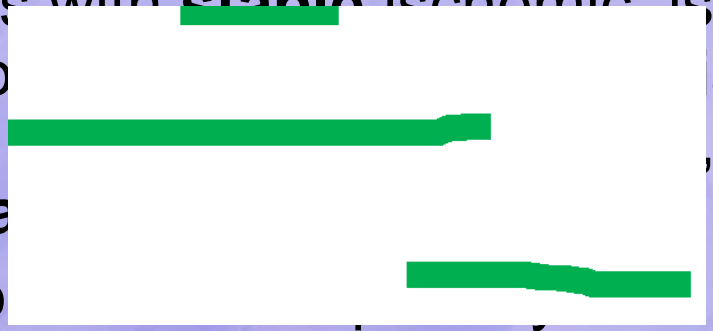


- ade by harvesting
  ching it between
- ery from its normal course and attaching it to the coronary artery
  - Internal Mammary Artery
  - Gastroepiploic Artery
  - Radial Artery

Current Medical State of SVG Disease

- Average lifespan [illegible]
  - 50% of S[illegible]0 years
  - 75% will [illegible]same period
- SVG lesions pre[illegible]er surgery are typically caused by intima[illegible]
  - respond
- Late vein graft stenoses are more commonly caused by diffuse atherosclerosis
  - friable plaque and thrombus tend to fragment and embolize into distal coronary vessels

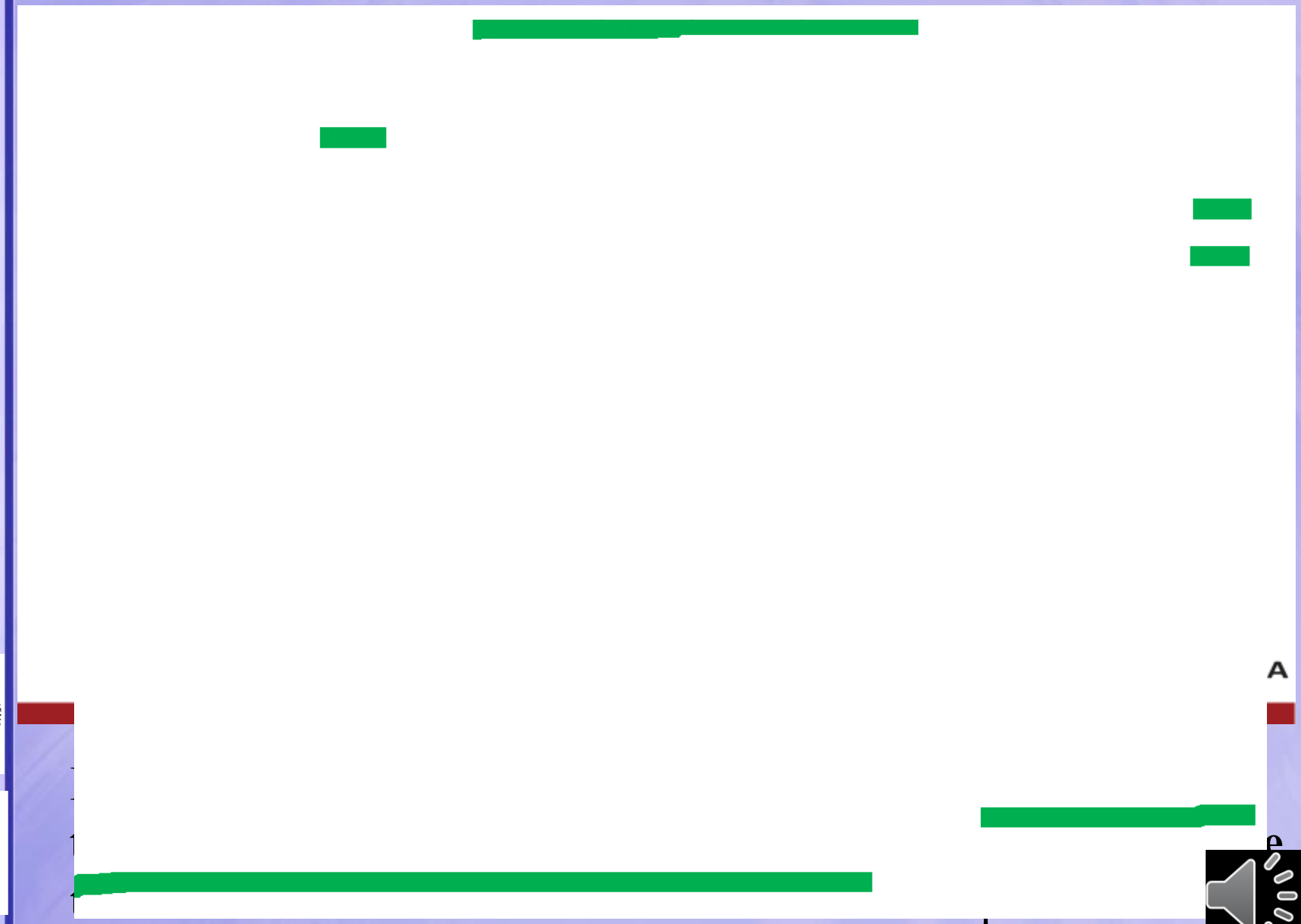
Ischemia Trial 2019

- Patients with **stable** ischemic heart disease and mo  a were randomized to routine ,588) versus **optimal medica**
- Duratio
- Mean patient age: 64 years

- Inclusion: Moderate to severe ischemia on noninvasive stress testing

- Presented by Judith S. Hochman at the American Heart Association Annual Scientific Sessions (**AHA 2019**), Philadelphia, PA, November 16, 2019.

Ischemia Trial



medicines and lifestyle changes alone.

Treatment

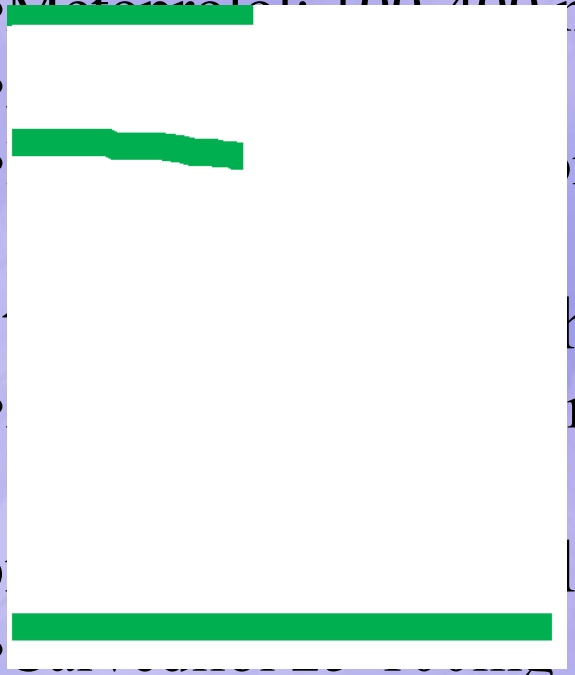
- Non – pharmacological
  - Revascularisation: CABG / PCI
  - heart transplantation
- Pharmacological
  - antiplatelet agens
  - Betablockers
  - ACEI
  - Calcium – antagonist
  - Lipid lowering agens
  - Nitroglycerin / nitrates

Treatment – antiplatelet agens

- Cyclooxygenase inhibitors
  - Aspirin ([redacted]) 100 mg daily
- Adenosine ([redacted]) receptor inhibitors 6-
  - Ticagrelor
  - Prasugrel ([redacted])
  - Clopidogrel 75 mg daily
  - (Ticlopidine)

Treatment - betablockers

- Cardioselective
  - Metoprolol: 100-400 mg
  - [redacted]
  - [redacted] long half-life)
- With [redacted] homimetic activity
  - [redacted] mg
- Non-[redacted] alfa α-blocking activity)
  - [redacted]



Treatment - betablockers

• Freemantle Nick, et al: **β Blockade after myocardial infarction: systematic review and meta regression analysis** BMJ 1999;318:1730

•Systematic review of randomised controlled trials.

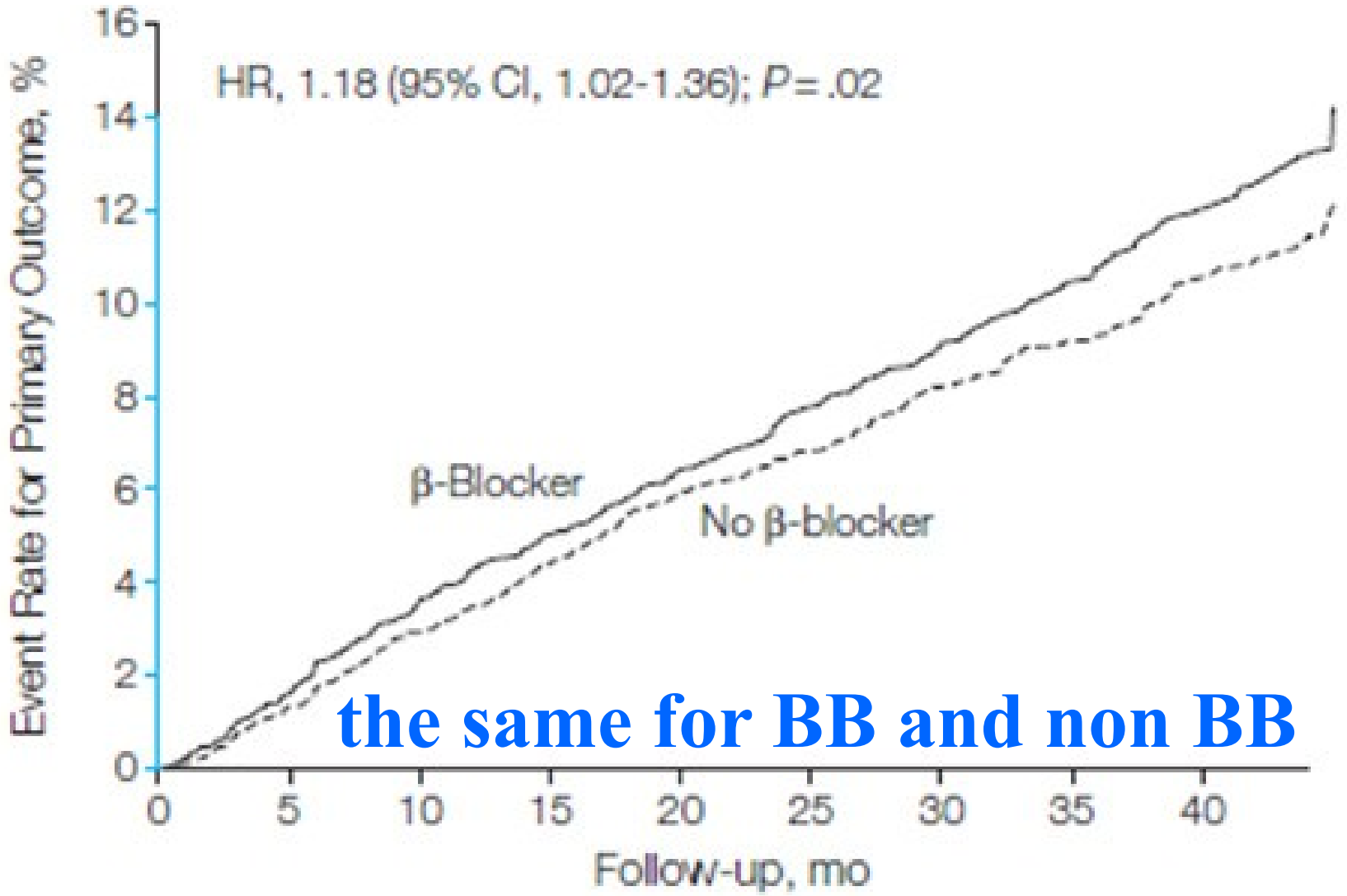
•**Subjects**: Patie

•**Intervention**: β

•**Main**:outcome

reinfarction

•We identified a **25% reduction in the odds of death** in long term trials (95% confidence interval 15% to 31%)



the same for BB and non BB

•Bangalore S, Steg G, Deedwania P, et al; REACH Registry Investigators. JAMA. 2012;308(13):1340-1349

Treatment : lipid lowering agents

Tab. 4 Metaanalýza studií – kvantifikace účinku statinů[4]

	Denní dávka statinu				
	5 mg	10 mg	20 mg	40 mg	80 mg
a) Absolutní pokles (mmol/l) LDL cholesterolu v séru					
b) Procentuální pokles (%) LDL cholesterolu v séru					
Simvastatin	23	27	32	37	42
Lovastatin		21	29	37	45
Pravastatin	15	20	24	29	33
Fluvastatin	10	15	21	27	33
Atorvastatin	31	37	43	49	55
Rosuvastatin	38	43	48	53	58

Barevně jsou vyznačeny ekvipotence dle Wenga a spol., 2010.[5] Dávky statinů schopné snížit LDL cholesterol zhruba o 20–30 % jsou označeny bíle a dávky schopné snížit LDL cholesterol zhruba o 30–40 % jsou označeny tmavě zeleně.

Tab. 1 Cílové hodnoty cholesterolu a apolipoproteinu B

	Populace obecně	Bez KVO, riziko ≥ 5 %, DM2 nebo DM1 s mikro-albuminurií	Přítomnost KVO
Celkový	< 5 mmol/l	< 4,5 mmol/l	< 4,0 mmol/l

Podle: Doporučení pro diagnostiku a léčbu dyslipidémií v dospělosti[1]

Tab. 2 Optimální hodnoty HDL cholesterolu a triglyceridů (stejné pro všechny kategorie rizika)

	Muži	Ženy
HDL cholesterol	> 1,0 mmol/l	> 1,2 mmol/l
Triglyceridy	< 1,7 mmol/l	< 1,7 mmol/l

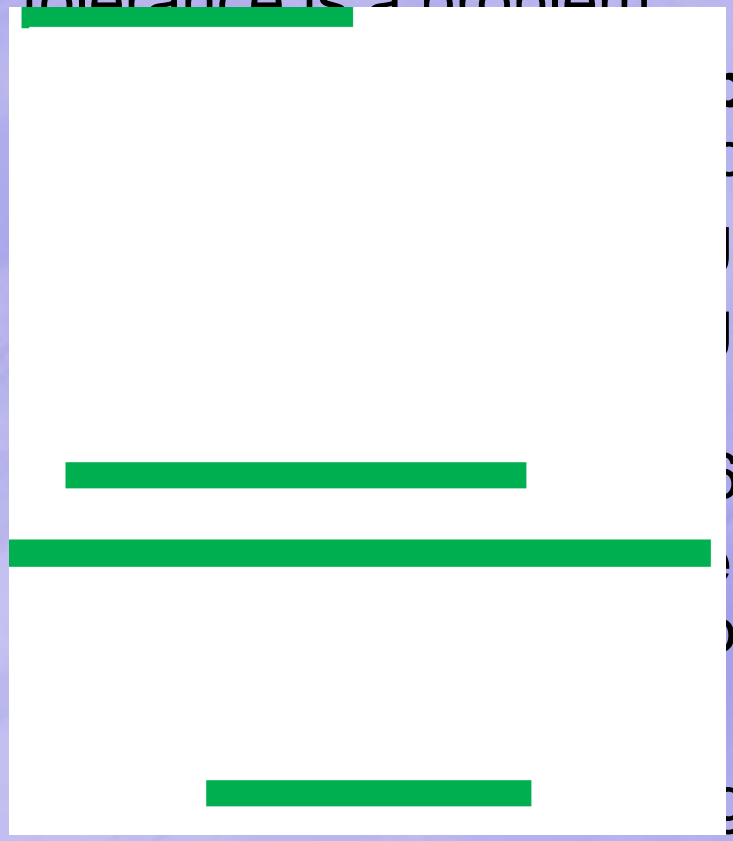
Podle: Doporučení pro diagnostiku a léčbu dyslipidémií v dospělosti[1]

UNIVERSITAS MASARYKIANA BRUNENSIS FACULTAS MEDICA

FAKULTNÍ NEMOCNICE BRNO

Treatment - nitrates

- tolerance is a problem
- **ray** (Aborts acute
  tension)
- SL
- /h patches Prophylactic
- 60 mg three times daily
- 20 mg twice daily Take
  rm – once daily
- g (vasodilators)

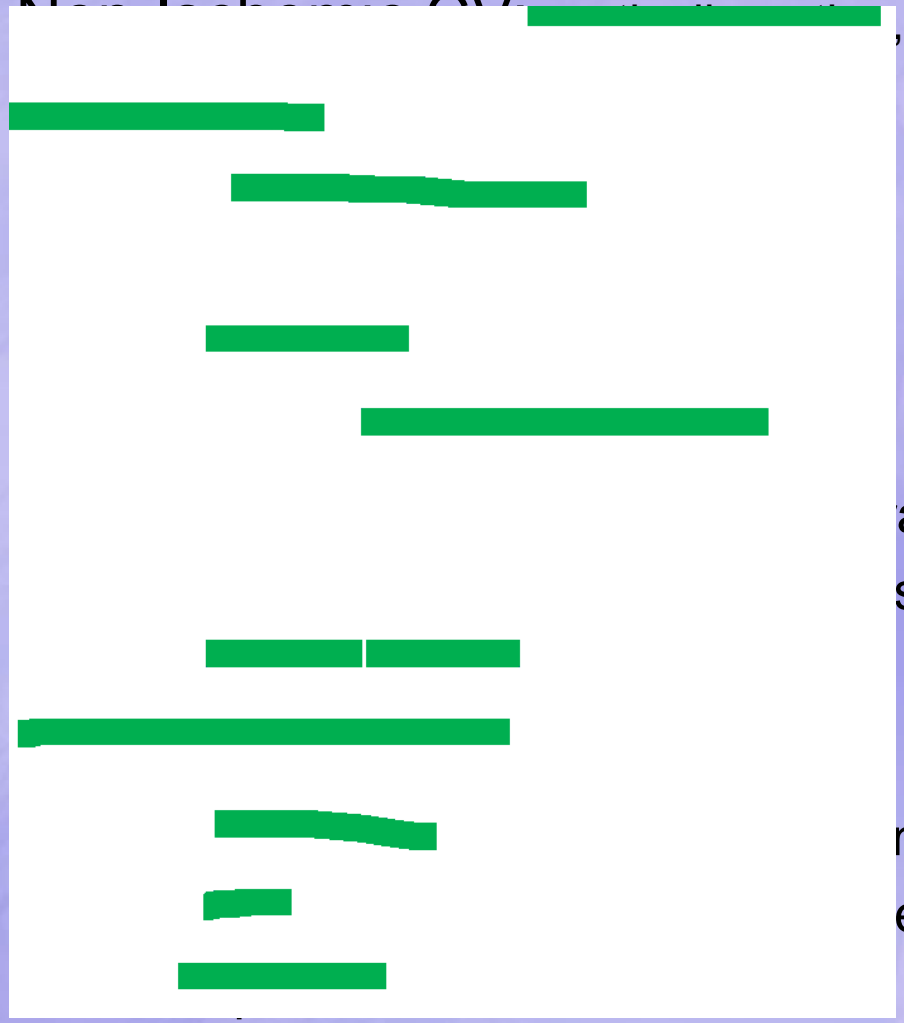


Treatment : ca blockers

- Calcium Channel Blockers:
  - Heart Rate Lowering
  - Verapamil 120–480mg Heart-rate lowering; AV block, heart failure, constipation
- Dihydroperidine Calcium Channel Blockers
  - Amlodipine 5–10mg Least myocardial depression
  - Felodipine 5–20mg High vascular selectivity

Alternative Diagnoses to Angina for Patients with Chest Pain

- , pericarditis
- acture
- s zoster
- m, reflux
- edocholithiasis, cholangitis



Variant (Prinzmetal's) angina

- vessels
- during coronarography
- =ergometrine intra arterially)
- (verapamil)

Cíle po IM – sekundární prevence

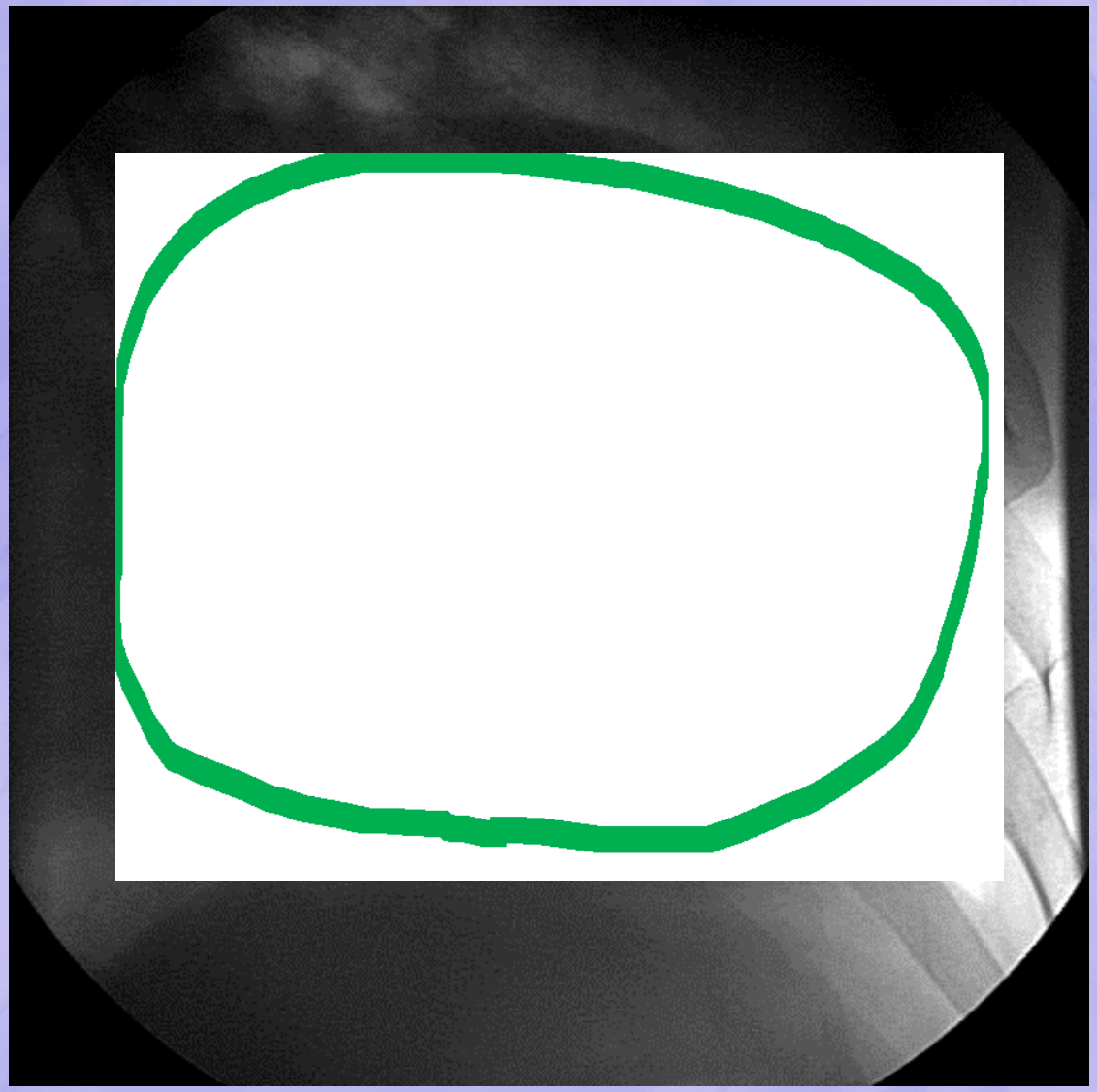
- Zan
- Kon
- Red
- TK
- TCH
- LDL
- TG <1,7 mmol/l, HDL > 1 (1,2 ženy) mmol/l

Treatment

- A = Aspirin and Antianginal therapy
- B =
- C =
- D =
- E =

•Th

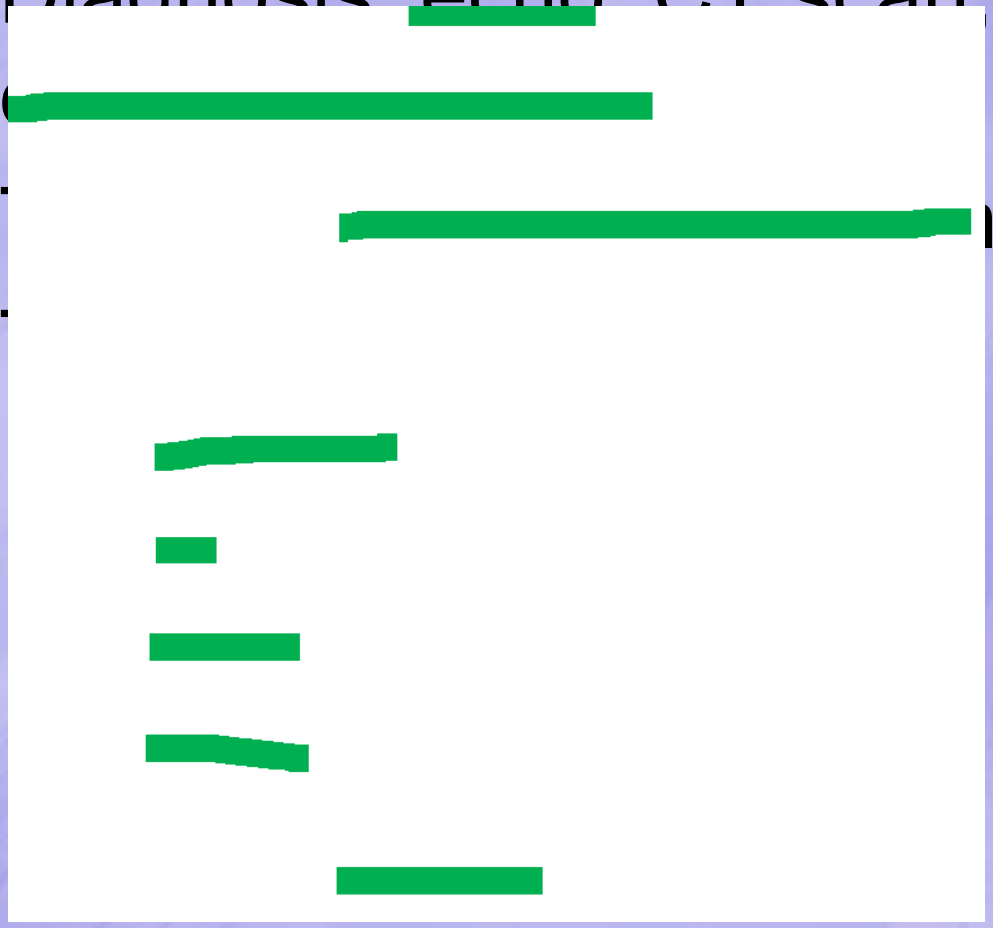
CAD with heart failure



Courtesy of: MUDr. Roman Miklík, Ph.D.

CAD with heart failure

- Diagnosis: echo, CT scan
-
-

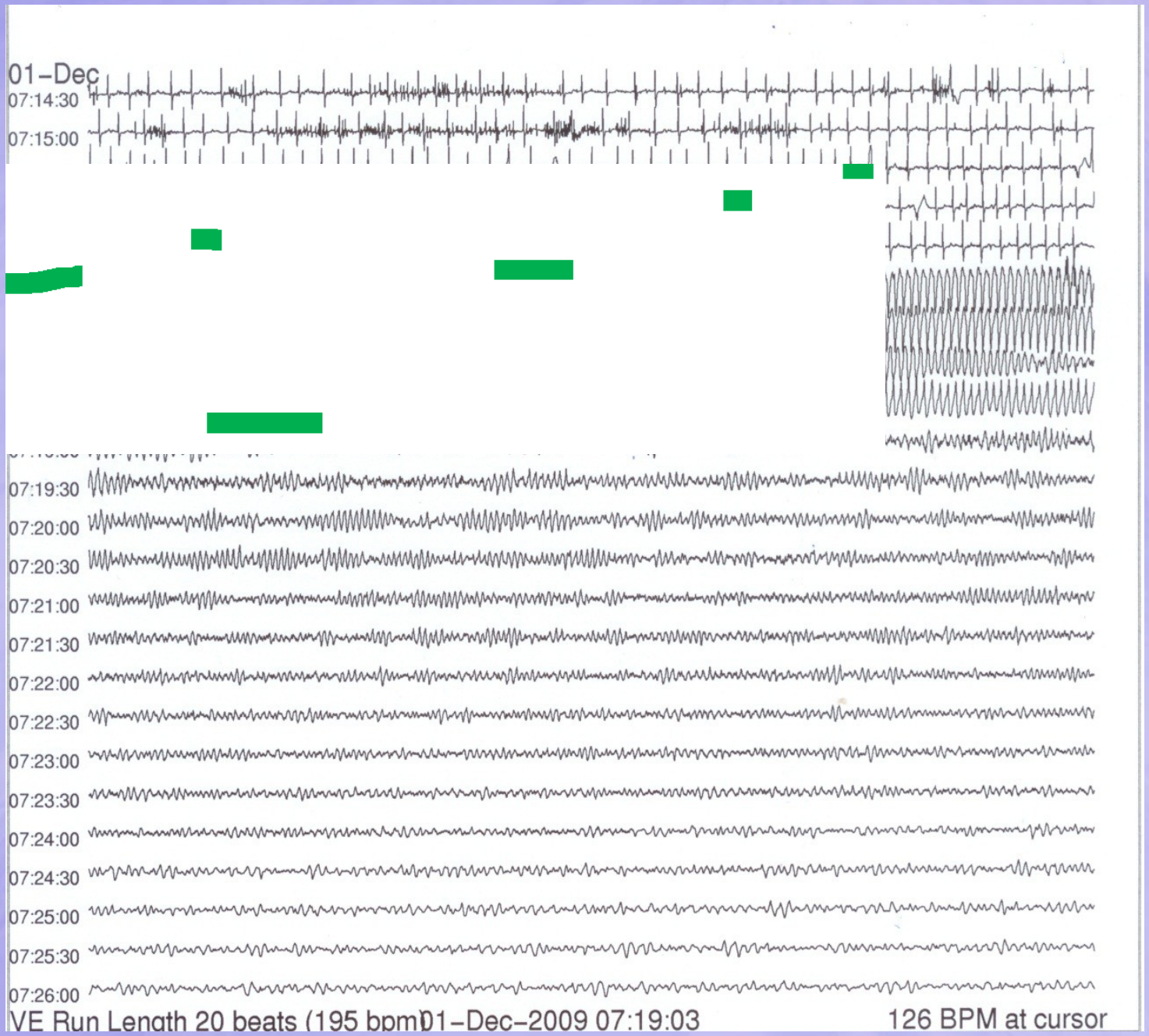


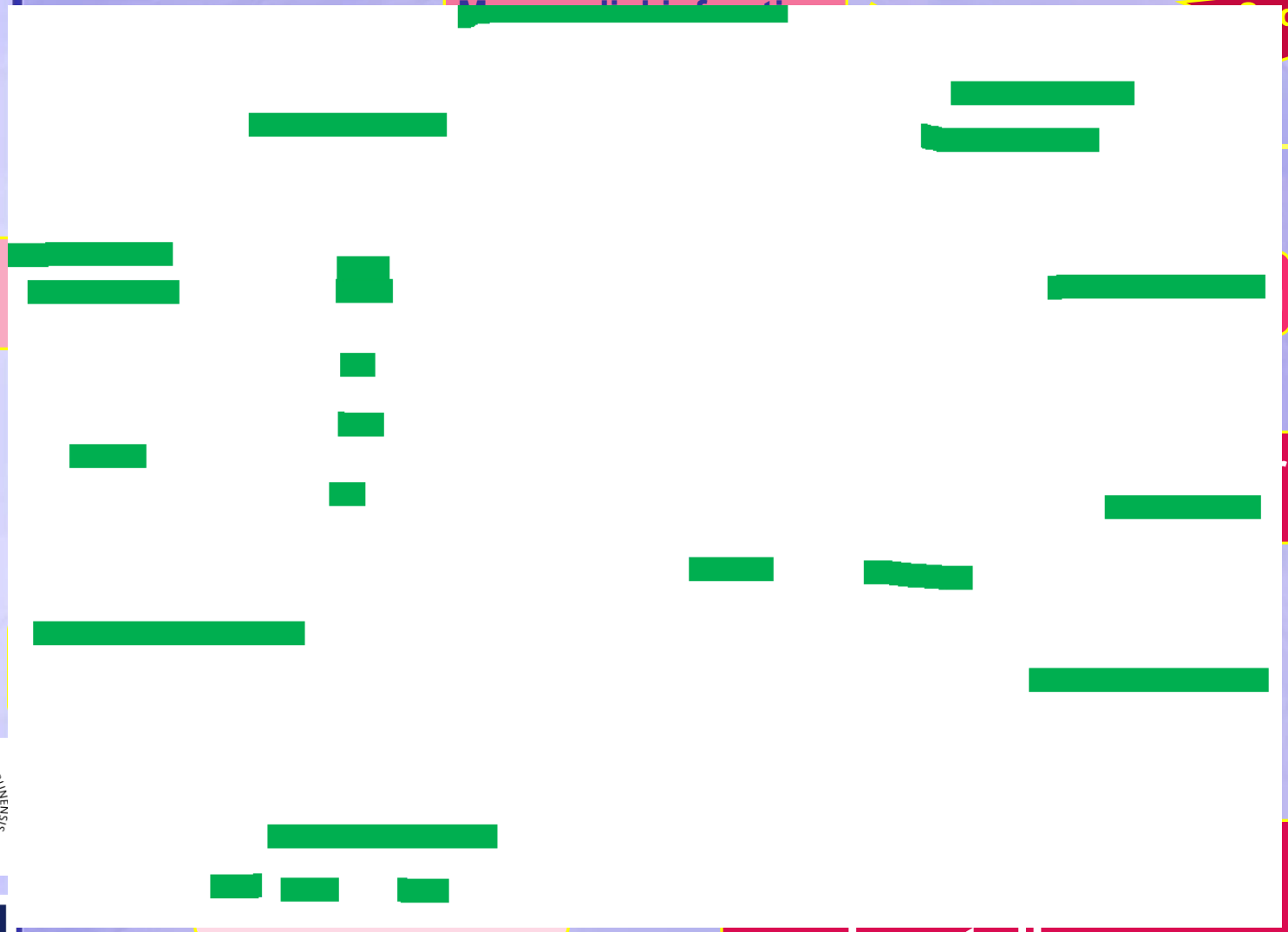
Arrhythmias - supraventricular

- Atrial fibrillation
- 

Arrhythmias - ventricular

- Ventricular extrasystoly
- Amiodarone / BB


01-Dec
07:14:30
07:15:00
07:19:30
07:20:00
07:20:30
07:21:00
07:21:30
07:22:00
07:22:30
07:23:00
07:23:30
07:24:00
07:24:30
07:25:00
07:25:30
07:26:00
VE Run Length 20 beats (195 bpm)
01-Dec-2009 07:19:03
126 BPM at cursor



dden death

heart disease

Thank You for You attention!