

## Koronaarhaigus: morfoloogiline versus funktsionaalne diagnostika stabiilse koronaarhaiguse korral

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TÜK südamekliinik

ERÜ ja EKS ühiskosolek "Pildidiagnostika kardioloogias"  
30 november 2012, Tallinn Swissotel

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### REMARKS ON ANGINA PECTORIS.

BY JOHN WARREN, M. D.

In our inquiries into any particular subject of Medicine, our labours will generally be shortened and directed to their proper objects, by a knowledge of preceding discoveries.

When Dr. Heberden, in the London Medical Transactions, first described a disease under the name of Angina Pectoris, so Huxle had it attracted the attention of physicians, that much surprise was excited by the communication. From the most strik-

The result of his inquiry was an opinion, that a connection subsists between ossification of the coronary arteries of the heart, and Angina Pectoris, or Syncope Anginosa; and that from the great variety of other organic derangements, such as enlargement or smallness of the heart, undue fatness of the heart, thickness of the pericardium, induration or ossification of the valves, ossification and dilatation of the aorta, and their com-

If it should be proved that ossification of these arteries is the cause, it will probably be still difficult to explain, why it should produce its effects in this particular form, rather than that of a continued disease, as is known to be the case in by far the larg-

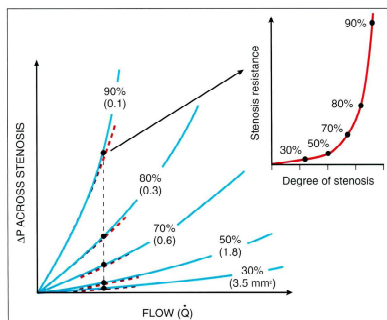
NEJM 1812

## Pärgarteri stenoosi angiograafiline hindamine



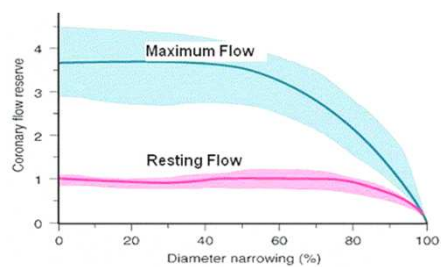
- $D_1$  on stenoosile lähim normaalse arteri diameeter
- $D_2$  on stenoosi väikseim diameeter
- Stenoosi raskusena kirjeldatakse  $D_2/D_1 \times 100\%$

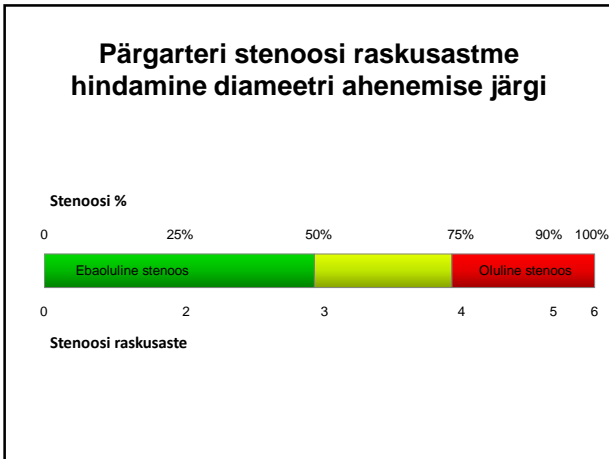
## Pärgarteri perfusioonirõhu vähenemine sõltuvalt stenoosi raskusastmest



J Am Coll Cardiol 1:31, 1983

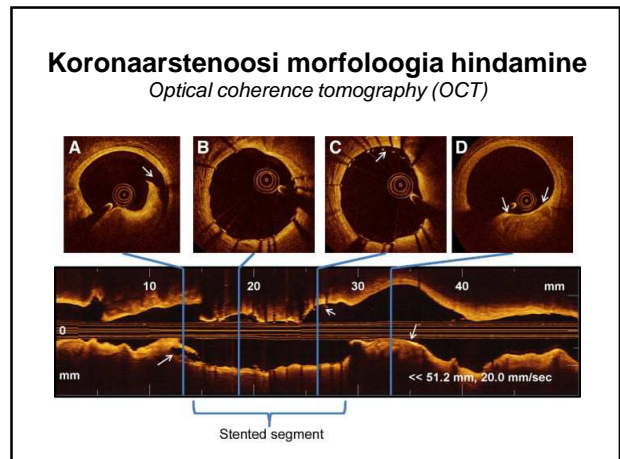
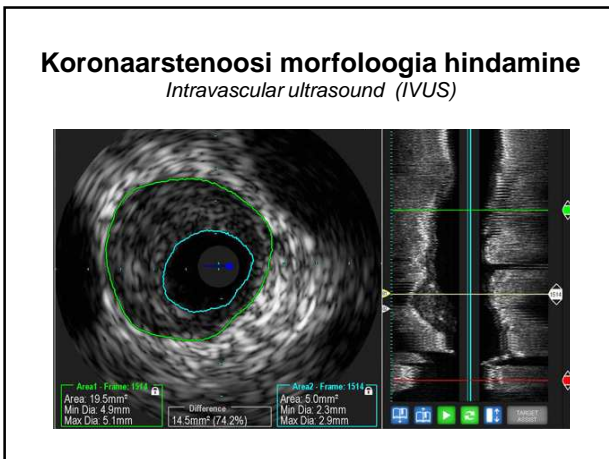
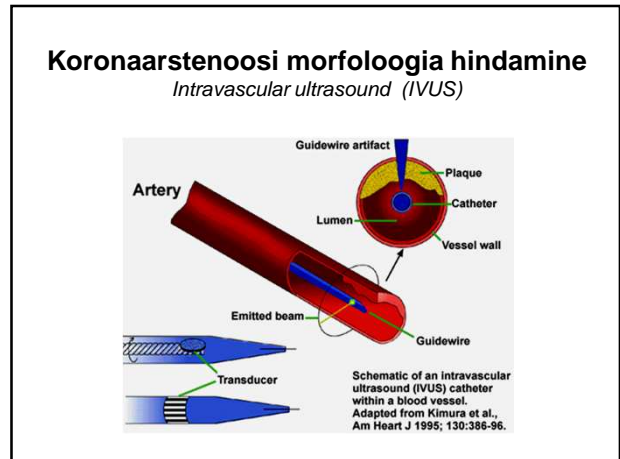
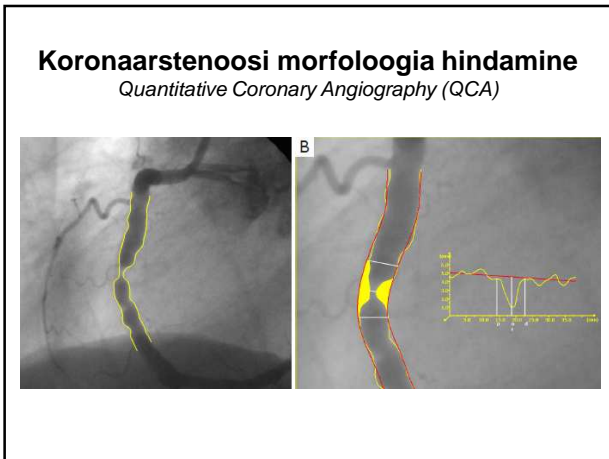
## Koronaarvereringe füsioloogia voolureserv





### Morfoloogia hindamine ei piisav koronaarstenooosi funktsionaalse olulisuse hindamiseks

- Morfoloogia võib olla kompleksne, mis teeb hemodünaamika modelleerimise keerukaks
- Kollateraalide olemasolu suurendab või langetab stenooosi funktsionaalset olulisust
- Perifeerse mikrotsirkulatsiooni omadused võivad olla erinevad



### Oklulostenootiline refleks



Oculostenotic Reflex and Introgenosis Fulminans  
Ozlem Soran, Arthur M. Feldman and Howard A. Cohen

Circulation. 2000;101:e198-e199  
doi: 10.1161/01.CIR.101.20.e198  
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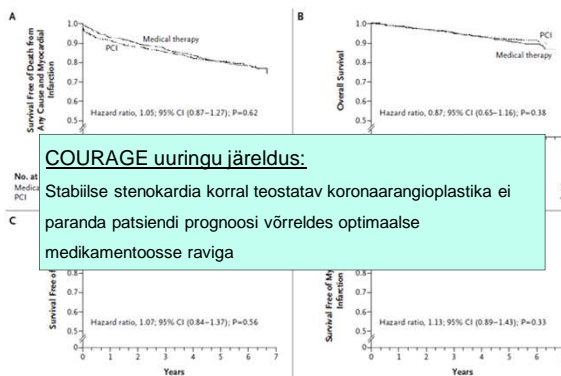
#### Optimal Medical Therapy with or without PCI for Stable Coronary Disease

William E. Boden, M.D., Robert A. O'Rourke, M.D., Koon K. Teo, M.B., B.Ch., Ph.D., Pamela M. Hartigan, Ph.D., David J. Maron, M.D., William J. Kostuk, M.D., Merrill Knudtson, M.D., Marcia Dada, M.D., Paul Casperson, Ph.D., Crystal L. Harris, Pharm.D., Bernard R. Chaitman, M.D., Leslee Shaw, Ph.D., Gilbert Gosselin, M.D., Shah Nawaz, M.D., Lawrence M. Title, M.D., Gerald Gau, M.D., Alvin S. Blaustein, M.D., David C. Booth, M.D., Eric R. Bates, M.D., John A. Spertus, M.D., M.P.H., Daniel S. Benjamin, M.D., G.B. John Mancini, M.D., and William S. Weintraub, M.D., for the COURAGE Trial Research Group\*

### COURAGE uuring

- Stabiilne stenokardia
- Vähemalt 1 stenoos >70% koos EKG muutusega või
- >80% stenoos ilma EKG muutuseta
- Angioplastika tehti >50% stenoosidel

N Engl J Med 2007;356:1503-16.



N Engl J Med 2007;356:1503-16.



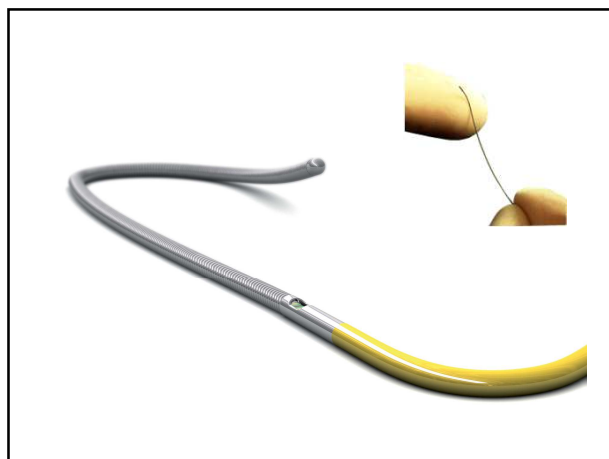
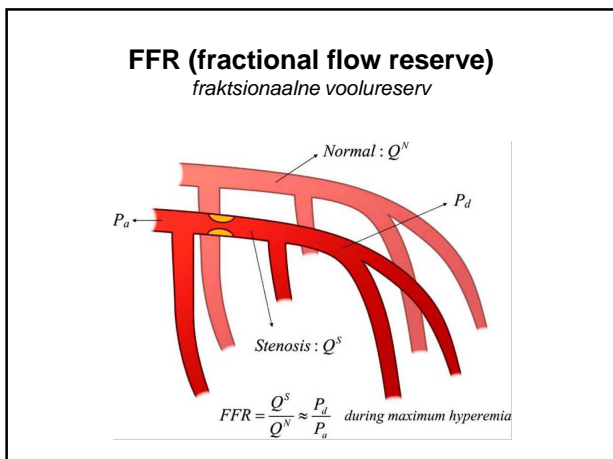
### Inappropriate heart procedures are expensive and risky. And studies show thousands happen every year.

By Sarah Kliff, Updated: August 8, 2012

In 2006, a trio of medical professors gathered 20 cardiologists and asked them to discuss a hypothetical heart patient with a blocked artery and no symptoms. Removing the blockage would be riskier and costlier than giving the patient a few pills to take. The professors wanted to know: Would the cardiologists do the procedure?

### FFR (fractional flow reserve)

fraktsionaalne voolureserv



### FFR uuringu valideerimine

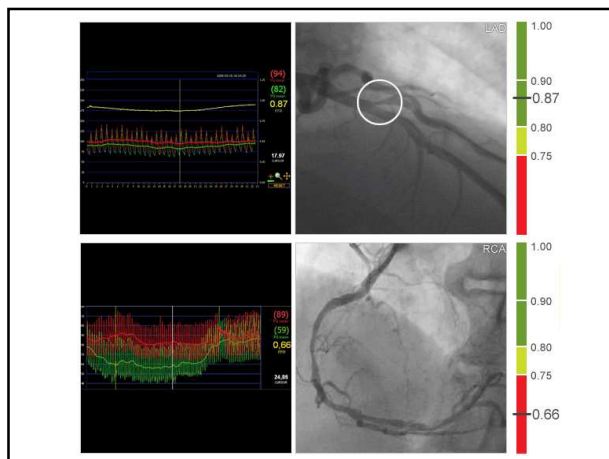
TABLE 4. Comparison of FFR, CFR with noninvasive stress test results

Index	Reference	Year	N	Ischemic test	BCV	Accuracy
FFR	Pijls	1995	60	X-ECG	0.74	97
	DeBruyne	1995	60	X-ECG/SPECT	0.96	87
	Pijls	1996	45	X-ECG/SPECT/pacing/DSE	0.75	93
	Bartunek	1997	37	DSE	0.67	90
	Abe	2000	46	SPECT	0.75	91
	Chamuleau*	2001	127	SPECT	0.74	77
	Caymaz	2000	40	SPECT	0.75	95
	Fearon	2000	10	SPECT	0.75	95
	DeBruyne†	2001	57	SPECT	0.78	85
	Jimenez-Navarro	2001	21	DSE	0.75	90
	Mouwissen	2002	151	SPECT	0.74	75
	Usui†	2003	167	SPECT	0.75	79
	Yanagisawa	2002	165	SPECT	0.75	76

N, number; BCV, best cut-off value (defined as the value with the highest sum of sensitivity and specificity); SPECT, single photon emission tomography; DSE, epidural stress echocardiography; X-ECG, exercise ECG.

0  0.75 0.8 1

Oluline stenosis      Ebaoluline stenosis



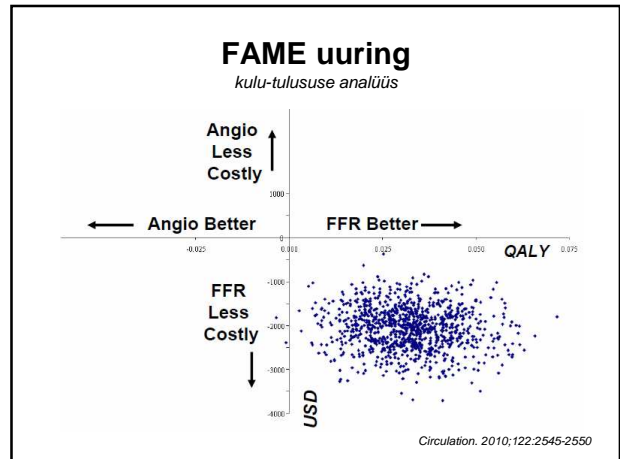
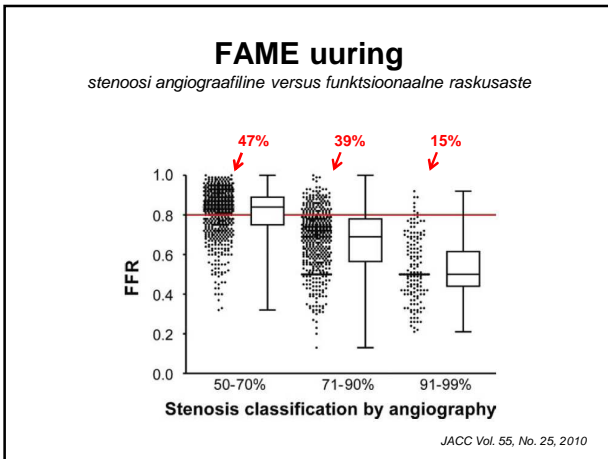
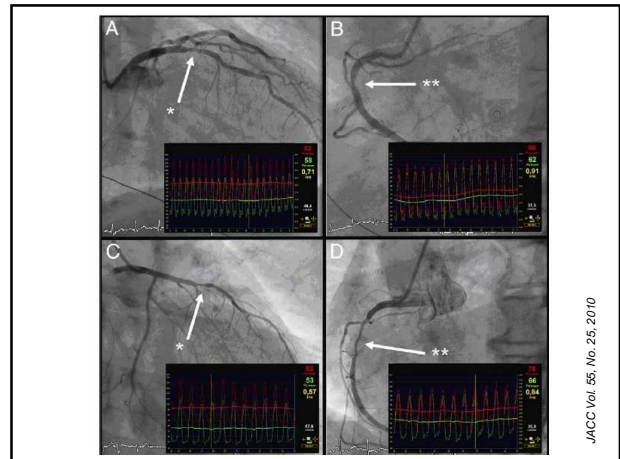
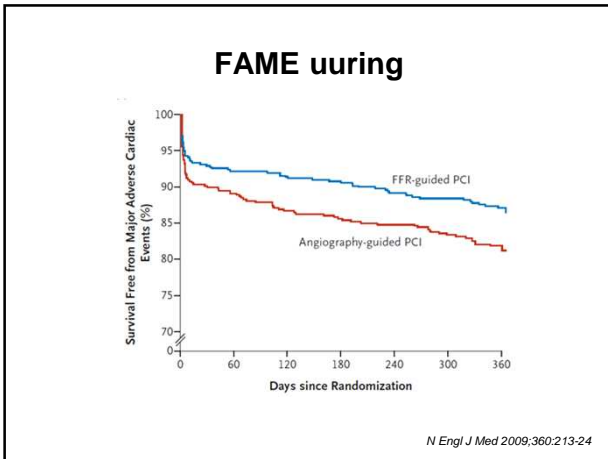
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ESTABLISHED IN 1812      JANUARY 15, 2009      VOL. 360 NO. 3

**Fractional Flow Reserve versus Angiography  
for Guiding Percutaneous Coronary Intervention**

Pim A.L. Tonino, M.D., Bernard De Bruyne, M.D., Ph.D., Nico H.J. Pijls, M.D., Ph.D., Uwe Siebert, M.D., M.P.H., Sc.D., Fumiaki Ikeno, M.D., Marcel van 't Veer, M.Sc., Volker Klaus, M.D., Ph.D., Ganesh Manoharan, M.D., Thomas Engstrom, M.D., Ph.D., Keith G. Oldroyd, M.D., Peter N. Ver Lee, M.D., Philip A. MacCarthy, M.D., Ph.D., and William F. Fearon, M.D., for the FAME Study Investigators\*

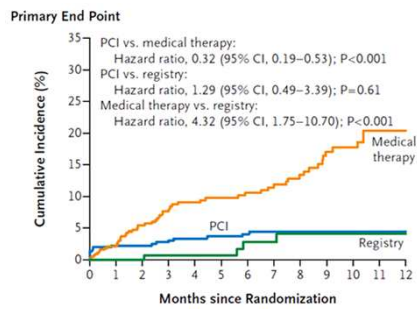
- ### FAME uuring
- Stabiilne koronaarhaigus
  - Angioplastika teostamine anatoomiliste või funktsionaalsete kriteeriumite alusel
  - Raviti kõik ≥ 80% stenoosid
- versus*
- Raviti kõik stenoosid, mille FFR ≤ 0,80
- N Engl J Med 2009;360:213-24



- ### FAME uuring
- järeldused
1. Ei esine head korrelatsiooni stenoosi anatoomilise ja funktsionaalse raskusastme vahel. Seda nii 50-70% kui ka 71-90% stenooside grupis
  2. Patsiendi prognoosi parandab funktsionaalselt oluliste stenooside revasculariseerimine, seda eriti müokardiinfarkti ja korduva revasculariseerimise vähenemise tõttu
  3. Funktsionaalselt ebaolulise stenoosi angioplastika halvendab prognoosi
  4. Täiendav rahakulu stenoosi funktsionaalse olulisuse hindamiseks (FFR) on kulu-tulus ning tagab kokkuvõttes väiksema ravi maksumuse

- ### FAME 2 uuring
- Stabiilne koronaarhaigus
  - Funktsionaalselt oluline stenoos (FFR  $\leq$  0,80)
  - Angioplastika versus medikamentoosne ravi
- N Engl J Med 2012;367:991-1001

## FAME 2 uuring



*N Engl J Med 2012;367:991-1001*

## FAME 2 uuring

*järeldused*

1. Funktsionaalselt olulise stenoosi (FFR  $\leq$  0,80) korral parandab revaskulariseerimine patsiendi prognoosi võrreldes medikamentoosse raviga
2. Peamiseks prognoosi paranemise teguriks oli erakorralise revaskulariseerimise vajaduse vähenemine
3. Funktsionaalselt ebaolulise stenoosi korral on medikamentoosne ravi piisav ning revaskulariseerimise mitteteostamine ei halvenda prognoosi

*N Engl J Med 2012;367:991-1001*

## Kokkuvõte

*Koronaarhaigus: morfoloogiline vs funktsionaalne diagnostika*

1. Koronaarstenoosi morfoloogia hindamine võib olla keerukas
2. Stenoosi morfoloogia ei pruugi olla heas korrelatsioonis stenoosi funktsionaalse tähtsusega
3. Patsiendi prognoosi parandab vaid funktsionaalselt olulise stenoosi revaskulariseerimine
4. Funktsionaalselt ebaolulise stenoosi angioplastika suurendab tüsistuste riski ja mõjutab koronaarhaiguse kulgu negatiivselt