



NATIONAL INSTITUTE FOR HEALTH AND WELFARE

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Fatal versus total events in risk assessment models

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Risk assessment models

- Estimates the risk of an event or death based on levels of selected risk factors
- Needed;
 - To demonstrate the risk to the patient
 - To motivate for lifestyle changes
 - To assess the need for drug treatment in clinical practice



Absolute risk

Depends on;

- Age and gender
- Population (low- vs. high risk populations)
 - Time of baseline measurements
- Selected risk factors in the model
 - Printed table vs. computerized systems
- Length of follow-up
- Endpoint
 - Mortality vs. total events
 - CHD, stroke, any CVD event



Factors explaining CVD mortality

- **Non-modifiable risk factors**
 - Age, gender, genes
- **Known modifiable risk factors**
 - Smoking, lipid abnormalities (total and HDL cholesterol), high blood pressure, diabetes, low physical activity, obesity
- **Other/putative risk factors**
 - Hemostatic and inflammatory factors, number of dietary factors more than one hundred??
- **Treatment**
 - Secondary prevention: statins, beta-blockers, ACE inhibitors, ASA
 - Invasive treatment: trombolysis, angioplasty, coronary surgery



Different risk assessment models

- Framingham: Classic - many versions
- SCORE: the European standard
- PRECARD: Sophisticated electronic
- FINRISK Score: National tool



Framingham

- Small American town (about 60000 inhabitants)
- First baseline data collection started 1948
- Different versions
 - Example based on the follow-up of 2590 men and 2983 women aged 30-74 years at baseline (original cohort + Framingham Offspring Study cohort)
- 10-year follow-up
- End-point: all CVD events (including non-hospitalized patients and MIs based on ECG findings without marked symptoms)
- Published in different versions and technical solutions



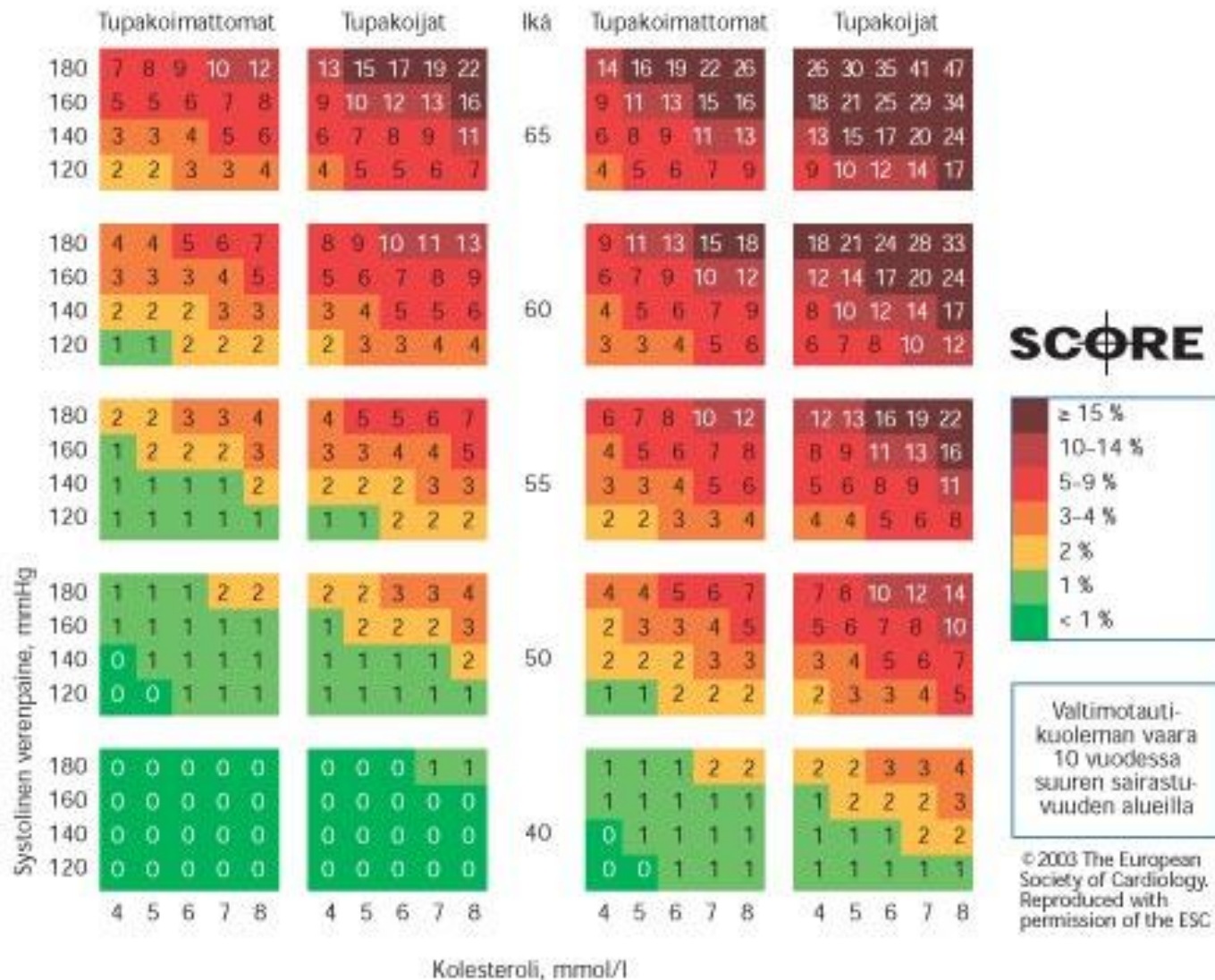
SCORE

- The function is based on the follow-up of 12 European cohorts
- Baseline data collection between 1969 and 1988
 - 117098 men and 88080 women
- Age, sex, smoking, total cholesterol, systolic blood pressure
 - Sub-sample: Diabetes, HDL cholesterol, family history
- Baseline risk calculated separately for southern (low-risk) and northern (high risk) cohorts
- End-point: death from CHD or other atherosclerotic CVD

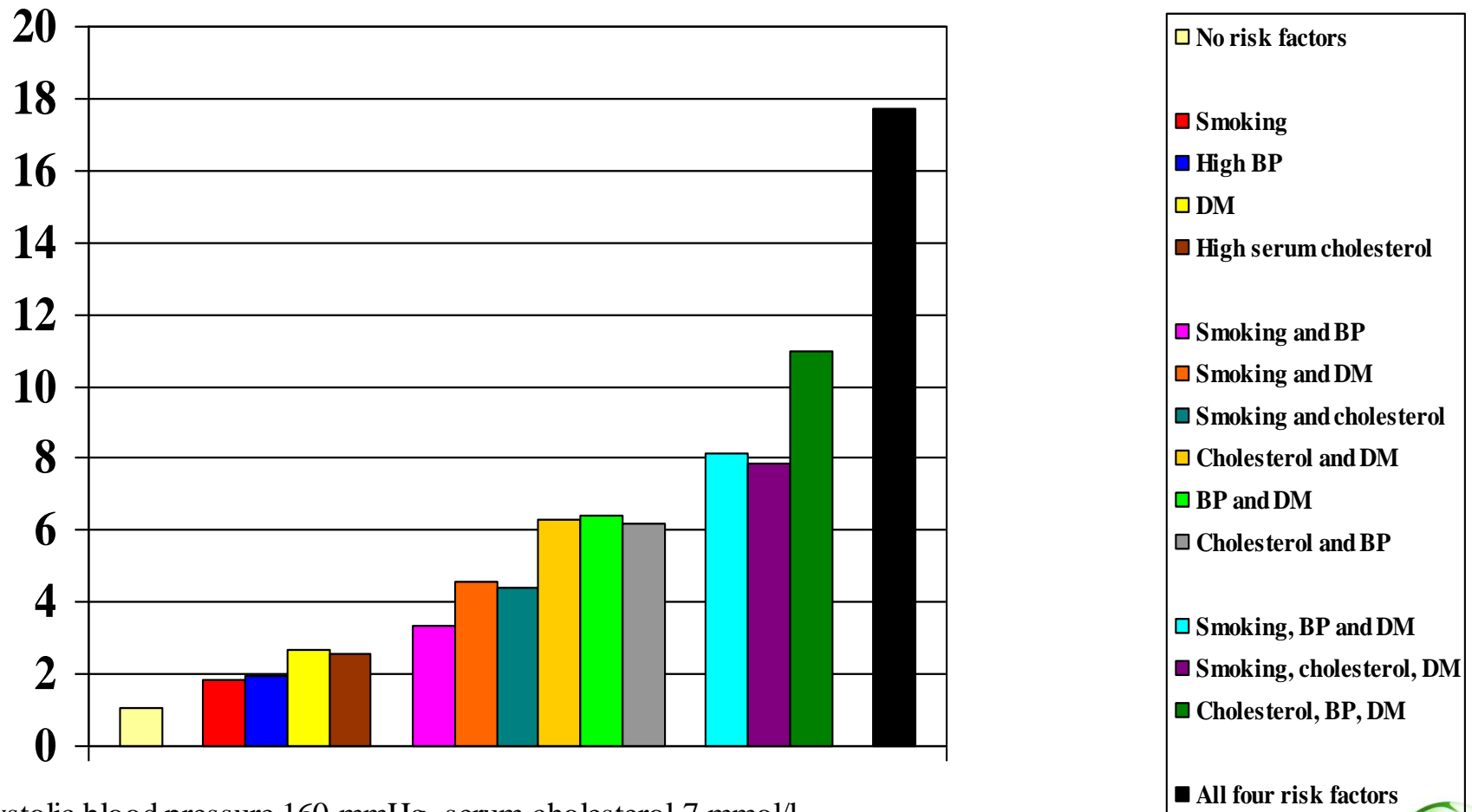


NAISET

MIEHET



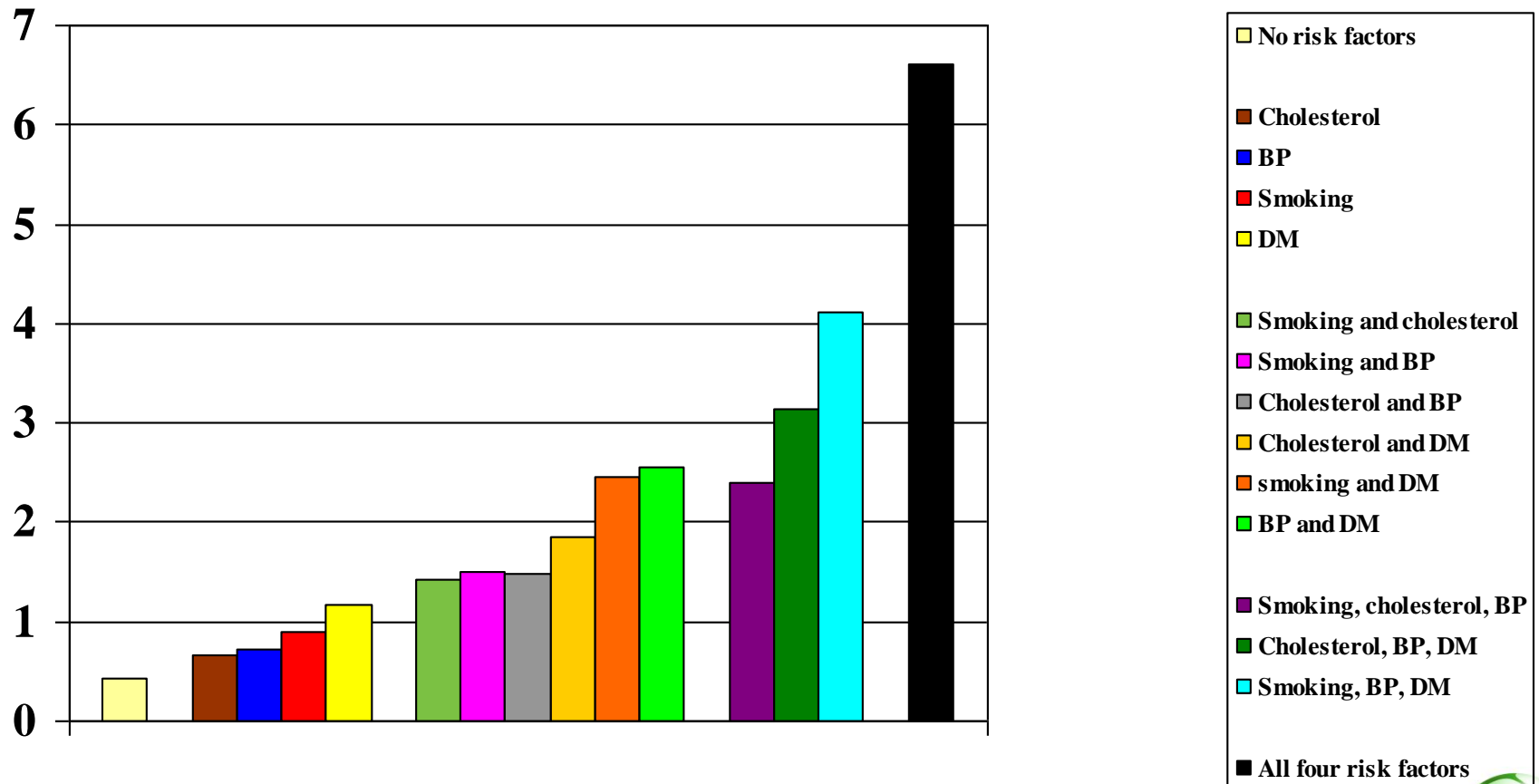
Ten-year CHD risk among Finnish men, 50 years of age (%)



Systolic blood pressure 160 mmHg, serum cholesterol 7 mmol/l



Ten-year CHD risk among Finnish women, 50 years of age (%)



Systolic blood pressure 160 mmHg, cholesterol 7 mmol/l



FINRISK Score

- Follow-up of FINRISK 1982, 1987 and 1992 cohorts
 - 9391 men and 10056 women aged 25-64 and free of symptomatic CHD at baseline
- Follow-up based on national hospital discharge and cause of death registers
- End-point: MI, unstable angina pectoris (needing hospitalization) and CHD death
 - cerebrovascular events (both ischemic and hemorrhagic) needing hospitalization and stroke deaths
- Computer-based calculator in web – for both for health professionals and general public



FINRISK Score

<http://www.ktl.fi/portal/suomi/osastot/eteo/tutkimus/riskipiste/finriski-laskuri/>





Terveyden edistämisen ja kroonisten tautien ehkäisy osasto

Tutkimus | Yhteistyö | Julkaisut | Yhteystiedot | Henkilökunta

Tutkimus

Sydän- ja verisuonitaudit

Terveystyöryhmittäminen

Riskitekijät

Ravitsemus

Diabetes

Syöpätaudit

Terveyden edistäminen

Alueellinen tutkimus

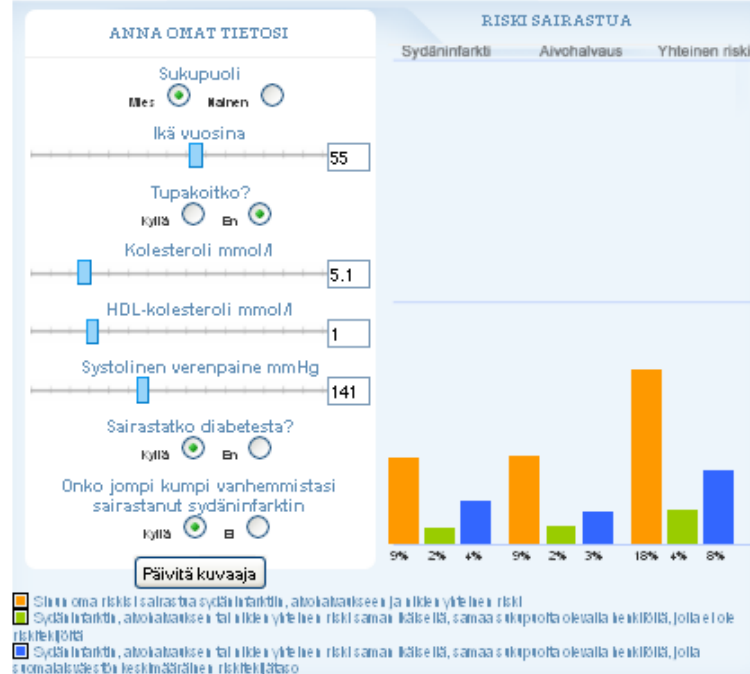
FINRISKI-laskuri

Riski sairastua sydäninfarktiin tai aivohalvaukseen seuraavan 10 vuoden aikana.

Vedä pallista liirejä tai käytä desimaalipistettä.

Oikea laskuri käyttöön

TULOSTA SIIVU

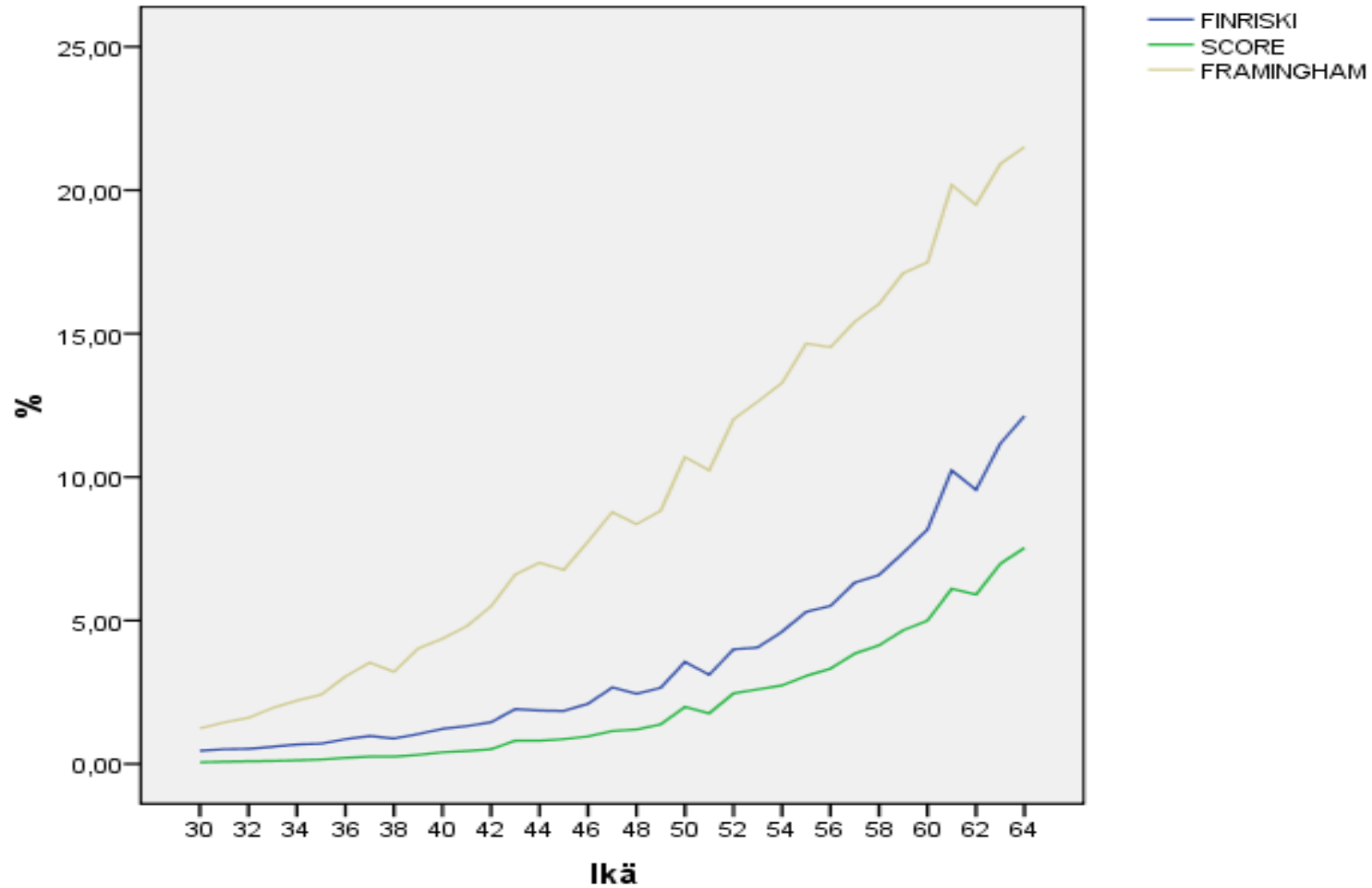


Average 10-year risk for CVD event or death (FINRISK 2007 population)

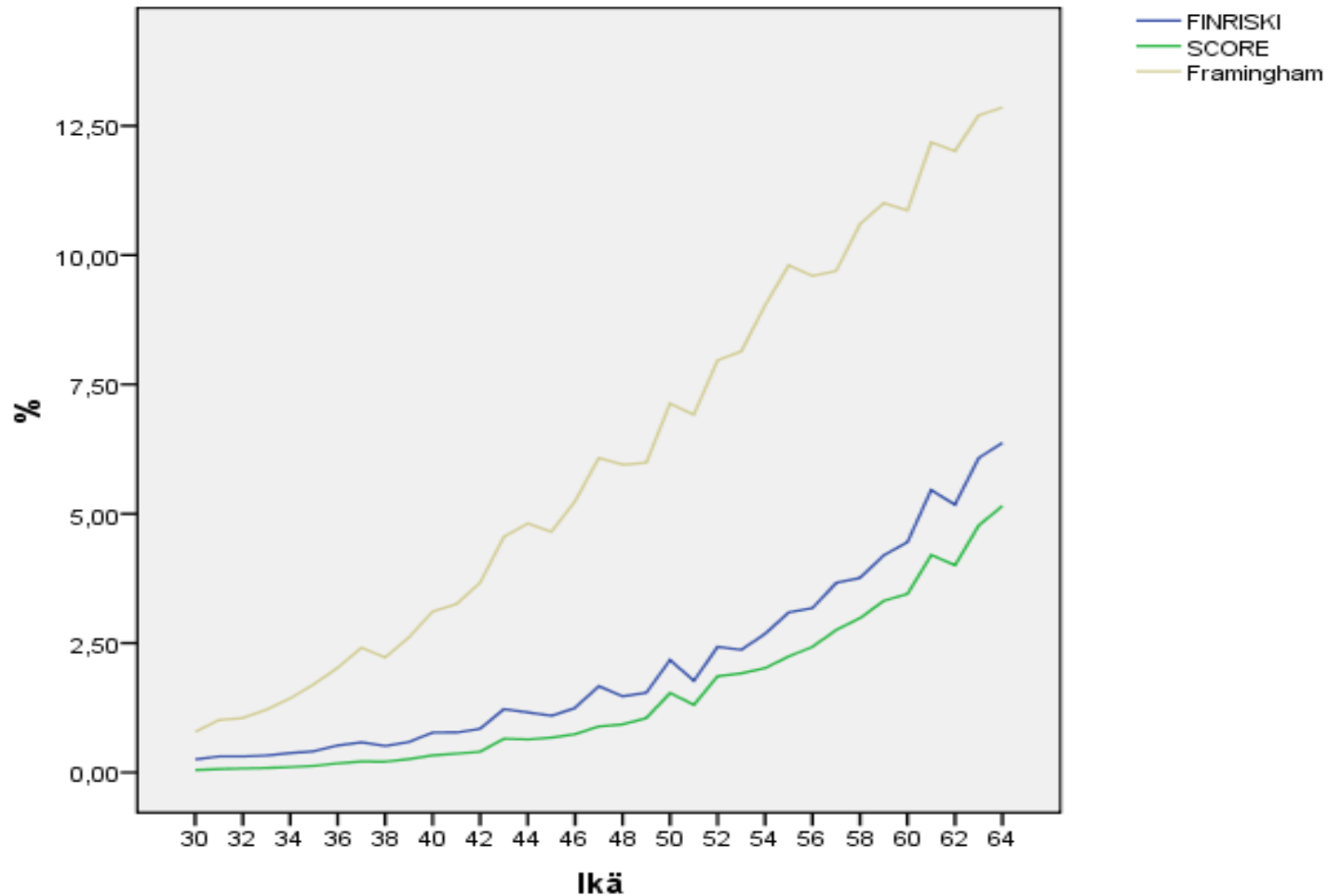
	FINRISK	SCORE	FRAMINGHAM
MEN			
CHD	3,4	2,7	9,3
Stroke	2,3	0,9	2,1
CVD	5,7	3,5	13,5
WOMEN			
CHD	1,1	0,6	3,9
Stroke	1,1	0,4	1,3
CVD	2,2	1,0	6,7



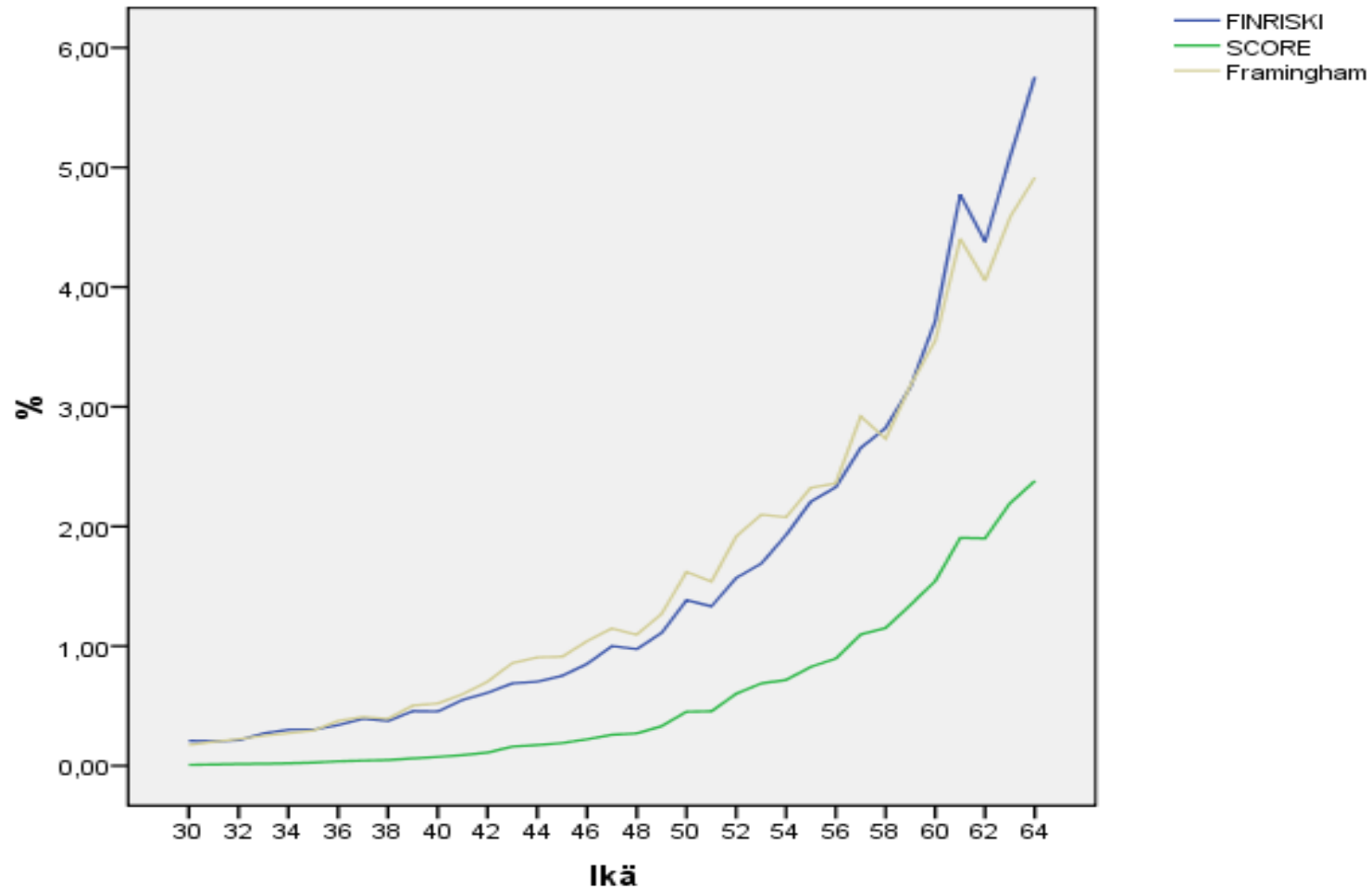
Ten-year CVD risk by age



Ten-year CHD risk by age



Ten-year stroke risk by age

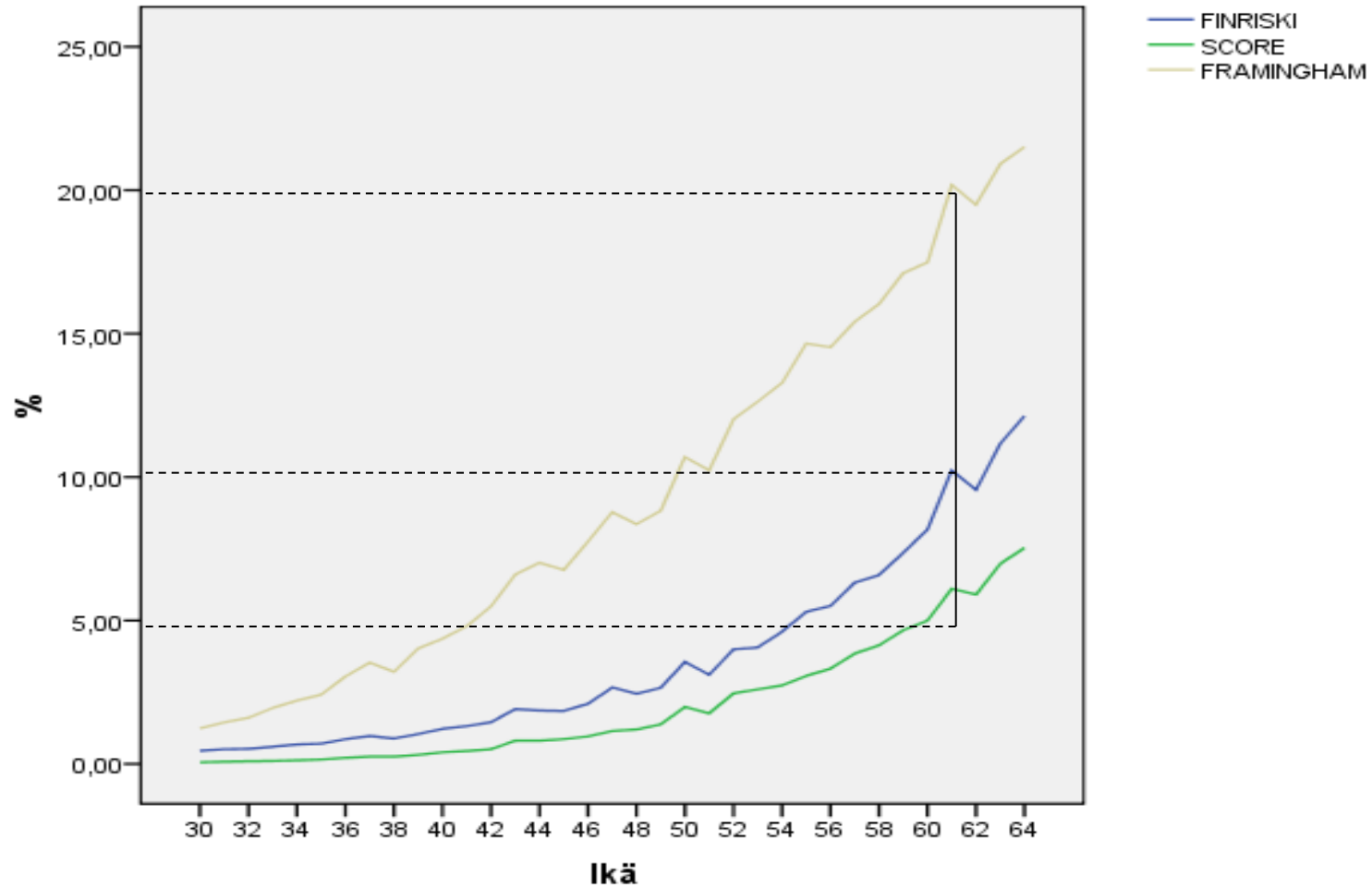


Fatal vs. total risk assessment

- CVD death
 - clear and fairly reliable
 - international comparisons
 - underestimates the “true” CVD risk
 - can not make difference between primary prevention and treatment
- Total CVD events
 - preferable
 - national data available in many countries
 - risk prediction depends on end-point definition
- Risk “equivalents”
 - SCORE 5%
 - FINRISK: 10%
 - Framingham 20%



Ten-year CVD risk by age



Mr X

- Age 55 yrs, SBP 140mmHg, total cholesterol 5.0 mmol/l, non-smoker – **fine!**
- 10- year risk
– **SCORE 3%**



Mr X

- **But** he has diabetes, parents have had MI, HDL cholesterol 1.0 mmol/l
- 10- year risk
– **FINRISK 16%!**



Absolute vs. relative risk

- Absolute risk is generally low in young people
 - life time risk
 - risk projection to higher age (with same risk factors)
- Motivation for **lifestyle changes**
 - both absolute and relative risk can be used
- **Drug treatment**
 - assessment should be mainly based on absolute risk
 - total risk assessment (including major risk factors and end-points)
 - Should men and women have different guidelines for hypertension and cholesterol treatment? How about smokers and non-smokers?
 - **side effects and costs are absolute**



Conclusions

- There are no objective definition for “high” risk
 - depends on age, gender - and values of the individuals and society
 - The specificity and sensitivity of the test depends on arbitrary decision
 - Health economic calculations; cost of healthy life year, saved life year, DALY....
- In clinical practice (and public health projects) differences in end-point definitions should be taken into account in risk assessment



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- Literature:
 - SCORE: Conroy RM et al, Estimation of ten-year risk of fatal cardiovascular disease in Europe: the SCORE Project. Eur Heart J 2003;24:987-1003.
 - Framingham: Anderson KM et al, Updated coronary risk profile. A statement for health professionals. Circulation 1991;83:356-362.



THANK YOU

