

# Follicle Stimulating Hormone Levels and Subclinical Atherosclerosis in Older Postmenopausal Women

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## Introduction

- Recent studies suggest that follicle stimulating hormone (FSH) may play a role in cardiovascular health, independent of estradiol (E2)<sup>1</sup>
- Previous studies have evaluated FSH and atherosclerosis in women during the menopausal transition, when levels are highly dynamic
- Whether FSH after menopause is associated with atherosclerosis is unknown.

## Objectives

- We assessed the relation of postmenopausal FSH and E2 levels with carotid artery intima-media thickness (IMT), a measure of atherosclerosis.
- Study participants were members of the Kuopio Ischaemic Heart Disease (KIHD) Risk Factor Study, a prospective study of risk factors for cardiovascular disease in men and women in eastern Finland.

## Methods

- Participants were 588 female KIHD members, aged 53-73 at baseline (1998-2001) and not using hormone therapy (HT).
- Women completed a clinical examination, during which common carotid artery (CCA) IMT was measured via high resolution B-mode ultrasonography. Mean IMT was averaged from 100 measures of the left and 100 of the right CCA.<sup>2</sup>
- Fasting blood samples were assayed for FSH and E2, along with testosterone, plasma lipids, insulin and glucose.
- Participants self-reported data on demographics, behavioral, reproductive and health factors via questionnaire.
- Height and weight were directly measured, and study physicians recorded prevalent cardiovascular and metabolic disease.
- Multivariable linear regression was used to assess relations of FSH and E2 with mean IMT.

## Results

Table 1: Mean Participant Characteristics by Quartile of FSH

	Q1	Q2	Q3	Q4
N	147	149	145	147
FSH (IU/L)*	32.1	45.1	55.4	72.8
Age (yr)	64.5	65.1	64.4	62.9**
BMI (kg/m <sup>2</sup> )	31.1	29.0	28.8	26.8**
E2 (pmol/L)	55.8	35.1	32.5	34.1**
T (nmol/L)	1.5	1.1	1.1	1.1
Parity (#)	2.5	2.4	2.5	2.0**
HT use (%)	28	32	34	36
IMT (mm)	0.94	0.91	0.87	0.85**

BMI= body mass index; E2 = estradiol; T = testosterone, HT = hormone therapy (past use); IMT = intima-media thickness  
\* quartile median  
\*\* P < 0.05

Figure 1: Adjusted Mean IMT by Quartile of FSH

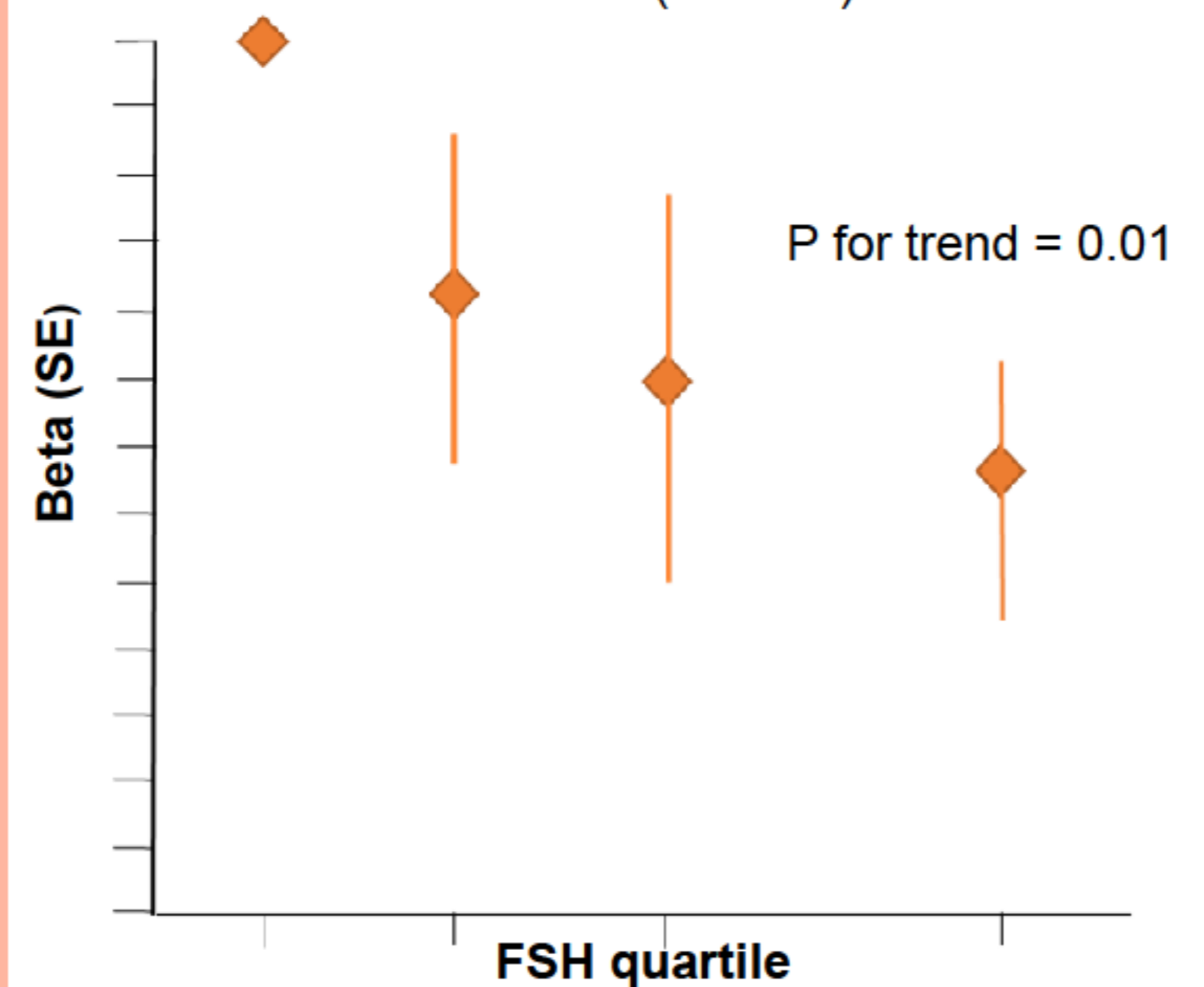


Figure 2a: Adjusted Mean IMT by Quartile of FSH

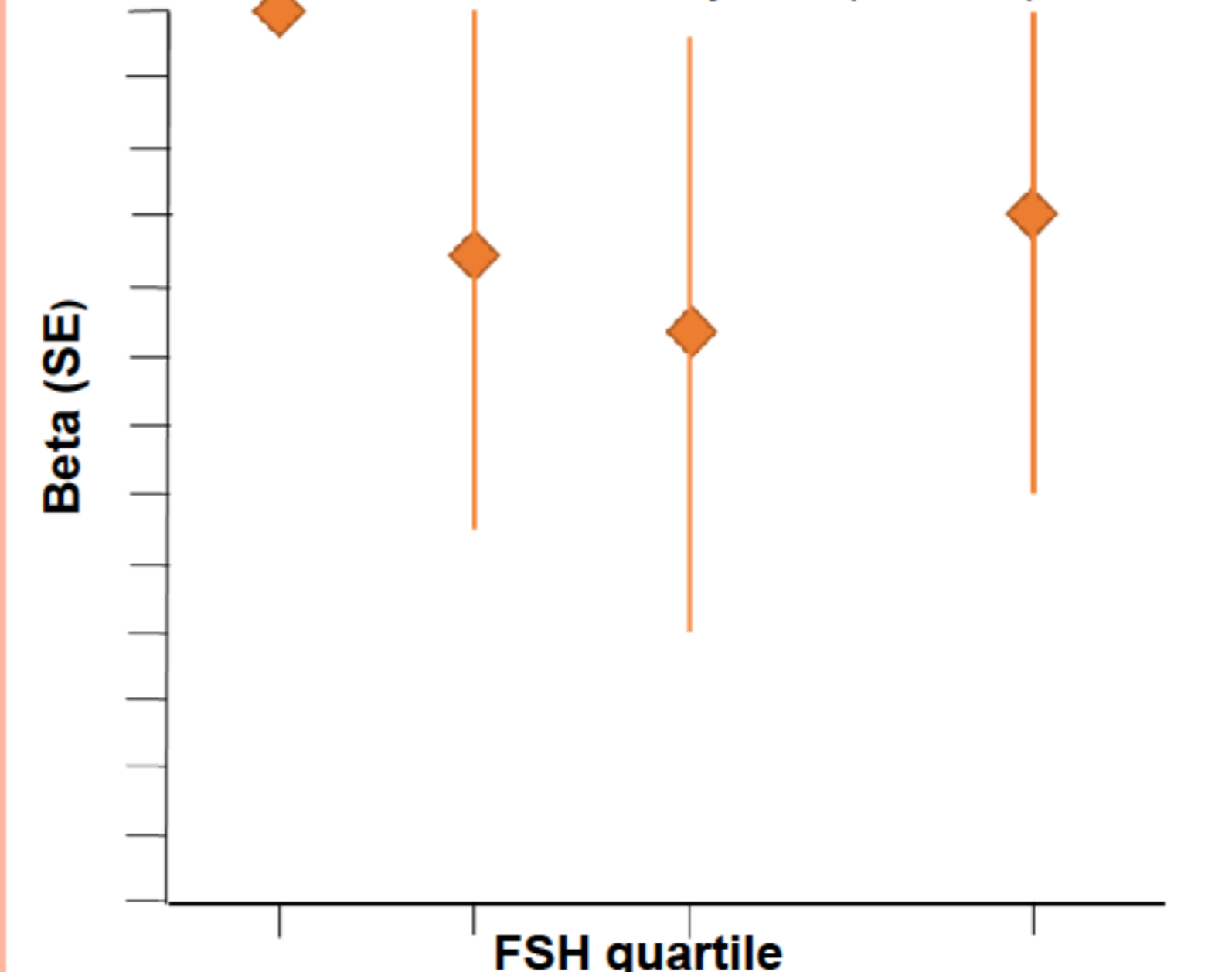
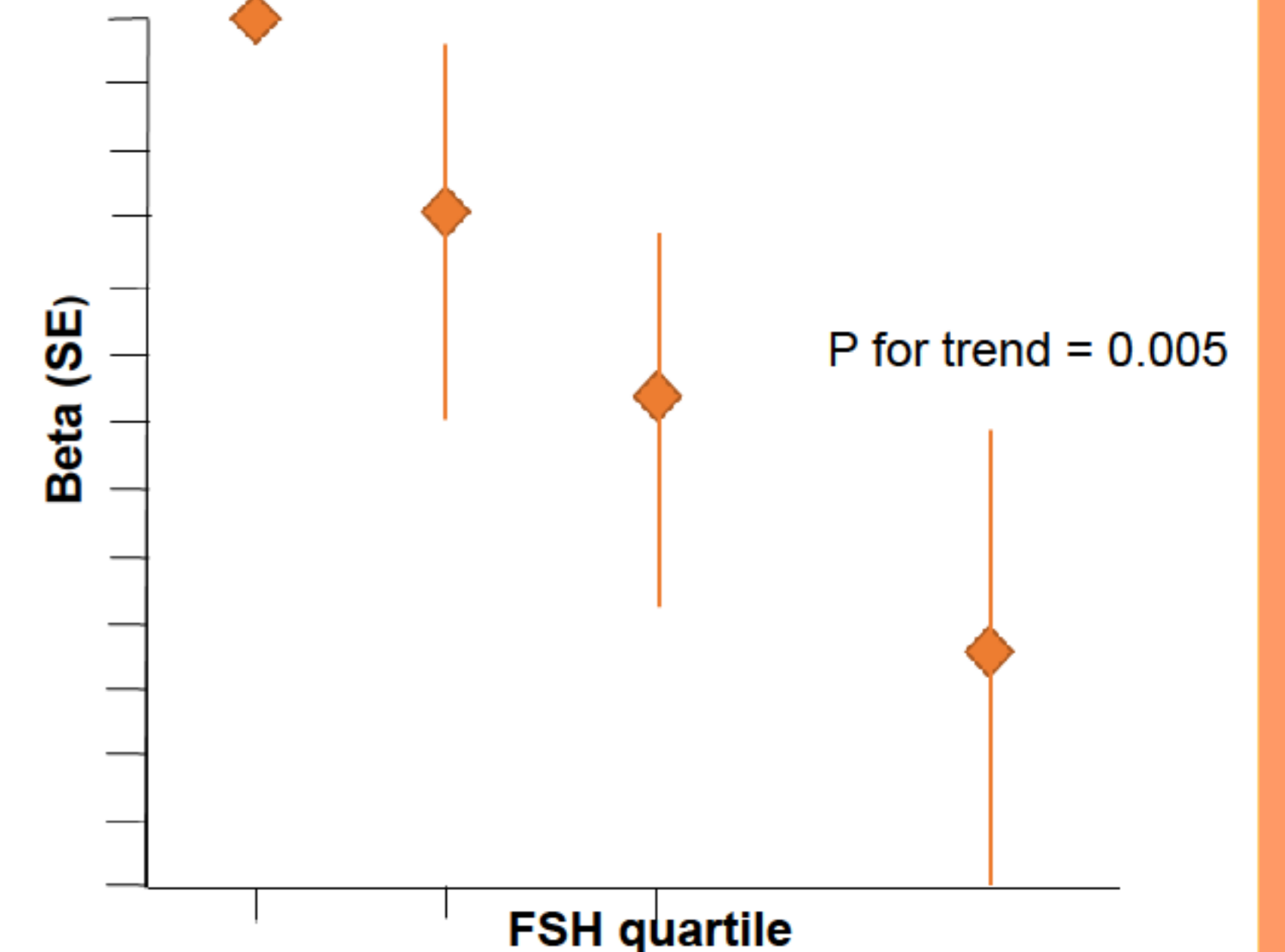


Figure 2b: Adjusted Mean IMT by Quartile of FSH



- Mean IMT in women in quartiles 1-4 of FSH were 0.94, 0.91, 0.87 and 0.85mm, respectively ( $P_{\text{trend}} < 0.001$ ; Table 1).
- FSH levels remained inversely associated with IMT in multivariable models ( $P_{\text{trend}} = 0.01$ ; Figure 1).
  - Models were adjusted for age, enrollment year, E2, body mass index, waist to hip ratio, physical activity, past HT use, duration of HT use, smoking status, pack-years of smoking, alcohol use, parity, age at menopause, systolic & diastolic blood pressure, testosterone, lipid levels (total, LDL, & HDL cholesterol & triglycerides), fasting glucose, fasting insulin, history of hypertension, diabetes, symptomatic heart disease and stroke, and current use of medications for hypertension, diabetes, high cholesterol and heart disease.
- Findings differed by age ( $P_{\text{interaction}} = 0.01$ ; Figures 2a & 2b) and were strongest for women aged 64-73 ( $P_{\text{trend}} = 0.005$ ).
- In contrast, E2 levels were unrelated to IMT ( $P > 0.05$ ). Additionally, findings did not vary by body mass index ( $P_{\text{interaction}} > 0.05$ ).

## Conclusions

- Postmenopausal FSH levels were significantly and inversely associated with common carotid artery intima-media thickness.
- Relations were strongest among older postmenopausal women (ages 64-73).
- Associations of FSH and IMT were not explained by confounding or effect modification by adiposity, estradiol levels, or prevalent cardiometabolic disorders.
- Prospective studies of postmenopausal FSH and atherosclerosis progression are warranted to better understand these relations and clarify potential underlying physiology.

## References:

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