

ATBC Lung Cancer Prevention Study

Information for researchers interested in using stored samples and data

Introduction

The Alpha-Tocopherol, Beta-Carotene (ATBC) Lung Cancer Prevention Study (also known by its Finnish name SETTI) was a randomized, double-blinded, placebo-controlled trial testing whether alpha-tocopherol and/or beta-carotene supplements can reduce the incidence of lung cancer and other cancers. The study was conducted by the Finnish Institute for Health and Welfare (THL) and the U.S. National Cancer Institute (NCI).

Almost 30 000 male smokers, aged 50 to 69 years, participated in the study between 1985 and 1993. Participants were randomized to one of four treatment groups: to receive daily Alpha-tocopherol alone, beta-carotene alone, Alpha-tocopherol and beta-carotene or placebo capsules for 5 to 8 years (median 6.1 years). Blood samples and physical measurements were collected during the baseline and several follow-up visits. Participants also completed questionnaires on background characteristics, occupational history, health status and smoking. They also filled food frequency questionnaires (FFQ). After the active study part, in order to evaluate the long-term effects of the vitamins on cancer incidence and mortality, participants were followed from the national registries in Finland.

More detailed information about the study methods is available in published [study article](#).

Ethical considerations

Written informed consent was obtained from every participant who participated in the original study. ATBC Lung Cancer Prevention Study sample collection has been transferred to THL Biobank in 31st December 2019, following a personal notification process allowed by the Finnish Biobank act. The transfer of the ATBC Lung Cancer Prevention Study to the biobank has been approved by the Coordinating Ethics Committee of Helsinki University Hospital on 15th May 2019 and personal notification of the biobank transfer was approved by the Ministry of Social Affairs and Health on 3rd July 2019.

Selection of study participants

Participants of the ATBC Lung Cancer Prevention Study were recruited from 14 different areas in southwestern Finland. The inclusion criteria for study participants were the following

- male
- 50-69-years-old
- smoking five or more cigarettes per day

Individuals were excluded from the study based on the following criteria: a proven malignancy other than nonmelanoma skin cancer or carcinoma in situ, severe angina on exertion, chronic renal insufficiency, cirrhosis of liver, chronic alcoholism, anticoagulant therapy, and other medical problem that might limit participation for 6 years or use of supplements containing vitamin E, vitamin A or BC.

ATBC Lung Cancer Prevention Study samples available for biobank research

The following samples are available from ~20 000 sample donors

- DNA

Inventory of serum samples is ongoing and the samples will become gradually available.

Sample collection details:

- All study nurses were trained, registered nurses. Participants were asked to fast for at least 12 hours before the first baseline visit. At the first baseline visit blood samples were collected, divided into 10 aliquots of 1,5 ml serum and stored deep frozen at -70°C. Similar sample collection and storage were repeated after three years of intervention in the follow-up visit. Toenail samples were collected in the baseline visit.

ATBC Lung Cancer Prevention Study phenotype and omics data available for biobank research

Below are the details on the baseline data that is available from the ATBC Lung Cancer Prevention Study participants. The data collected during follow-up visits is not yet available from THL Biobank.

Baseline data

- Age
- Gender
- Recruitment area
- Sampling information

Data collected by questionnaires

- Sociodemographic characteristics
 - ✓ Education
 - ✓ Marital status
 - ✓ Work history
- Health status
 - ✓ Cancer
 - ✓ Heart and cardiovascular diseases
 - ✓ Digestive system diseases
 - ✓ Nutritional and metabolic diseases
 - ✓ Genitourinary system diseases
 - ✓ Respiratory diseases
 - ✓ Skin diseases
 - ✓ Musculoskeletal system
 - ✓ Oral health
 - ✓ Vision and hearing problems
 - ✓ Family history
- Health services
- Lifestyle
 - ✓ Physical activity
 - ✓ Smoking

Dietary data

- Food frequency (use) questionnaire (FFQ)
 - ✓ Portion size and frequency of consumption for several food items and mixed dishes

Physical examination data

- Weight, height, BMI
- Blood pressure, pulse

Biological test results

- Blood lipid values (total cholesterol, HDL cholesterol)
- Vitamin measurements (alpha-tocopherol, beta-carotene, retinol)
- Glucose

Omics data

For availability of genome-wide genotypes and sequencing data, see more information in the 'THL Biobank Omics data availability table' at the THL Biobank sample collection page.

Registry data

Data from Finnish National Registers (such as National Social Welfare and Health Care registers e.g. Care Register for Health Care, Cancer Registry, Statistics Finland's registers, Kela's registers e.g. Drug Reimbursement Registers) can be linked to all sample donors by a separate application process.

Research group**Principal Investigator**

Satu Männistö, THL
(Jarmo Virtamo, THL)

Key references

The alpha-tocopherol, beta-carotene lung cancer prevention study: Design, methods, participant characteristics, and compliance. The ATBC cancer prevention study group. *Ann Epidemiol.* 1994 Jan;4(1):1-10.

Alpha-Tocopherol, Beta Carotene Cancer Prevention Study Group. The effect of vitamin E and beta carotene on the incidence of lung cancer and other cancers in male smokers. *N Engl J Med.* 1994 Apr 14;330(15):1029-35.

Heinonen OP, Albanes D, Virtamo J, Taylor PR, Huttunen JK, Hartman AM, Haapakoski J, Malila N, Rautalahti M, Ripatti S, Mäenpää H, Teerenhovi L, Koss L, Virolainen M, Edwards BK. Prostate cancer and supplementation with alpha-tocopherol and beta-carotene: incidence and mortality in a controlled trial. *J Natl Cancer Inst.* 1998 Mar 18;90(6):440-6.

Kataja-Tuomola M, Sundell JR, Männistö S, Virtanen MJ, Kontto J, Albanes D, Virtamo J. Effect of alpha-tocopherol and beta-carotene supplementation on the incidence of type 2 diabetes. *Diabetologia.* 2008 Jan;51(1):47-53.

Hemilä H, Kaprio J. Vitamin E supplementation and pneumonia risk in males who initiated smoking at an early age: effect modification by body weight and dietary vitamin C. *Nutr J.* 2008 Nov 19;7:33.

Männistö S, Kontto J, Kataja-Tuomola M, Albanes D, Virtamo J. High processed meat consumption is a risk factor of type 2 diabetes in the Alpha-Tocopherol, Beta-Carotene Cancer Prevention study. *Br J Nutr.* 2010 Jun;103(12):1817-22.

Moy KA, Mondul AM, Zhang H, Weinstein SJ, Wheeler W, Chung CC, Männistö S, Yu K, Chanock SJ, Albanes D. Genome-wide association study of circulating vitamin D-binding protein. *Am J Clin Nutr.* 2014 Jun;99(6):1424-31.

Lai GY, Weinstein SJ, Taylor PR, McGlynn KA, Virtamo J, Gail MH, Albanes D, Freedman ND. Effects of α -tocopherol and β -carotene supplementation on liver cancer incidence and chronic liver disease mortality in the ATBC study. *Br J Cancer.* 2014 Dec 9;111(12):2220-3.

Playdon MC, Moore SC, Derkach A, Reedy J, Subar AF, Sampson JN, Albanes D, Gu F, Kontto J, Lassale C, Liao LM, Männistö S, Mondul AM, Weinstein SJ, Irwin ML, Mayne ST, Stolzenberg-Solomon R. Identifying biomarkers of dietary patterns by using metabolomics. *Am J Clin Nutr.* 2017 Feb;105(2):450-465.

Middha P, Weinstein SJ, Männistö S, Albanes D, Mondul AM. β -Carotene Supplementation and Lung Cancer Incidence in the Alpha-Tocopherol, Beta-Carotene Cancer Prevention Study: The Role of Tar and Nicotine. *Nicotine & Tobacco Research.* 2018 Jun 8

Lai GY, Wang JB, Weinstein SJ, Parisi D, Horst RL, McGlynn KA, Männistö S, Albanes D, Freedman ND. Association of 25-Hydroxyvitamin D with Liver Cancer Incidence and Chronic Liver Disease Mortality in Finnish Male Smokers of the ATBC Study. *Cancer Epidemiol Biomarkers Prev.* 2018 Sep;27(9):1075-1082.