

# Elevated calcium concentration – is it dangerous?

## Long-term follow-up in primary care

*Distriktsläkare Sofia Dalemo*

Avdelningen för samhällsmedicin och folkhälsa/enheten för allmänmedicin,  
Institutionen för medicin  
Sahlgrenska akademien, Göteborgs universitet

Akademisk avhandling

som för avläggande av medicine doktorexamen vid Sahlgrenska akademien vid  
Göteborgs universitet kommer att offentligt försvaras i Lokal: 2118, hus 2,  
Arvid Wallgrens Backe

fredagen den 7 mars 2014 kl.13.00

### Fakultetsopponent:

*Peter Engfeldt,  
Professor Örebro universitet*

Avhandlingen baseras på följande delarbeten:

- I. **Dalemo S**, Hjerpe P, Bostrom Bengtsson K. Diagnosis of patients with raised serum calcium level in primary care, Sweden. *Scand J Prim Health Care*. 2006; 24:160-165.
- II. **Dalemo S**, Eggertsen R, Hjerpe P, Jansson S, Almqvist E, Bengtsson Boström K. Long-term follow-up of patients with elevated serum calcium concentration in Swedish primary care. *Scand J Prim Health Care*. 2013; 31:248-254.
- III. **Dalemo S**, Eggertsen R, Hjerpe P, Jansson S, Almqvist E, Bengtsson Boström K. Quality of life and health care consumption in patients with elevated serum calcium concentrations in Swedish primary care. Submitted.
- IV. **Dalemo S**, Hjerpe P, Ohlsson H, Eggertsen R, Merlo J, Bostrom KB. Variation in plasma calcium analysis in primary care in Sweden – a multilevel analysis. *BMC Fam Pract*. 2010; 11:43.



GÖTEBORGS UNIVERSITET

# Abstract

**Background and aims:** Patients with hypercalcaemia are relatively common in primary care; the most frequent causes are primary hyperparathyroidism (pHPT) and cancer. Many patients with pHPT have such discrete symptoms that they are difficult to detect without a calcium analysis. To increase the detection of pHPT, more calcium analyses are recommended by Swedish authorities. The aim of this thesis was to study the care of patients with elevated calcium concentrations and to investigate factors contributing to the variation in calcium analyses between physicians and health care centres (HCC) in primary care.

**Material and Methods:** First, we investigated all patients with elevated calcium concentrations (n=142) at Tibro HCC between the years 1995–2000. In the following studies, HCC patients with normal calcium concentrations were used as controls. Both groups were offered an examination after 10 years with new blood analyses and questions concerning diseases, medication and quality of life.

In the last study, the variation in the ordering of calcium analyses between 457 physicians and 24 HCCs was investigated through a multilevel analysis.

**Results:** In the first study we tried to survey the underlying causes in patients with elevated calcium concentrations; however, no cause was found in 70 % of the patients. pHPT and cancer were among the most common diagnoses. At follow-up, 88 % of the patients with elevated calcium concentrations turned out to have an underlying disease. Many women had pHPT, while men showed an increased mortality from cancer. Patients with elevated calcium concentrations had poorer quality of life and increased health care utilisation than patients with normal calcium concentrations.

There were large differences in the number of calcium analyses ordered, both between physicians and HCCs. A patient's likelihood of an analysis could increase 2.5 times if both the physician and the HCC were changed. Physicians in education ordered more and locums fewer calcium analyses than the average general practitioner.

**Keywords:** Hypercalcaemia, primary care, primary hyperparathyroidism, cancer, gender, mortality, longitudinal studies, quality of life, health care costs, Physician's Practice Patterns

ISBN:978-91-628-8905-0