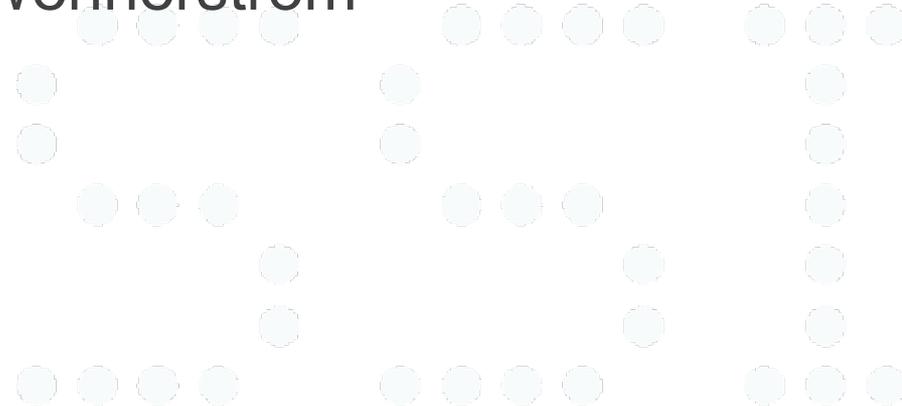




# LABMED REGISTRY, STORAGE, CONTENT AND POSSIBILITIES FOR CRC STUDIES

E. Christina M. Wennerström





Civil registration number

Civil Registration System

Individual info.

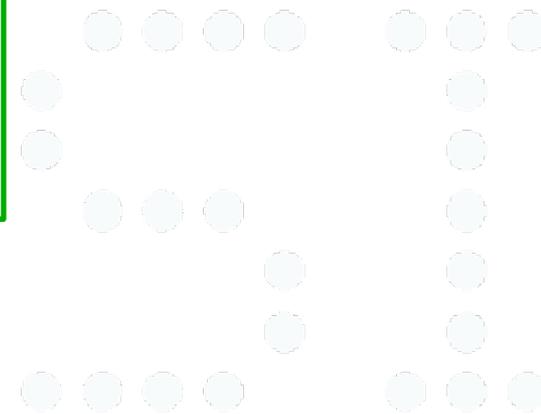
- Health care/cost
- Civil: family, childcare, residence, work, income
- Biological samples

Medical Birth Registry  
National Patient Registry  
Pathology registry  
Prescription Drug Registry  
Cancer Registry  
Vaccination Registry  
Hospital Cost Database  
...  
Specific health registries

Education registry  
Labour force registry  
...

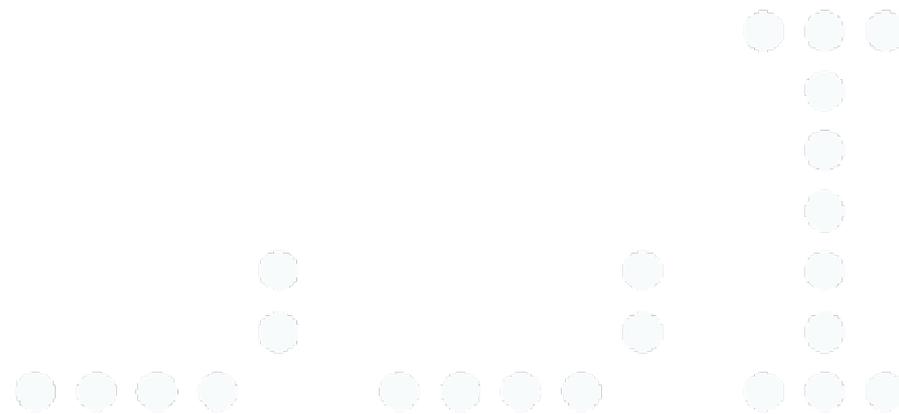
Biobank registry

Labdata registry



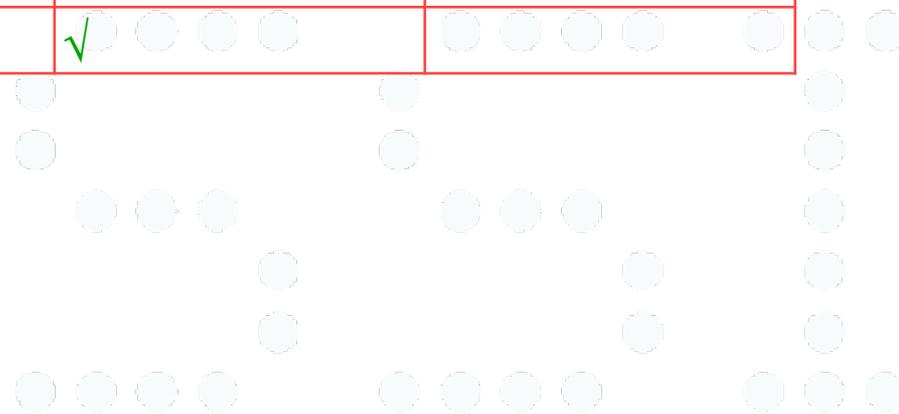
∴ MEDCOM has replaced handwritten messages to a large extent

| Type of communication                                       | Digital |
|---|---------|
| Referrals: general practitioner to specialized treatment    | 81 %    |
| Discharge letters: hospitals to general practitioner        | 99 %    |
| Lab test orders/results: laboratory to general practitioner | 99 %    |



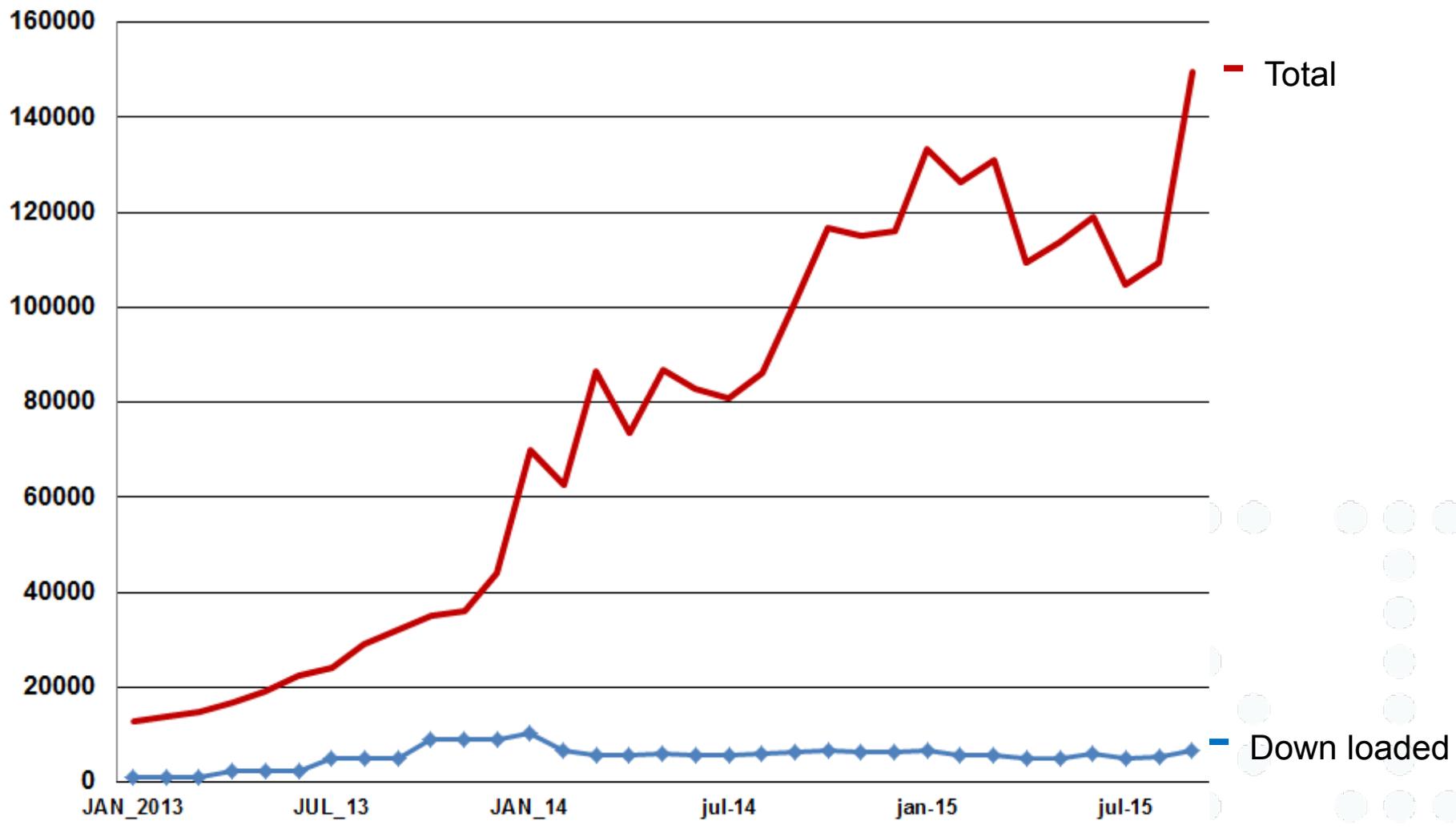
# CONNECTING REGIONS/LABORATORIES

| Region/Laboratorie                        | Biochemistry      | Immunology        |
|---|-------------------|-------------------|
| North Jutland (Nordjylland)               | ✓                 | ✓                 |
| Central Jutland (Midtjylland)             | Not yet connected | ✓                 |
| South Denmark (Syddanmark)                | ✓                 | Not yet connected |
| Capital region (Hovedstaden)              | ✓                 | ✓                 |
| Zealand (Sjælland)                        | ✓                 | Not yet connected |
| KPLL, Copenhagen Practitioners laboratory | ✓                 |                   |
| Steno Diabetes Center                     | ✓                 |                   |
| Statens Serum Institut                    | ✓                 |                   |

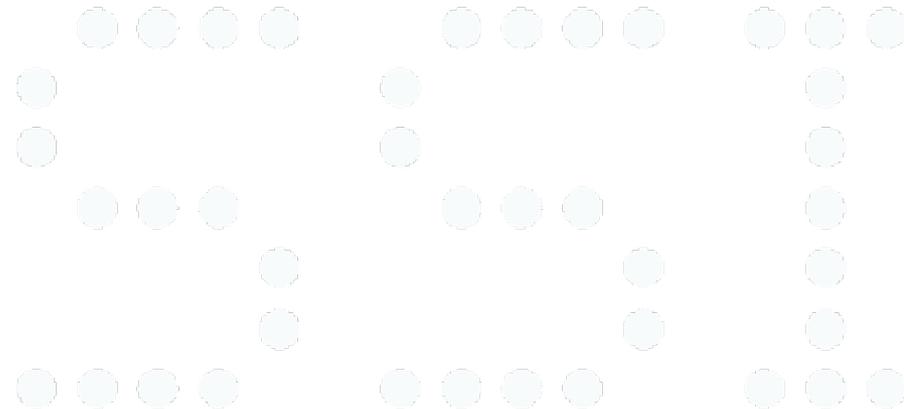


# REGISTERED LABDATA RESPONSE

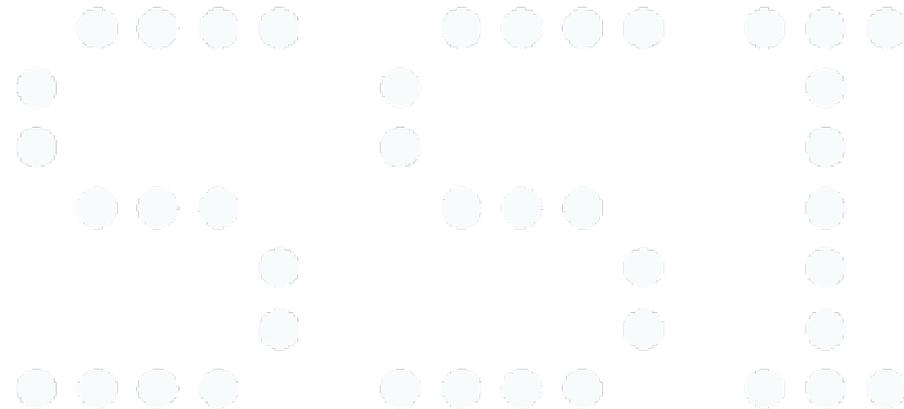
per month



- Electronic message
  - Envelope
    - Date sent
  - Laboratory report
    - Letter
      - Authorization date
    - Sender
    - Receiver
      - Remitting physician
    - CC Receiver
    - Patient



- Requisition information
  - Sampling date/time
  - Sampling interval
    - Start date/time
    - End date/time
- Laboratory results
  - General information of result
    - Date/time
- Result max. x 99
  - Analysis
  - Performing laboratory
  - Reference interval
  - Reference max. x 10



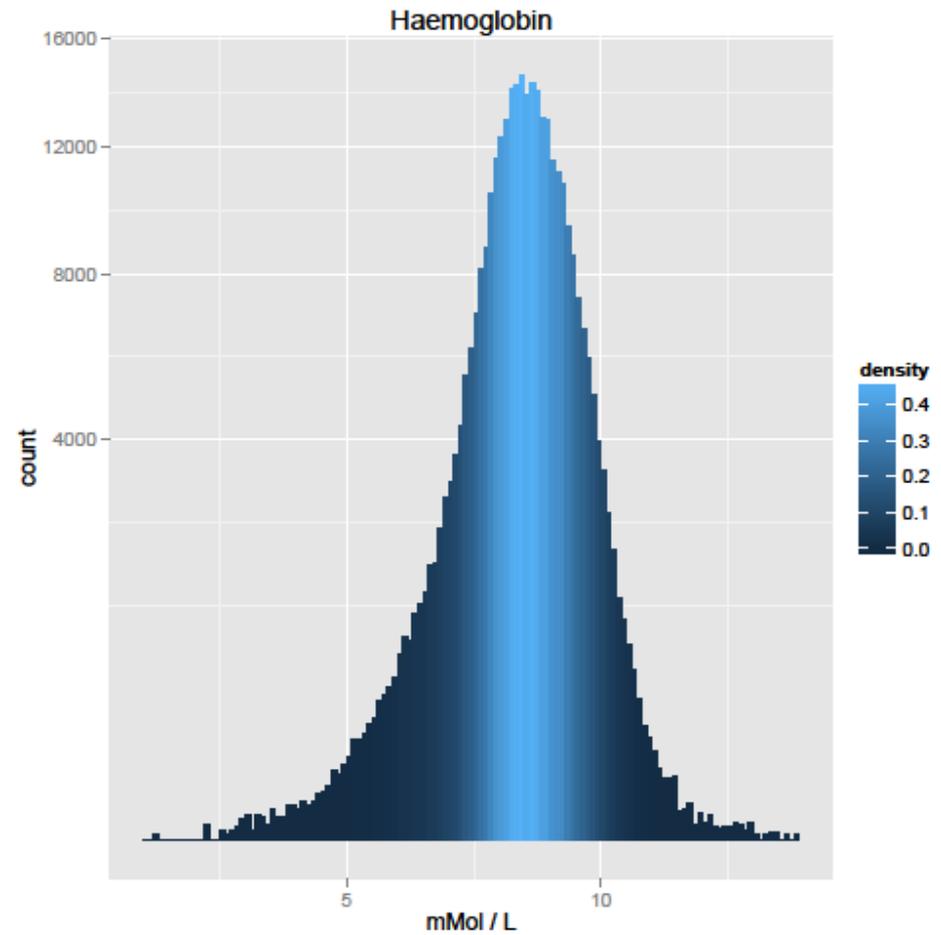
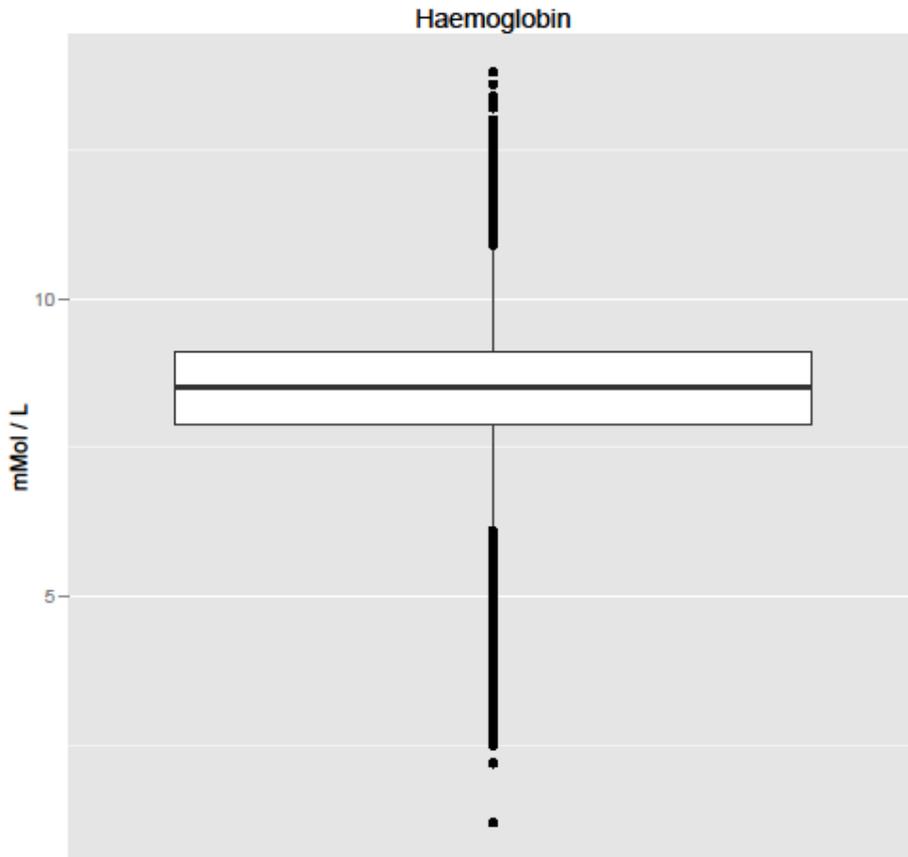
Currently 20 million records monthly, 30 million in the future

2911 different types of tests, defined by the NPU- or a local-code

- Numeric
  - >100 types of lab tests have been performed once
  - 50 types of lab tests have been performed >10 000 times
- Alphanumeric, 23% of the results
  - ANALYSIS TYPE= SYPHILIS TEST, RESULT= NEG
  - ANALYSIS TYPE= BAC-TEST, RESULT= Blood can be sent until 15-07-2013  
KI. 08:00)
  - Most common \*\*\*\*\*, analysis will be performed in near future

| Code     | Namo   |
|----------|--|
| NPU18016 | P-Creatininium; subst.c. = ? $\mu\text{mol/L}$   |
| NPU02319 | B-Haemoglobin (Fe); subst.c. = ? $\text{mmol/L}$   |
| DNK35131 | Kidn.-Glomerular filtration; vol.rate (surf.=1.73 $\text{m}^2$ ;<br>DSKB-DNS 2009) = ? $\text{mL/min}$ |
| NPU02593 | B-Leukocytes; num.c. = ? $\times 10^9/\text{L}$  |
| NPU03429 | P-Sodium ion; subst.c. = ? $\text{mmol/L}$   |
| NPU03230 | P-Potassium ion; subst.c. = ? $\text{mmol/L}$  |
| NPU03568 | B-Thrombocytes; num.c. = ? $\times 10^9/\text{L}$  |
| NPU19651 | P-Alanine transaminase; cat.c.(IFCC 2002) = ? $\text{U/L}$   |
| NPU01944 | B-Erythrocytes; entitic vol. = ? $\text{fL}$   |

# HAEMOGLOBIN DISTRIBUTION





Civil registration number

Civil Registration System

Individual info.

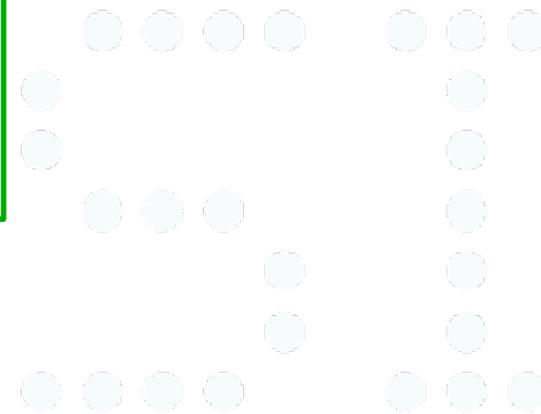
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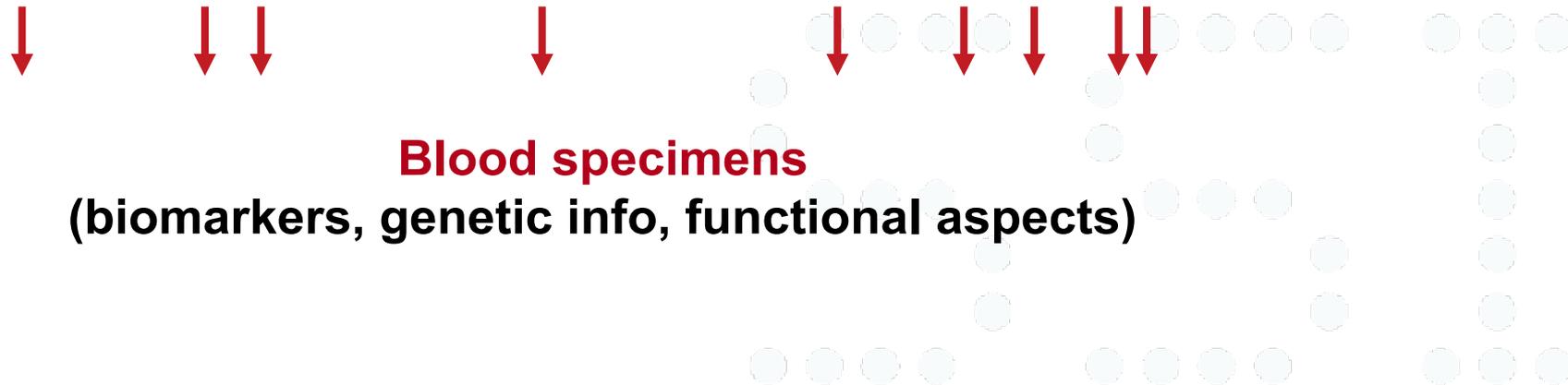
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Labour force registry  
...

Biobank registry

Labdata registry

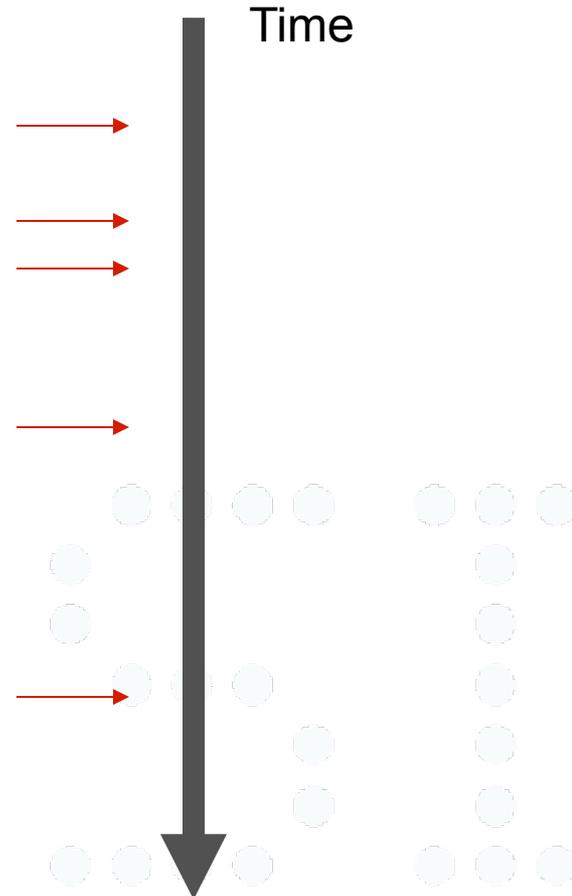


# LIFE CAUSE EPIDEMIOLOGI



# A PERSONS HEALTH SNAP SHOT

| Service                            | Costs (DKK) | Results   |
|------------------------------------|-------------|-----------|
| Chemotherapy (per dose)            | 6 530       |           |
| Radiation planning                 | 5 731       |           |
| Cholesterol measurement            | 189         | 6 mmol/l  |
| X- ray                             | 466         |           |
| Consultation, general practitioner | 129         |           |
| Blood pressure                     | 78          | 135/80    |
| Bone marrow examination            | 4 860       |           |
| Clinical examination               | 129         |           |
| MR-scanning                        | 1 647       | Prolap.S1 |
| Home care                          | 448         |           |
| Radiotherapy (per fraction)        | 2 473       |           |
| Bone marrow examination            | 4 860       |           |
| Visit at the dermatologist         | 566         |           |
| Hemoglobin                         | 643         | 8 mmol/l  |
| Biopsy                             | 45          |           |
| Unemployment benefits              | 1.320       |           |
| Change of marital status           |             |           |



# POSSIBILITIES FOR CRC STUDIES

## Defined study population

CPR registry



Cancer registry      CRC



CPR registry  
Cancer registry



No family member  
with CRC

Family member  
with CRC



## Colorectal Cancer in Denmark

|                        | Total<br>(C18-C20) | Colon<br>(C18) | Rectosigmoid<br>junction (C19) | Rectum<br>(C20) |
|------------------------|--------------------|----------------|--------------------------------|-----------------|
| Total n (%)            | 136 090 (100)      | 85 163 (62.6)  | 3894 (2.9)                     | 46732 (34.3)    |
| 1 CRC relative n (%)   | 1421 (1.0)         | 900 (63.3)     | 19 (1.3)                       | 501 (35.3)      |
| 2+ CRC relatives n (%) | 74 (0.1)           | 49 (66.2)      | 2 (2.7)                        | 23 (31.1)       |

Information collected from the Civil Registration System and Cancer Registry, diagnosed 1968-2014

## National Biobank samples among CRC diagnosed, 1968-2014

| Type of sample | Individuals (n) | Samples (n) |
|----------------|-----------------|-------------|
| DNA            | 1903            | 1907        |
| Dry frozen     | 2611            | 2670        |
| FFPE           | 70 183          | 289 013     |
| Serum          | 81              | 151         |
| Urine          | 11 496          | 19 377      |
| Whole blood    | 1475            | 2597        |

Age at sampling 35-100, sampled year 1877-2014, diagnosed 1968-2014

**Employment registry**

Employment

**Education registry**

Highest/type of education

**Income registry**

Family income

**National Patient Registry**

Diseases ICD-code:

- Smoking/Alcohol
- Obesity
- Diabetes
- Infections

**Prescription Drug Registry**

Treatment ATC-code:

- Smoking/Alcohol
- Obesity
- Antibiotics
- NSAIDs

**CRC registry**

Collected information:

- Smoking/Alcohol
- Obesity

## LABdata registry

NPU-code:

- Nicotine/Cotinine
- Alcohol (GGT,CDT)
- Glucose
- Insulin
- Cholesterol
- Infections
- Inflammation
- ...

# CRC RELATED FACTORS

**Cancer registry**  
**Pathology registry**

Tumor information  
Morphology, stage, type ...

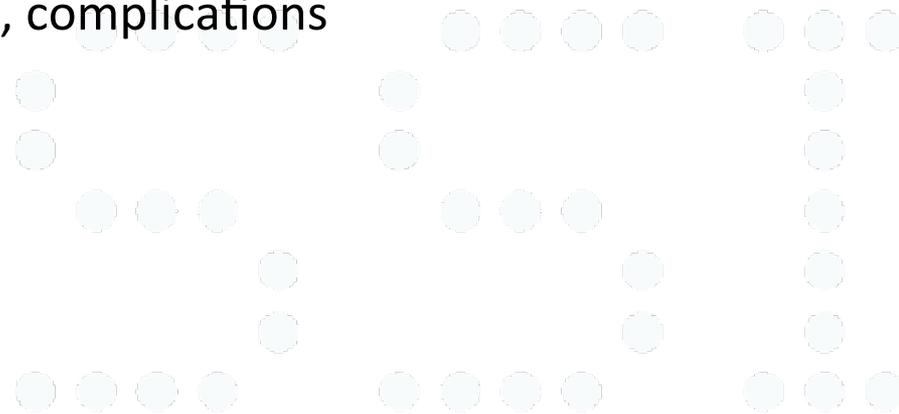
**National Patient Registry**  
**Prescription Drug Registry**

Diagnosis  
Prescriptions

**CRC registry**

Operation, surgery  
Treatment, complications  
Relapse

**Cause of death registry**



❖ ...and the:

- impact of **Folate**
- global metabolites influence
- systemic pre-diagnostic and diagnostic Folate levels
- pre-diagnostic and diagnostic Folate related microRNA levels/expression
- DNA methylation alteration and related Folate levels
- DNA methylation levels related to the expression of specific microRNAs
- mutations of Folate related microRNAs
- previous prescriptions related to inflammation
- Folate levels and inflammatory levels of markers
- Folate levels where Folate related microRNA is overexpressed
- Folate levels in individuals with specific mutations of Folate related microRNAs
- Folate levels by previous prescriptions related to inflammation

## ❖ Measurements

- before diagnosis
- at diagnosis
- at treatment
- after treatment

### **Labdata registry (NPU-code)**

#### Inflammation (levels)

- CRP
- Neopterin

#### Metabolites (levels)

- Folate
- B-vitamin
- Homocysteine

### **Biobank registry**

#### Blood/tissue/urine

#### Levels

- Metabolites
- Expression of genes, mi-RNA
- DNA methylation

#### Mutations

- Gene, proteins
- micro-RNA

# QUESTIONS?

