A NATIONWIDE PULMONARY CARCINOID TUMOR COHORT COLLECTED FROM THE FINNISH CLINICAL PATHOLOGY INTEGRATED BIOBANKS

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European Society of Pathology

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Disclosure Information

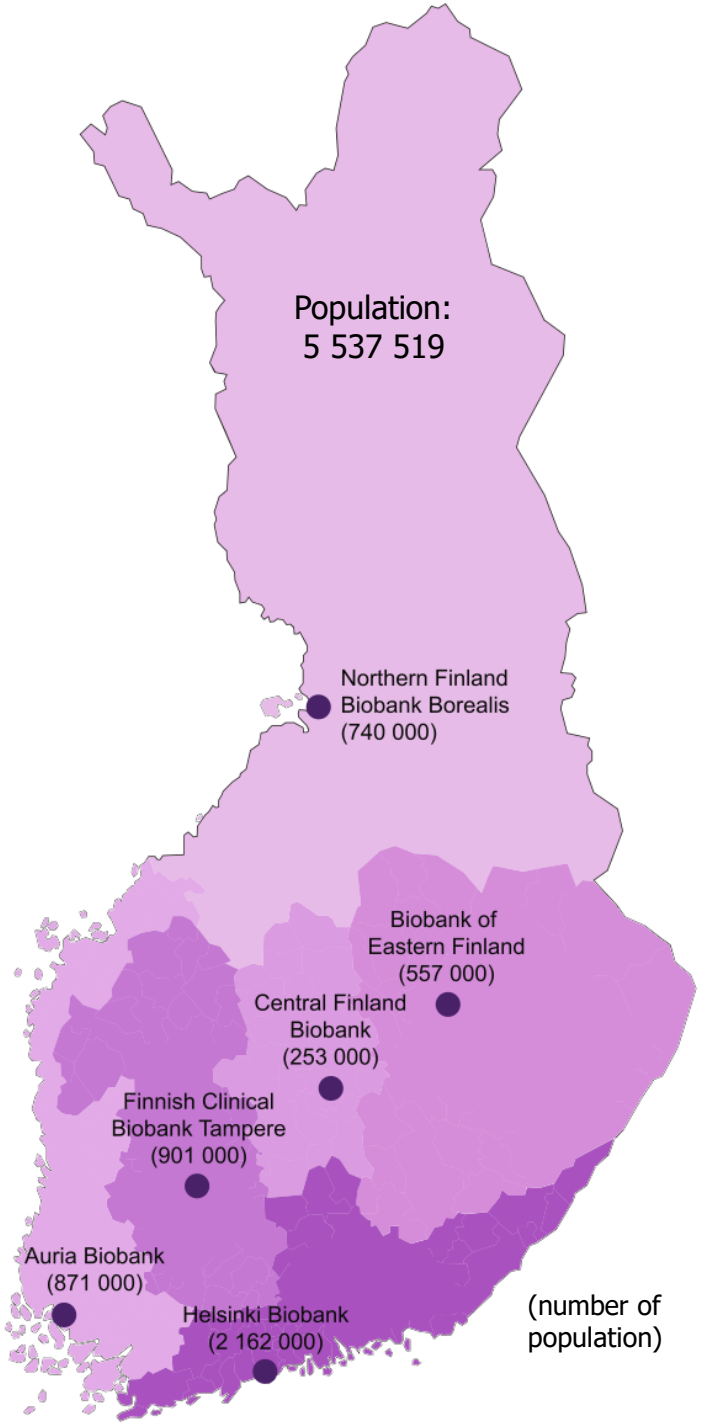
I hereby declare that I have had business or personal interests in the following industrial enterprises since 1 September 2018:

Name of the enterprise / Nature of the interest

Enterprise | Interest
None

FINNISH BIOBANKS: NATIONWIDE COHORTS OF RARE DISEASES

- Biobank Act, 09/2013
- 10 biobanks, 6 hospital-integrated
- Broad, informed consent as the primary justification for collecting samples
- Pathway for transferring clinical and research sample collections to a biobank: opt-out procedure
- Major Finnish clinical pathology sample archives have been transferred and are available for research use
  - Millions of tissue samples from ~3 million persons



FINNISH CANCER REGISTRY (FCR) COLLECTS NATIONWIDE CANCER INCIDENCE DATA

- Operates under the National Institute for Health and Welfare
- Compulsory for institutions and health care professionals since 1961
- The degree of data completeness in lung cancers >97%

- Every Finn has a unique personal identity number:

  → Combining information from different registries is easy

130489 - 1234

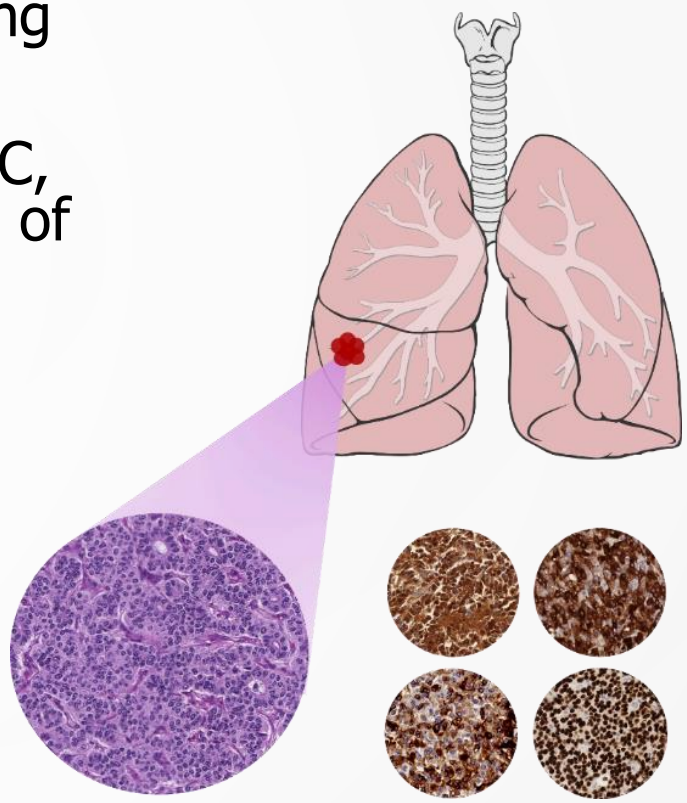
dd mm yy

If even, female
If uneven, male

If - , born in the 20th
If A, born in the 21st

EXAMPLE OF A RARE CANCER: PULMONARY CARCINOID (PC) TUMOR

- Rare malignant neuroendocrine neoplasms, 1-2% of all lung cancers
- Histological subtypes typical (TC, 70-90%) and atypical (AC, 10-30%) carcinoid tumor, classification based on presence of necrosis and number of mitoses
- Primary treatment surgery, no standard treatment for metastasized disease
- TCs rarely metastasize, 5-yrs survival >90%
- ACs more aggressive, 5-yrs survival 40-70%
- Large cohorts needed to study the characteristics of the PC tumors



AIMS

- To explore, how the number of tumors found in the biobanks corresponds to the number of tumors registered in the Finnish Cancer Registry
- To study the bottlenecks of the sample and data delivery process
- How the diagnostic group (TC or AC) of tumors changes after re-evaluation
- To study prognostic factors of PC tumor patients

PERFORMANCE OF THE BIOBANKS

We proposed from the biobanks:

Primary resected PC tumor sample + patient follow-up and survival data

A 10-year period: 2002-2011

- FCR: 256 tumors, 91% histologically confirmed
- 88% of the expected tumors found in the biobanks
- 63% delivered to us
- 12 tumors excluded
  - Incompatible morphology
  - Not primary PCs but metastases
  - No follow-up data
- 117 (57%) tumors included

Hospital region	Local biobank(s)	FCR all	FCR hist.	Number of tumors found in the biobank		
		(n)	(n)	orig. (n)	deliv. (n)	incl. (n)
Helsinki	Helsinki Biobank	93	85	72	68	66
Turku	Auria Biobank	46	42	42	18	18
Tampere	Finnish Clinical Biobank Tampere	60	54	26	9	7
Kuopio	Biobank of Eastern Finland & Central Finland Biobank	34	30	34	18	14
Oulu	Northern Finland Biobank Borealis	23	22	22	16	13
All		256	233	206 88%	129 63%	117 57%

FCR: Finnish Cancer Registry

206 TUMORS FOUND FROM BIOBANK DATABASES BUT ONLY 129 (63%) DELIVERED – WHY?

1. Sample not found in the biobank archives
   - Tissue samples from 3 million Finns were transferred into biobanks based on registry information, no physical checking of sample availability
   - Prior active research use, no diligent follow-up of sample usage before the biobanking era
2. Lack of tissue material
   - Samples collected primarily for diagnostic purposes can be used for research purposes only if possible future patient care is not jeopardized. Scarce samples were excluded by the biobanks.
3. Incorrect primary diagnoses: pathologist in the biobank scanning the cases excluded these tumors
4. Biopsy samples: unsuitable for our study

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BOTTLENECKS IN SAMPLE AND DATA DELIVERY

1. Sample and data distribution process slow: 6-22 months
   - Our proposals 12/2016 – 9/2018 among the first ones, all processes not optimized yet
2. Challenges in collecting the clinical follow-up data from the patient records
   - Mainly in electronic form: not structured but freely written text
   - Technical skills needed for patient data mining
   - Special medical knowledge needed for accurate patient data mining

STRENGHTS OF THE FINNISH BIOBANKS

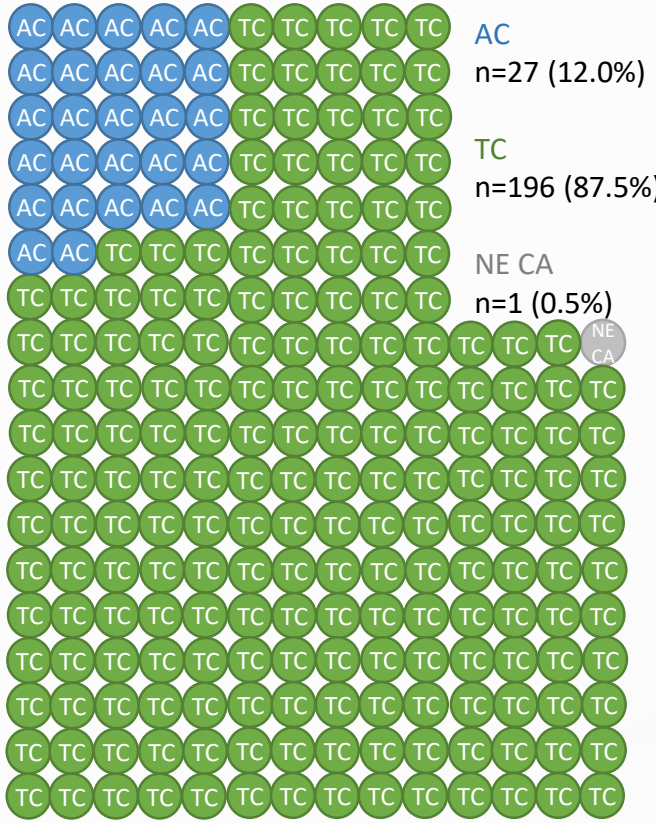
- 88% of the tumors were found from the sample registries
- Every Finn has a unique personal identity number: combining biological samples with data from multiple national or local health registers is straightforward
  - survival data from the Population Register Centre
  - cause of death data from Statistics Finland
- Excellent facilities and technical skills for processing FFPE tissue into e.g. TMA format

RE-EVALUATION OF THE TUMORS

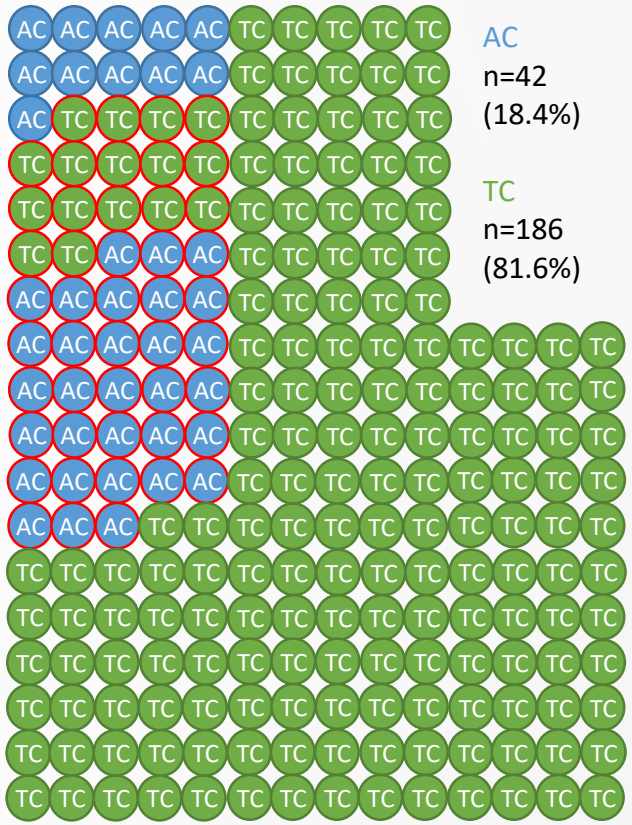
- A 20-year period
- Morphology + IHC (Chrom A, SYP, pan-CK, Ki-67), WHO 2015 classification

- 21% of the original diagnoses changed
  - 31 TC → AC
  - 16 AC → TC

Primary biobank database diagnosis



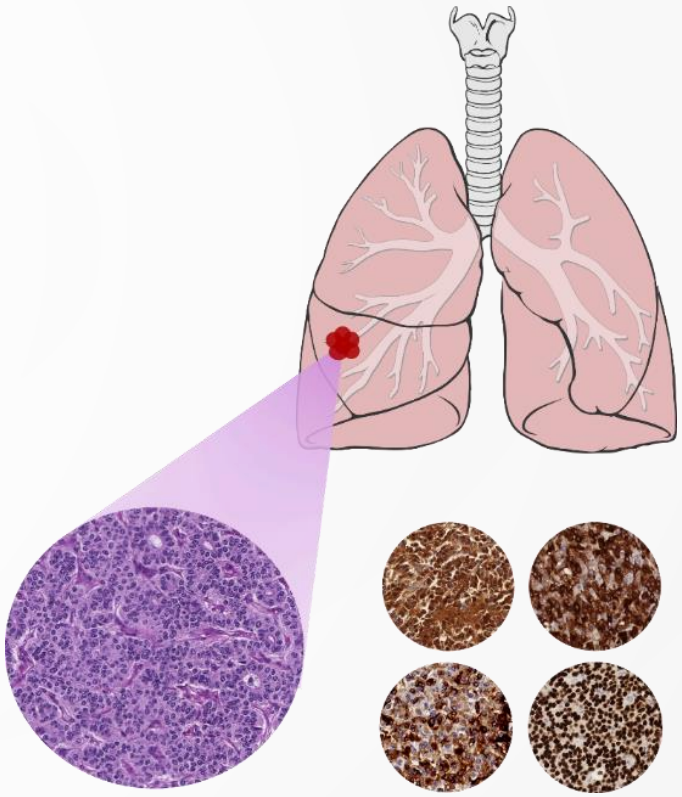
Diagnosis after re-evaluation



= changed diagnosis

CONCLUSIONS

- The Finnish biobank infrastructure offers excellent opportunities for biomedical tissue-based research
- To be able to develop the biobank operations further, involving more medical knowledge in the sample and data acquisition process is a necessity
- When working with tissue samples collected over the decades, histological expertise is needed for re-evaluation of the samples



READ THE WHOLE STORY:

Vesterinen et al 2019, Virchows Archiv

Virchows Archiv
https://doi.org/10.1007/s00428-019-02625-6

ORIGINAL ARTICLE

Check for updates

Performance of Finnish biobanks in nationwide pulmonary carcinoid tumour research

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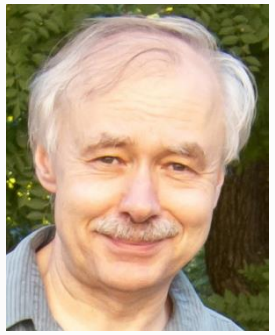
Teijo Kuopio


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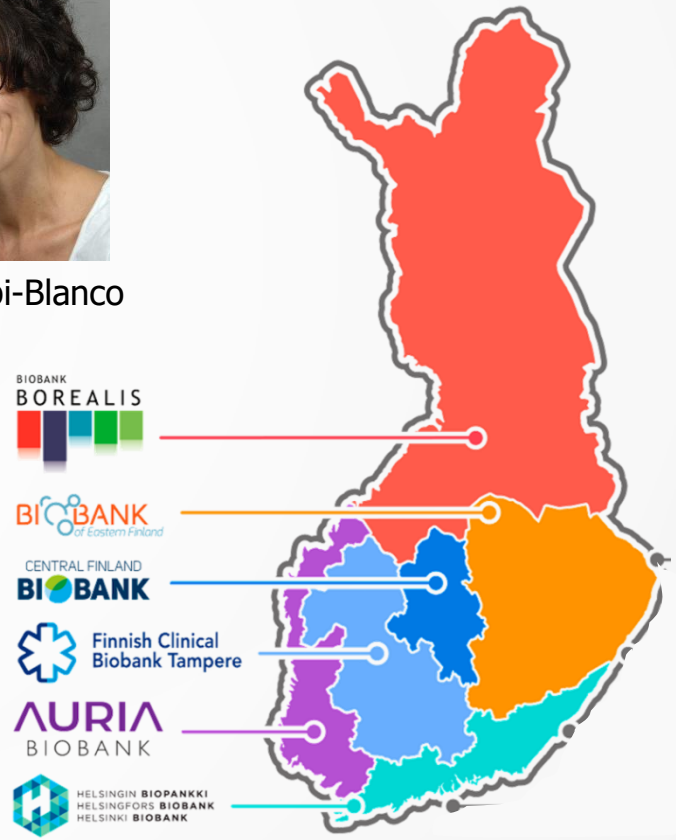
Biobanks and PC patients



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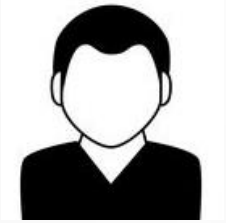
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