Lung Cancer Screening Programmes across Europe

Hans-Ulrich Kauczor

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Conflict of interest disclosure

I have the following real or perceived conflicts of interest that relate to this presentation:

<table>
<thead>
<tr>
<th>Affiliation / Financial interest</th>
<th>Commercial Company</th>
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<tbody>
<tr>
<td>Grants/research support:</td>
<td>Siemens, Philips, Bayer</td>
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<tr>
<td>Honoraria or consultation fees:</td>
<td>Siemens, Philips, Boehringer Ingelheim, MSD, Astra Zeneca</td>
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<tr>
<td>Participation in a company sponsored bureau:</td>
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<td>Stock shareholder:</td>
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ESR/ERS: Joint White Paper 2015 and 2020

ESR/ERS white paper on lung cancer screening

Hans-Ulrich Kauczor¹,², Lorenzo Bonomo², Mina Gaga³, Kristiaan Nackaerts⁴, Nir Peled⁵, Mathias Prokop⁶, Martine Remy-Jardin⁷, Oyunbileg von Stackelberg¹,⁹, Jean-Paul Sculier⁸ on behalf of the European Society of Radiology (ESR) and the European Respiratory Society (ERS)

ESR/ERS statement paper on lung cancer screening

Hans-Ulrich Kauczor¹, Anne-Marie Baird ¤, Torsten Gerriet Blum³, Lorenzo Bonomo¹, Clementine Bostantzoglou³, Otto Burghuber⁶, Blanka Čepicka⁶, Alina Comanescu⁹, Sébastien Couraud⁷, Anand Devaraj¹¹, Vagn Jespersen¹², Sergey Morozov¹³, Inbar Nardi Agmon¹⁴, Nir Peled¹⁵, Pippa Powell¹⁶, Helmut Prosch ¤, Sofia Ravara¹⁸,¹⁹, Janette Rawlinson¹⁹, Marie-Pierre Revel²¹, Mario Silva²², Annemieke Snoeckx²³, Bram van Ginneken²⁴,²⁵, Jan P. van Meerbeeck²⁶, Constantine Vardavas²⁷,²⁸, Oyunbileg von Stackelberg²⁹ and Mina Gaga ø on behalf of the European Society of Radiology (ESR) and the European Respiratory Society (ERS)
LCS: Evidence and Algorithms established

✓ Reduction of lung cancer mortality
✓ esp. in women
✓ Inclusion criteria 55-75 years
✓ Low dose CT
✓ 3D evaluation of nodules
✓ Algorithms for management (LungRads)

=> **Ready for implementation**
Nationwide LCS Programme: Croatia

✓ Official launch in Zagreb on January-14, 2020
✓ 16 sites throughout Croatia, central database
✓ Interrupted after earthquake on March-22
✓ And COVID-19
✓ Started on October-1, 2020

„Lung cancer does not kill if detected early“
Innovations

increase impact

overcome bottlenecks

tackle inequalities
Ultralow dose CT (Submillisievert)

- Dose negligible
- No long-term adverse effects

Artificial Intelligence: Images

Nodule detection and characterization, AI as a second reader

- Pre-fetch of relevant priors
- Automatic preprocessing of relevant algorithms
- Registration between studies from different time points
- Lung segmentation automatic results
- CAD for automatic nodule detection
- Semi-automatic nodule segmentation
- Automatic nodules matching between time points

Risk Prediction Calculator

Data integration (LungRADS)

Prefills based on nodules characteristics

Lung-RADS™ category and management suggestion

- Suggested Lung-RADS™ Category
- Category 4BC - Suspicious
- Findings for which additional diagnostic testing and/or tissue sampling is recommended

1% probability
11% probability
Artificial Intelligence: Data-driven Science

- Risk models
- Risk prediction calculator **nodule** and **individual**
- Individualized screening period and intervals
- Less overdignosis
- Register, QA
- Liquid and volatile biomarkers
Accessibility & Affordability

➢ Outreach
➢ Clear language and terminology
➢ Minimize stigma
➢ Shared decision making
➢ Benefits and harms
➢ Cost effectiveness
Downstream Workflow and Treatment Options

➢ **Integration** of screening and healthcare system (IT)

➢ **Multidisciplinary** nodule and tumor boards

➢ Re-evaluation of **treatment** options for stage 1 lung cancer:
  - lung sparing surgery, stereotactic radiation, ablation

➢ **Comorbidities**, incidentals
Lung Cancer Screening

➢ **Accomplished**: reduction of lung cancer mortality

➢ **Unmet need**: longer survival with lung cancer

➢ **Expected**: Quantum leap in technology: ultra low dose, data, AI

➢ **Required**: awareness and accessibility

➢ **Data and IT integration**