Community 365 Roundtable Meeting on Lung Cancer

Dr Matti Aapro

President
European Cancer Organisation

Meeting protocols

- To protect the quality of the audio for everybody **please stay on “Mute” throughout the meeting**

- **We encourage all participants to join the interactive discussion in the Chat box: ask questions, share thoughts and comments**

- **Please note that the meeting will be recorded**

Community 365 Roundtable Meeting on Lung Cancer

Agenda:

15:05-15:20 **Essential Requirements for Quality Cancer Care: Lung Cancer**

Yolande Lievens, Co-Chair of the Quality Cancer Network

15:20-15:30 **Open Discussion**

15:30-15:50 **Early Detection and Screening**

Co-Chair: Françoise Bartoli, VP, Head of Europe and Canada, Oncology Business, AstraZeneca

Presentation: Giorgio Scagliotti, Professor of Oncology, University of Turin and Chief of the Medical Oncology Division at the S. Luigi Hospital

15:50-16:00 **Open Discussion**

Community 365 Roundtable Meeting on Lung Cancer

16:00-16:20 **Molecular Diagnostics in Lung Cancer – Considerations and Relevance for Treatment Selection**

Co-Chair: Geoff Oxnard, Vice President, Global Medical Lead, Liquid Franchise at Foundation Medicine

Presentation: Matthew Krebs, Clinical Senior Lecturer in Experimental Cancer Medicine, University of Manchester and Consultant in Medical Oncology, The Christie NHS Foundation Trust, Manchester, UK

16:20-16:30 **Open Discussion**

16:30-16:50 **The Dutch Lung Cancer Audit: Nationwide Quality of Care Evaluation Using Quality Indicators**

Co-Chair: Ouzna Morsli, EMEAC Oncology Medical Lead at MSD

Presentation: Hans J.M. Smit, MD, PhD, Pulmonologist Rijnstate Hospital, Chairman of the Dutch Lung Cancer Audit, Arnhem, The Netherlands and **Rawa Ismail,** PharmD and PhD Candidate DICA

16:50-17:00 **Open Discussion**

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Our Quality Cancer Care Network

Special Network Impact of COVID-19 on Cancer

Prevention Network

Quality Cancer Care Network

Suvivorship and Quality of Life Network

Inequalities Network

Workforce Network

HPV Action Network

Health Systems and Treatment Optimisation Network

Digital Health Network

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Our Quality Cancer Care Network

CIRSE

EANM European Association of Nuclear Medicine

eau European Association of Urology

ECL Association of European Cancer Leagues

EFIC European Pain Federation

European Oncology Nursing Society

ESCP European Society of Coloproctology

European Society of Pathology

ESO European School of Oncology Learning to care

ESTRO

ESHI MT European Society for Hybrid, Molecular and Translational Imaging

ESOP

ERS European Respiratory Society every breath counts

ESTRO

esso The European Society of Surgical Oncology

EUSOMA European Society of Breast Cancer Specialists

IPOS International Psycho-Oncology Society

MASCC Multinational Association of Supportive Care in Cancer www.mascc.org

OECI Organisation of European Cancer Institutes European Economic Interest Grouping

SIOG International Society of Geriatric Oncology

Digestive Cancers Europe

European Cancer Patient Coalition

IBTA International Brain Tumour Alliance

INCA International Neuroendocrine Cancer Alliance

Lung Cancer Europe

MPe Myeloma Patients Europe

Melanoma Patient Network EU

Pancreatic Cancer Europe

Community 365 Initiative of the European Cancer Organisation

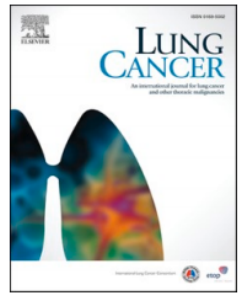
Community 365 Roundtable on Lung Cancer

Lung Cancer 150 (2020) 221–239

Contents lists available at ScienceDirect

Lung Cancer

journal homepage: www.elsevier.com/locate/lungcan



Review

European Cancer Organisation Essential Requirements for Quality Cancer Care (ERQCC): Lung cancer

Thierry Berghmans [a,1], Yolande Lievens [b,1], Matti Aapro [c], Anne-Marie Baird [d], Marc Beishon [e,*], Fiorella Calabrese [f], Csaba Dégi [g], Roberto C. Delgado Bolton [h], Mina Gaga [i], József Lövey [j], Andrea Luciani [k], Philippe Pereira [l], Helmut Prosch [m], Marika Saar [n], Michael Shackcloth [o], Geertje Tabak-Houwaard [p], Alberto Costa [q], Philip Poortmans [r]

europeancancer.org/resources

Community 365 Roundtable on Lung Cancer

Legacy from this meeting will include:

- Action report to be published in early January
- From tomorrow, video and slides on our website **europeancancer.org/resources**
- Follow up with EU Commission ahead of publication Europe's Beating Cancer Plan
- Next steps on implementation of Essential Requirements in our Quality Cancer Care Network

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Essential Requirements for Quality Cancer Care: Lung Cancer

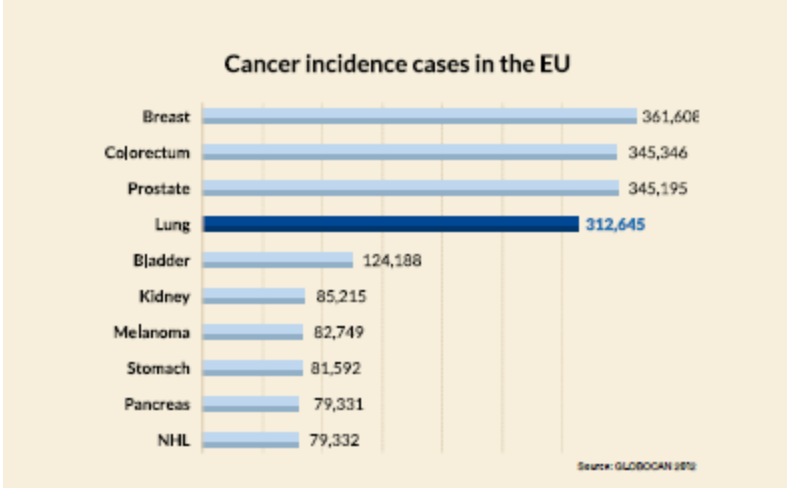
Yolande Lievens
Co-Chair of the Essential Requirements for Quality Cancer Care: Lung Cancer

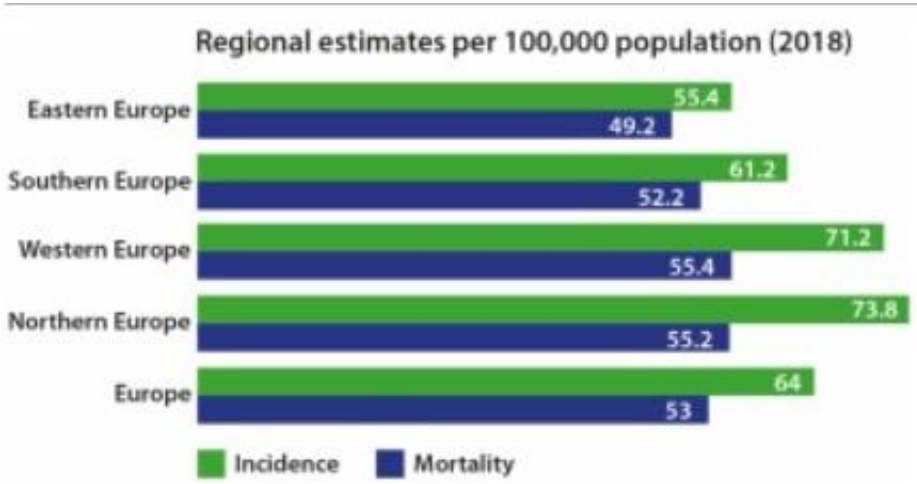
ESTRO

UZ GENT

Lung cancer: So much more to do

- In 2018, the estimated incidence of lung cancer in EU countries was around 365,000 with mortality nearly 300,000.
- Lung cancer sadly remains a poor prognosis tumour with 5-year survival rates at a very low level.
  Men represent about two-thirds of mortality – nearly 200,000 were projected to die from lung cancer in 2018.
- **Opportunities for improvement in prevention, care and treatment remain insufficiently exploited.**
- Better organisation of care, and ensuring patient access to key members of the multidisciplinary and multi-professional healthcare team, can drive up both quality of care and outcomes.





- **The Essential Requirements for Quality Cancer Care: *Lung Cancer* aims to help countries bridge that gap**

Essential Requirements for Quality Cancer Care: Lung Cancer

The Lung Cancer manuscript has been produced by the European Cancer Organisation as part of the Essential Requirements for Quality Cancer Care (ERQCC) programme.

The European Cancer Organisation Essential Requirements for Quality Cancer Care (ERQCC) are written by experts representing all disciplines involved in cancer care in Europe.

They give patients, health professionals, managers and policymakers a guide to essential care throughout the patient journey.

Some section highlights

A diagnosis and treatment summary

Recommendations on care pathways and timelines

Treatment centre recommendations

Patient involvement, access to information and transparency

Description and outline of the multidisciplinary team

Performance and quality recommendations

Recommendations on research and education

ELSEVIER

Lung Cancer

Volume 150, December 2020, Pages 221-239

Review

European Cancer Organisation Essential Requirements for Quality Cancer Care (ERQCC): Lung cancer

Thierry Berghmans [a, 1], Yolande Lievens [b, 1], Matti Aapro [c], Anne-Marie Baird [d], Marc Beishon [e] ✉, Fiorella Calabrese [f], Csaba Dégi [g], Roberto C. Delgado Bolton [h], Mina Gaga [i], József Lövey [j], Andrea Luciani [k], Philippe Pereira [l], Helmut Prosch [m], Marika Saar [n], Michael Shackcloth [o], Geertje Tabak-Houwaard [p], Alberto Costa [q], Philip Poortmans [r]

Understanding the particularities

The challenges section of the ERQCC paper helps audiences understand

- what makes lung cancer particular
- how organisational and health service response must adapt to this

such as

- The **high rate of diagnosis of lung cancer at advanced stages** is a major challenge for improving outcomes, and makes the option of lung cancer screening interesting.
- **Improved strategies at primary care level** are highlighted, such as lowering barriers to access - and to demanding - imaging, and equipping GPs with risk prediction tools.
- **Diagnosing and staging lung cancer is complex.**
  It is essential that experienced specialists *(e.g. radiologists, pulmonologists, pathologists, nuclear medicine specialists)* determine results from imaging and pathological samples.

  A successful management plan, especially for radical interventions, depends on their input to the MDT.

Understanding the particularities

The challenges section of the ERQCC paper helps audiences understand

- what makes lung cancer particular
- how organisational and health service response must adapt to this

such as

- **Optimal treatment of lung cancer is particularly challenging**, as patients may be older and have important comorbidities, requiring strong multidisciplinary knowledge, commitment and interaction to tailor the treatment to each individual patient.

- **Patients with lung cancer are a neglected population for psychosocial needs**
  compared with some other cancers, partly owing to the stigma of the disease as being self-inflicted through smoking, and they report increased distress as a result.

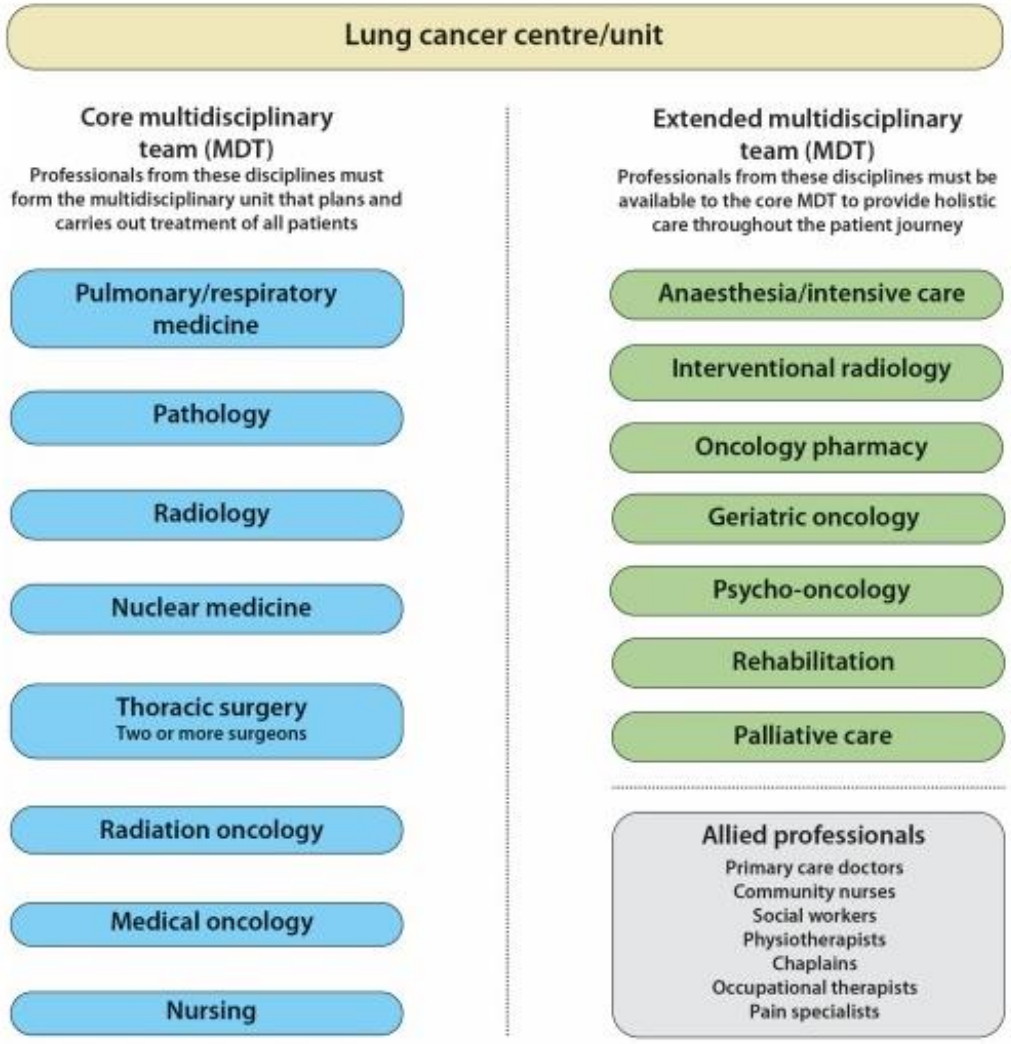
Pathway & Organisation: Getting it right!

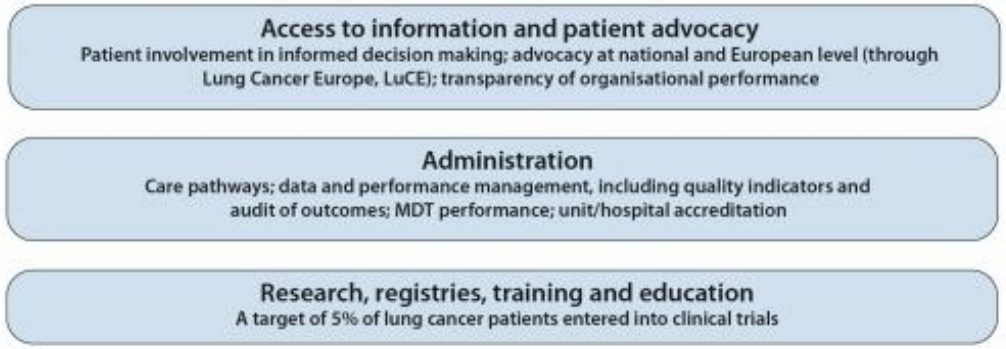
The ERQCC: *lung cancer*

- provides advice on improving pathway management for lung cancer patients
- highlights good practice on cancer centre organisation

- **After a diagnosis**, **the patient must know** which professional is responsible for each step in the **treatment pathway** and who is following the patient during the journey (usually called a case manager or patient navigator)
- **Follow-up, support and care for long-term survivorship, as well as palliative care,** must be part of a care pathway.
- **There is direction towards care and treatment for lung cancer performed in higher volume centres.** European countries taking notable steps in this direction:
  - **Denmark** - now carries out surgery in just 4 centres, and also has fewer locations where lung cancer is diagnosed and evaluated, reduced to 13 sites from about 50 previously
  - **Germany** - the target for a certified lung cancer centre is 200 cases a year (all new presentations)

Defining the core and extended MDT





Treatment strategies for all patients with lung cancer must be decided on, planned and delivered as a result of consensus among a **core MDT** that comprises the most appropriate members for the particular diagnosis and stage of **cancer**, and **patient** characteristics and preferences, with input from an **extended group of professionals**.

Requirements for professions: Examples

Essential requirements: pu

- Pulmonologists must take pa
- Pulmonologists must be able

Essential requirements: thoracic

- Lung cancer surgery must be carrie
  teams of appropriately trained surg
- There must be at least 2 experience
  a significant amount of their time t
  sufficient volume of patients to ens
- Perioperative care for patients unde
  be provided by specialist teams o
  theatre and on the wards) and anae
  to intensive care and high depende
  gical ward also attended by physio
- Patients with early stage lung ca
  invasive surgery where appropriate
- Outcomes of patients undergoing
  audited [117].

Essential requirements: radiation oncology

- Radiation oncology departments treating lung cancer must have access to up-to-date radiotherapy technology and techniques such as IMRT and SBRT, ideally on-site or at a centre through a formal collaborative agreement that includes a common MDT.
- Radiation oncologists must know the indications of radiotherapy for lung cancer, and the place, expected efficacy and potential side-effects of thoracic radiotherapy in multidisciplinary treatment regimens. They must have a special interest and expertise in the multidisciplinary treatment of lung cancer and of other thoracic malignancies to select the optimal treatment for each patient, considering the specific oncologic situation and comorbidities.
- Multimodal imaging including a CT in treatment position and/or a PET/CT scan are mandatory to define the target volume, along with pathological information obtained through mediastinal staging – either EUS-EBUS or mediastinoscopy – in the case of locally advanced disease.
- Radiation oncologists treating lung cancer must have a team of radiation therapists, dosimetrists and medical physicists with expertise in lung cancer and thoracic malignancies.
- Radiation oncologists must be aware of ongoing clinical trials and their methodology performed at their centre or in associated centres.
- The radiation oncology centre must have regularly updated protocols for radiotherapy and concurrent chemoradiotherapy for lung cancer based on international guidelines.
- Image guidance, motion management and adaptive radiotherapy policies and quality assurance guidelines must be clearly described and documented. External quality assurance audits are highly recommended.
- Radiation oncologists must follow up patients to act on early or late toxicity, and in case of relapse.

ology

with management guidelines of pul-

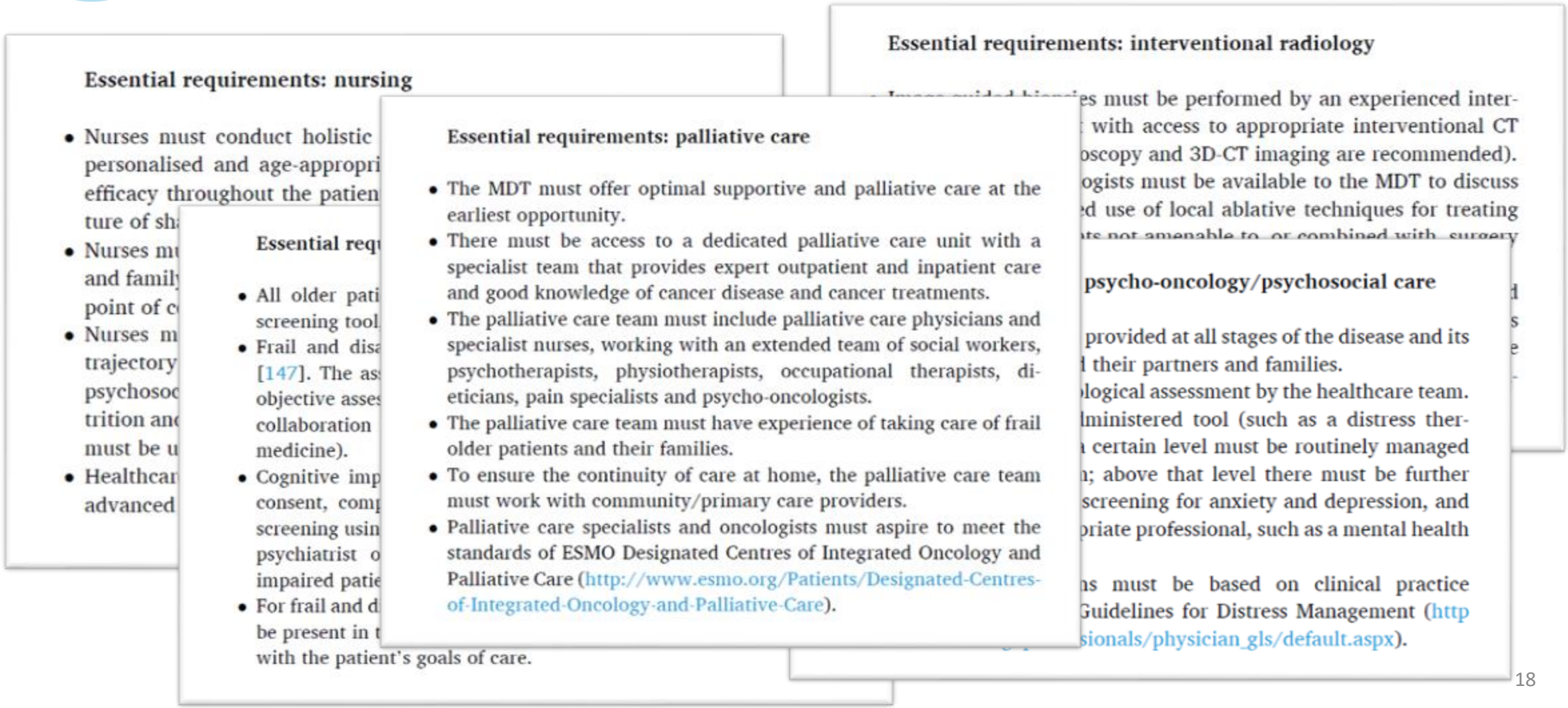
eculiar pattern of lymphatic and he-
ncer (including uncommon sites of

found knowledge of the TNM lung
itfalls [100,101].
with the strength and limitations of

with image guided biopsies and
ns (i.e. radiofrequency ablation,

with treatment responses to radio-
ed therapy and immunotherapy, and
nent.
with surgical procedures to assist sur-
y.
ng and PET/CT must be available.
o refer a patient to nuclear medicine

Requirements for professions: Examples



Essential requirements: nursing

- Nurses must conduct holistic
personalised and age-appropri
efficacy throughout the patien
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Essential req

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- Cognitive imp
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- For frail and d
be present in t
with the patient's goals of care.

Essential requirements: palliative care

- The MDT must offer optimal supportive and palliative care at the earliest opportunity.
- There must be access to a dedicated palliative care unit with a specialist team that provides expert outpatient and inpatient care and good knowledge of cancer disease and cancer treatments.
- The palliative care team must include palliative care physicians and specialist nurses, working with an extended team of social workers, psychotherapists, physiotherapists, occupational therapists, dieticians, pain specialists and psycho-oncologists.
- The palliative care team must have experience of taking care of frail older patients and their families.
- To ensure the continuity of care at home, the palliative care team must work with community/primary care providers.
- Palliative care specialists and oncologists must aspire to meet the standards of ESMO Designated Centres of Integrated Oncology and Palliative Care (http://www.esmo.org/Patients/Designated-Centres-of-Integrated-Oncology-and-Palliative-Care).

Essential requirements: interventional radiology

es must be performed by an experienced inter-
with access to appropriate interventional CT
oscopy and 3D-CT imaging are recommended).
ogists must be available to the MDT to discuss
d use of local ablative techniques for treating
ts not amenable to, or combined with, surgery

psycho-oncology/psychosocial care

provided at all stages of the disease and its
their partners and families.
logical assessment by the healthcare team.
lministered tool (such as a distress ther-
certain level must be routinely managed
; above that level there must be further
screening for anxiety and depression, and
priate professional, such as a mental health

ns must be based on clinical practice
Guidelines for Distress Management (http
sionals/physician_gls/default.aspx).

Measuring what we do

A lung cancer centre must develop:

- **Performance measurement metrics/quality indicators** based on the essential requirements in this paper and on clinical guidelines, in alignment with national requirements and legislation
- **Operational policies** to ensure the full benefits of a coordinated clinical pathway based on published guidelines
- **Accountability** within the governance processes in individual institutions
- **Systems** to ensure safe and high-quality patient care and experience throughout the clinical pathway
- **Effective data management** and **reporting systems**
- **Engagement with patients, their carers and support groups** to ensure reporting of patient outcomes and experience.

Some final words on improving lung care

Lung cancer

- includes **variable disease** entities and patient groups;
- requires a large range of **knowledge and expertise** over the entire care pathway;
- from professionals that work in a **well-structured and organised** manner.

Educational and awareness programs should support
that available **research evidence** is accessible, translating into **optimal outcome**.

Initiatives such as **ERQCC: *lung cancer* should not remain a static endeavour**
but should continuously integrate **optimised** treatment and health system approaches
and be **informed** by data collected in clinical trials as in real-life practice

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Thank you to the paper contributors!

Open Discussion

Please use the Chat feature to ask questions and make comments

Redefining the future for lung cancer patients in Europe

Co-Chair:

Françoise Bartoli, VP, Head of Europe and Canada, Oncology Business, AstraZeneca

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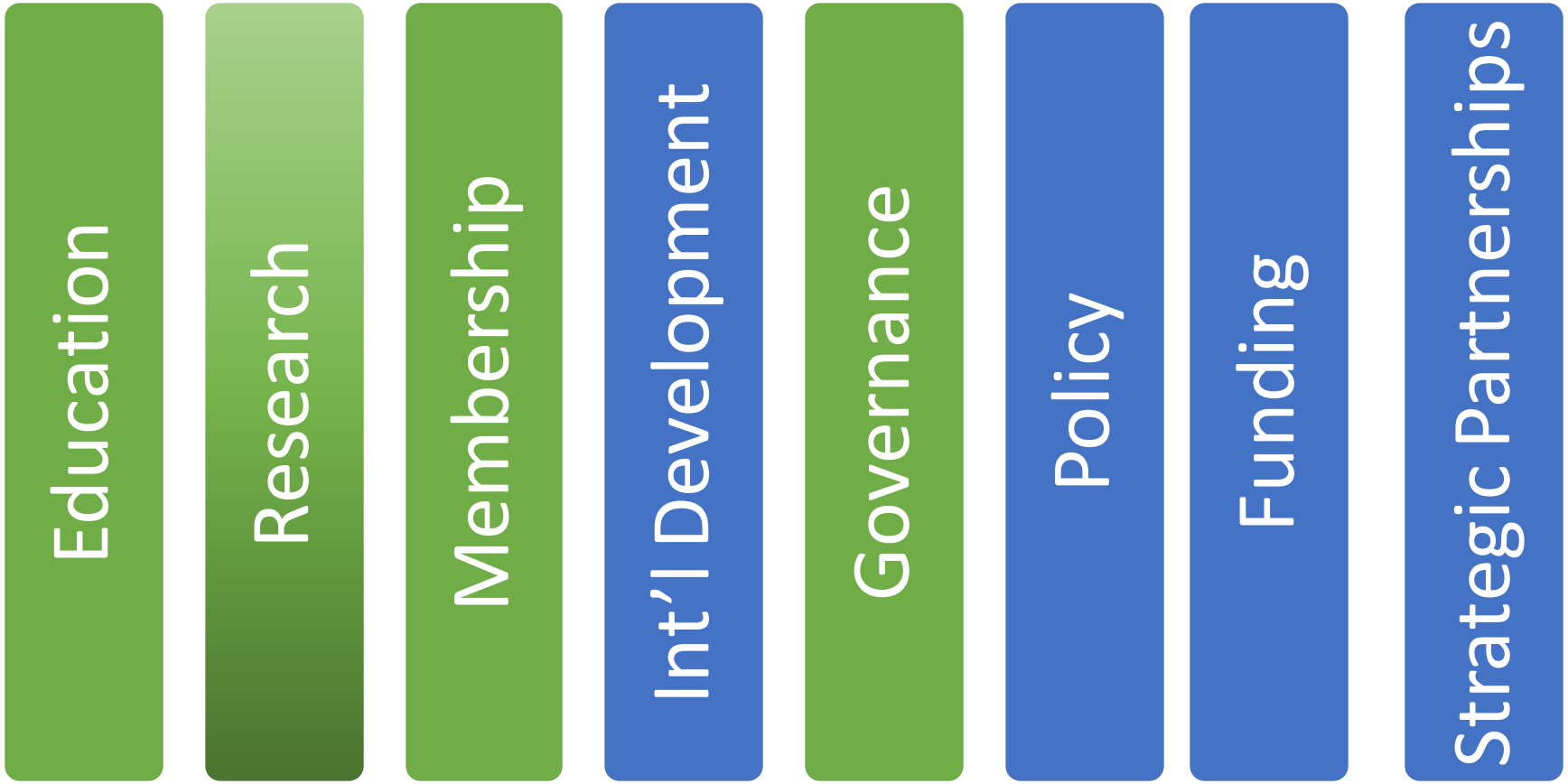
Accelerating advances for lung cancer patients through collaboration

Giorgio Scagliotti, Professor of Oncology, University of Turin and Chief of the Medical Oncology Division, S. Luigi Hospital

Eight pillars of the current IASLC strategic plan



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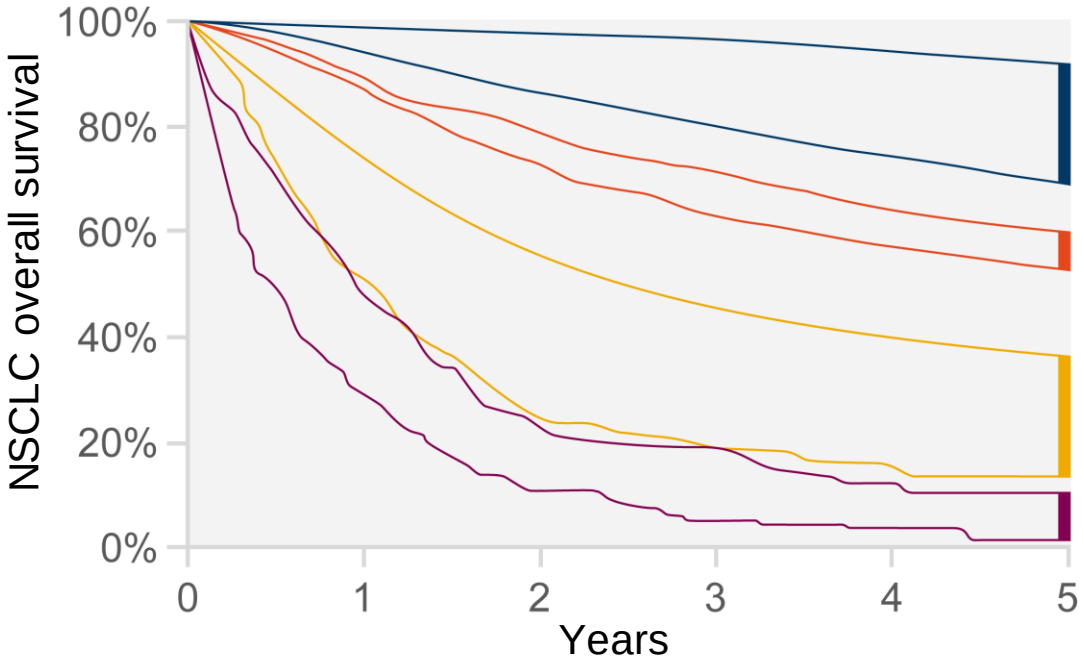
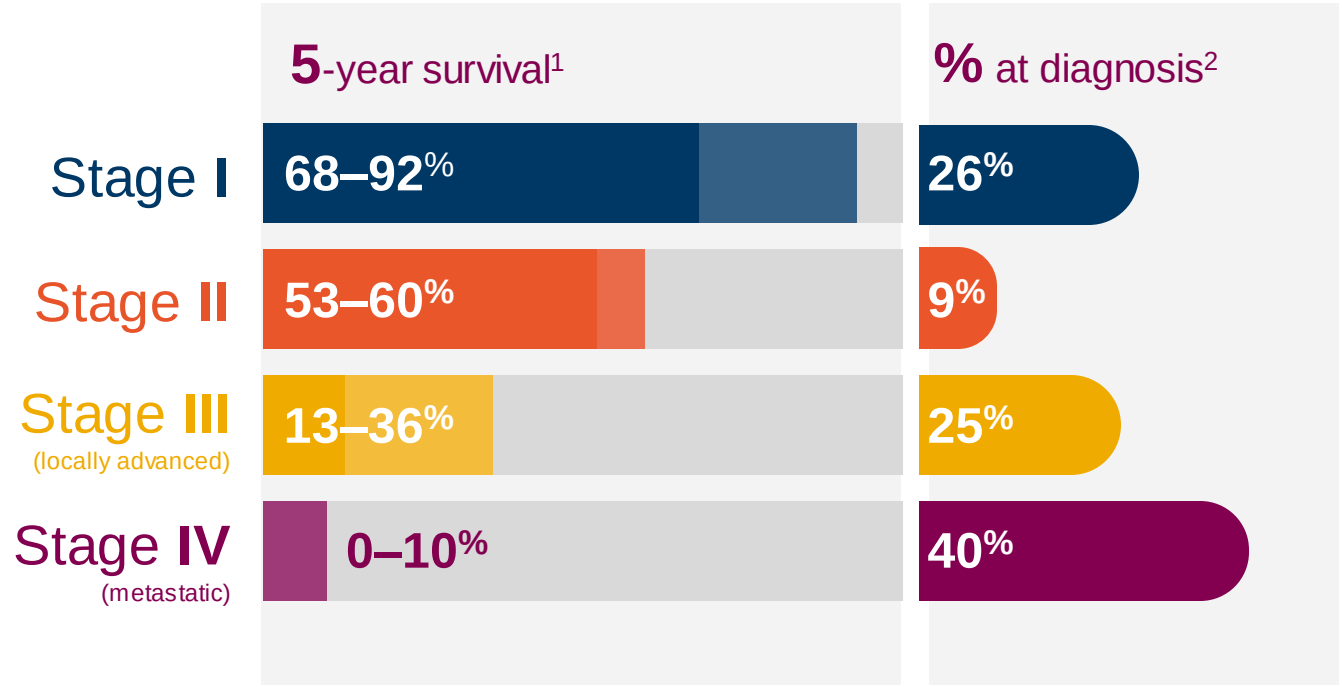
The Challenge

Globally lung cancer is the leading cause of cancer death with 1.8 million lives lost annually





[1]Goldstraw *et al. J Thorac Oncol*. 2016; 11(1):39–51; [2]EpiCast Report: NSCLC Epidemiology Forecast to 2025. GlobalData. 2016.

Staging: Improving Lung Cancer Staging through International Collaboration

- For more than 20 years, the IASLC has provided valuable recommendations for the TNM classification of lung cancer
- IASLC is currently gathering data to inform the 9th edition of the TNM Staging System, which for the first time, will include new data elements such as gene mutations, fusions, and copy number alterations and protein expression level.
- The goal of these additional tumor characteristics is to significantly enhance the accuracy of the Staging System, leading to more precise treatment regimens and increased patient survival.
- As of November 2020, the following number of cases have been collected from over 20 countries: Lung Cancer: 54,789, Mesothelioma: 436, Thymic malignancies: 7,183

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The LungAmbition Alliance

We are at a critical moment in the fight against lung cancer

In 2018 alone, 1.8 million people died from lung cancer[1]

Every 18 seconds, a life is lost to lung cancer[1]

40% are diagnosed after the disease has spread beyond the lung, worsening prognosis[2]

Only 1 in 5 patients are alive 5 years after diagnosis[3]

The Time For Change Is Now

Diverse perspectives enable our four founding partners to identify needs more precisely, while our depth of resources help us to amplify impact as we work to **eliminate lung cancer as a cause of death**

Founding Partners

AstraZeneca

GLOBAL LUNG CANCER COALITION

GUARDANT

IASLC

Project partners :Merck - BMS - Genentech - Lilly - Novartis

Lung Ambition - The Mission

Vision
What does the coalition aim to achieve?

As global partners with a common and enduring commitment, the coalition aims to one day **eliminate lung cancer as a cause of death**

Mission
Why should the coalition exist?

As a coalition, we can **accelerate progress** by amplifying the multi-disciplinary expertise of our partners

Goals
What do we want to do?

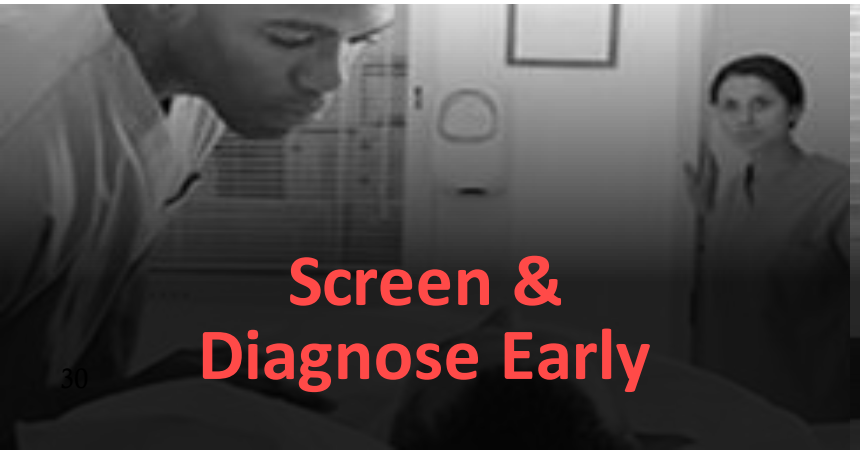
Together, we can shape the environment to improve outcomes for patients with lung cancer. As a first goal we will use the evidence, advance the science and motivate the community to **double 5-year survival in lung cancer by 2025**

Strategic Focus
How will we achieve it?

We will deliver on the mission through 3 key areas of focus:

- A commitment to **early screening & diagnosis**
- A promise to deliver **precision, curative treatments**
- A passion for ensuring **quality care** for patients

Focusing on Today and Future Potential



1. Screening Access & Policy
2. Screening Rates
3. New Technology (ctDNA)

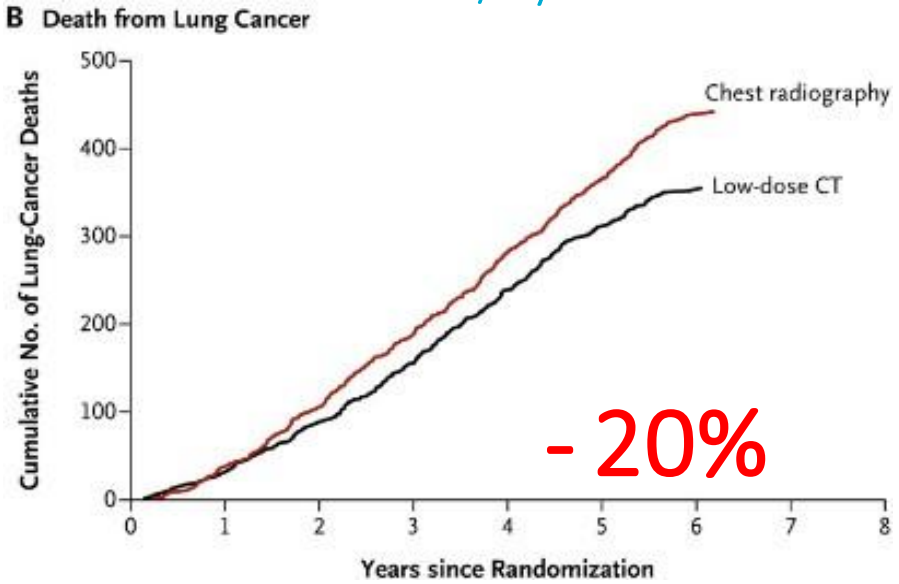
1. Early-Stage Disease
2. Resistance Mechanisms
3. Clinical Endpoints

1. Long-term Survivorship
2. Access
3. Standards of Optimal Care

LDCT screening trials results: lung cancer mortality can be reduced

large size trial (> 50,000)
diameter > 3 mm no risk modulation

3 rounds / 2 years

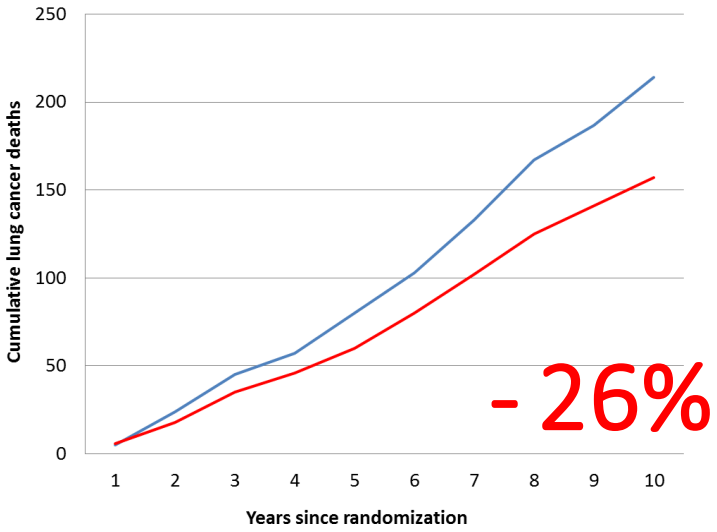


Aberle DR, N Engl J Med. 2011; 365:395

NLST

medium size trial (> 15,000)
volume > 50 mm^3 + VDT no risk modulation

4 rounds / 6.5 years

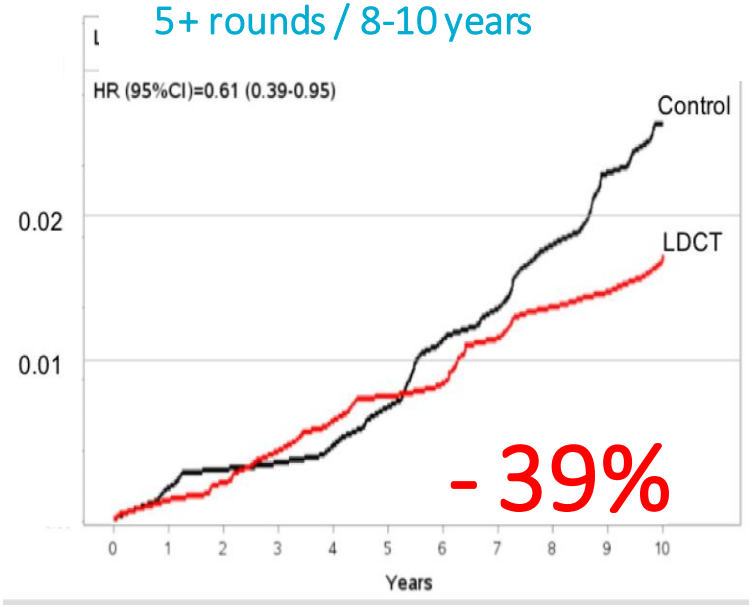


deKoning H, WCLC 2018; Toronto

NELSON

small size trial (> 4,000)
volume > 60 mm^3 + VDT + PET LDCT risk modulation

5+ rounds / 8-10 years



Pastorino U, Ann Oncol 2019 doi: 10.1093

MILD

Screening of Lung Cancer: key issues

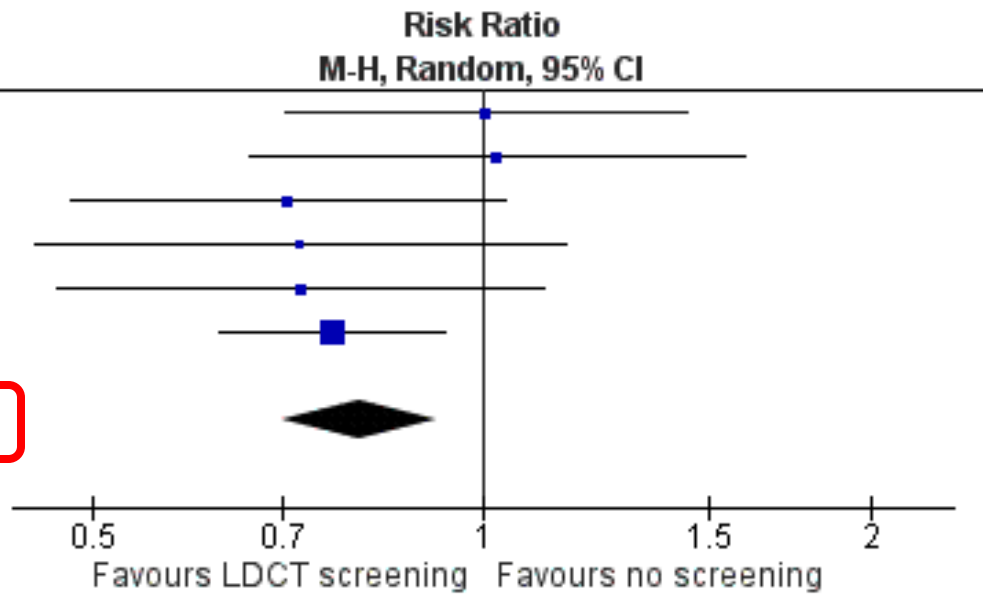
- Evidence from RCTs
- LDCT technology and risk
- Overtreatment & surveillance
- Benefits beyond LC detection
- Liquid biopsy & biomarkers
- Boosting prevention with LDCT
- Personalized strategy
- Implementation challenges
- Screening in the covid-19 time

Benefits and Harms of Lung Cancer Screening by Low-Dose Computed Tomography: a systematic review and meta-analysis

Study or Subgroup	LDCT screening Events	Total	no screening Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
DANTE	59	1264	55	1186	14.5%	1.01 [0.70, 1.44]
DLCST	39	2052	38	2052	9.5%	1.03 [0.66, 1.60]
ITALUNG	43	1613	60	1593	12.5%	0.71 [0.48, 1.04]
LUSI	29	2029	40	2023	8.3%	0.72 [0.45, 1.16]
MILD	40	2376	40	1723	9.9%	0.73 [0.47, 1.12]
NELSON	160	6583	210	6612	45.3%	0.77 [0.62, 0.94]
Total (95% CI)		**15917**		**15189**	**100.0%**	**0.80 [0.70, 0.92]**
Total events	370		443			

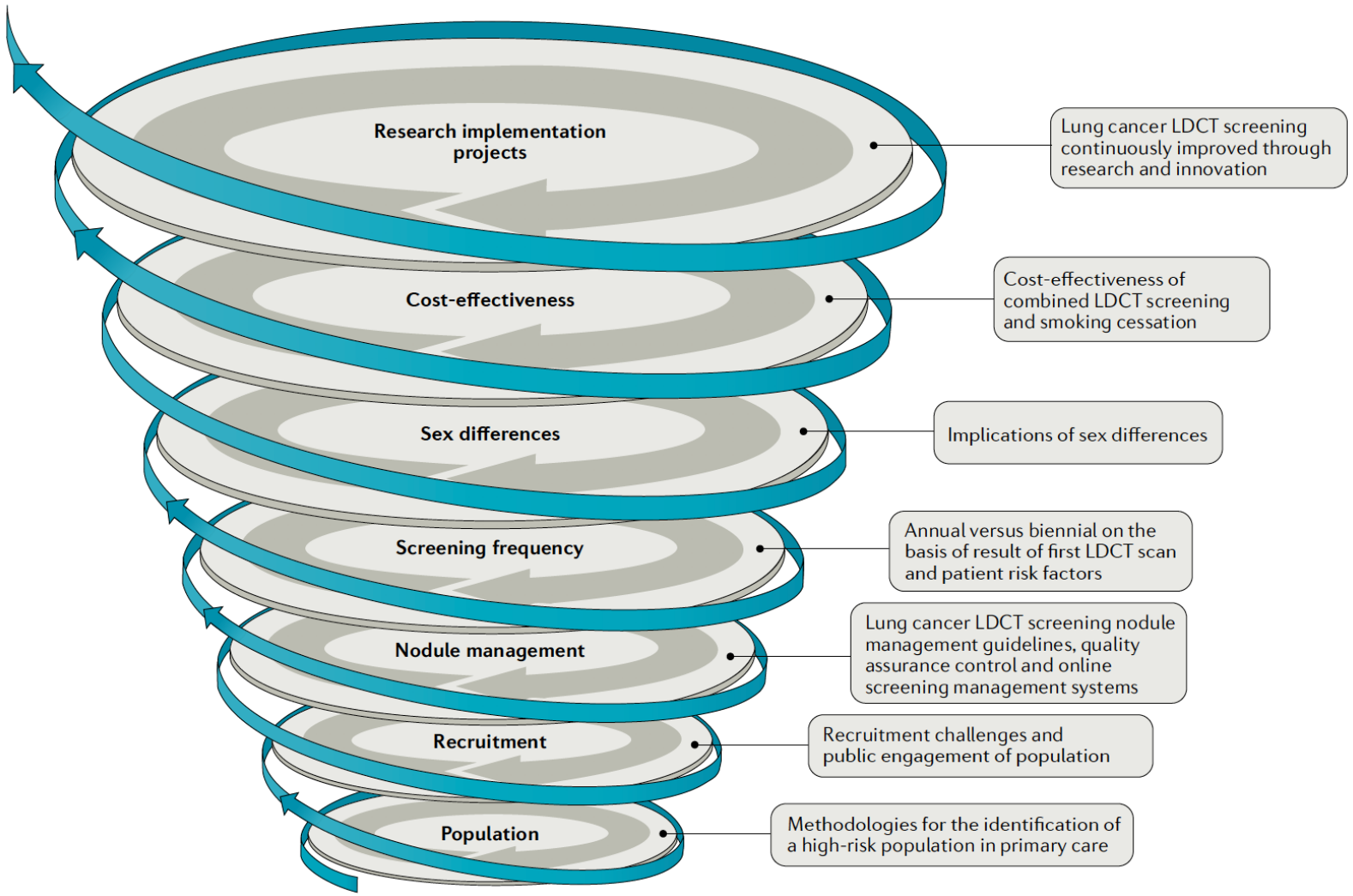
Heterogeneity: Tau² = 0.00; Chi² = 3.73, df = 5 (P = 0.59); I² = 0%

Test for overall effect: Z = 3.16 (P = 0.002)



Passiglia F. et al. unpublished data, paper submitted to a peer reviewed journal

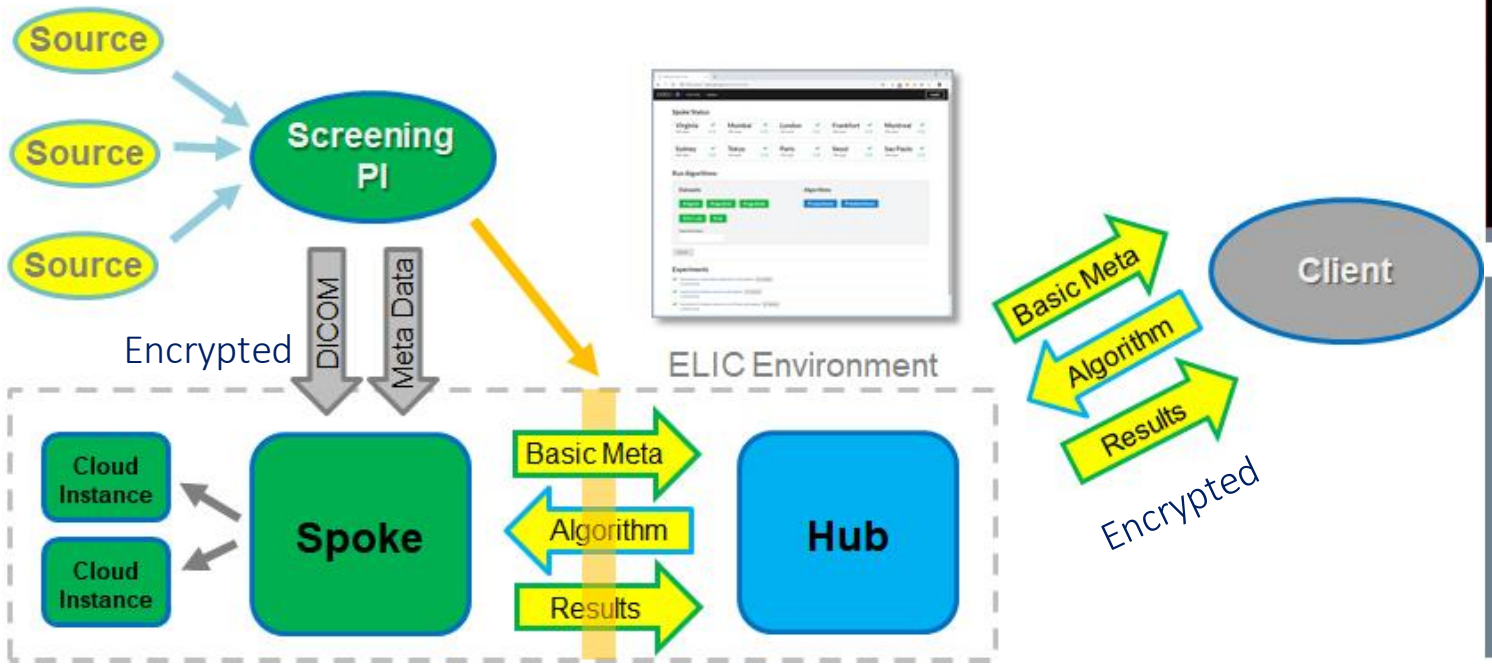
SPIRAL
Screening planning and implementation



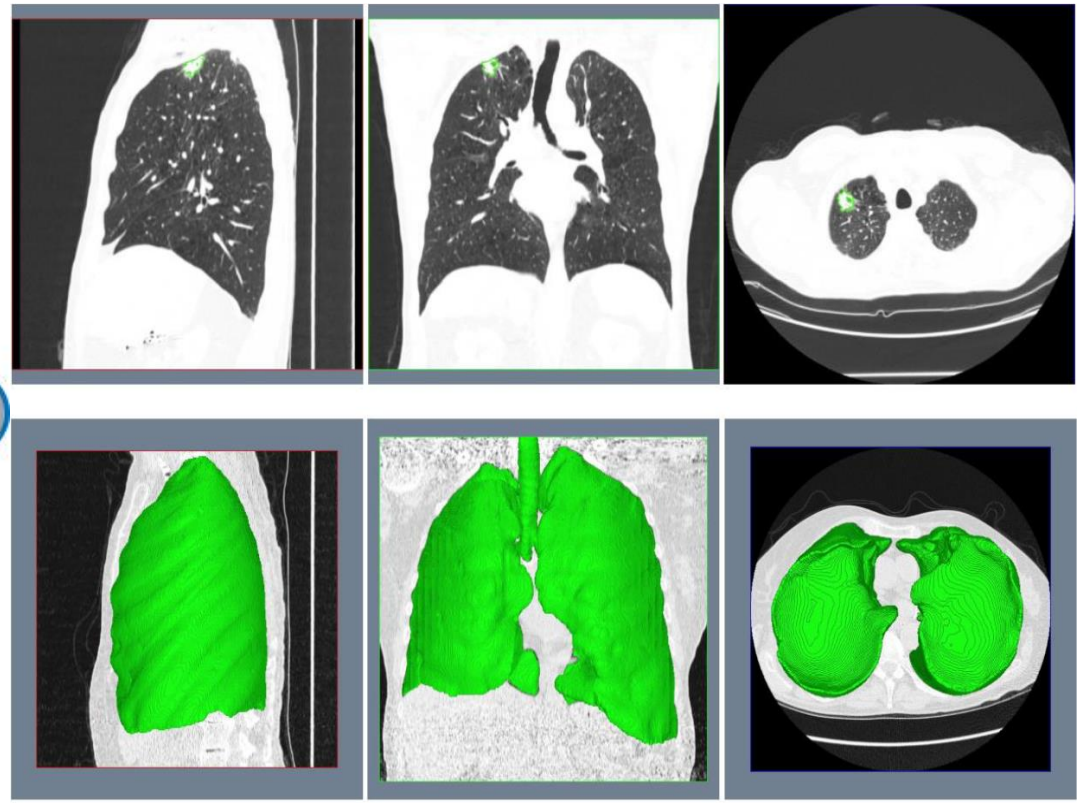
Early Lung Imaging Confederation (ELIC)

Lung cancer imaging database and computational analysis environment designed to enable the study of extremely large collections of quality-controlled internationally assembled CT chest images and associated biomedical data.

ELIC Hub and Spoke Model



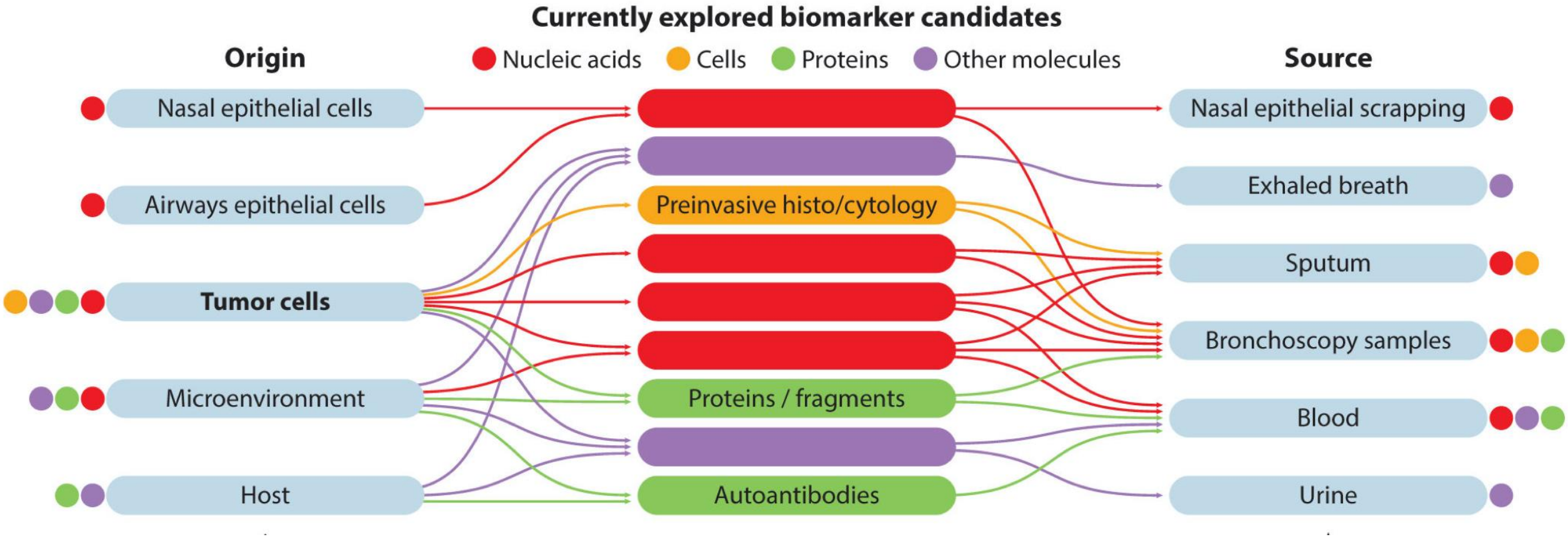
Nodule and Lung Volumes



ELIC Moving Forward

- ✓ **'Overall uptake of low-dose CT-screening needs to increase, if we are going to make a further dent in the lung-cancer mortality'**
  - Awareness Campaigns
  - Educational Efforts
  - Videos/Webinars
  - Podcasts with Multidisciplinary Participation
  - Workshops
- ✓ **Stratification of the indeterminate nodule on the screening scans**
- ✓ **Detection of squamous-cell and small-cell lung cancer earlier will be of importance**
- ✓ **Application of Artificial Intelligence, Machine and Deep learning will pick up relevant images for further invasive procedures and non-invasive bio-marker studies**
  - Precise volumetric segmentation of lung nodules automatically -- both detected and user found (Deep Learning will reduce variability)
  - Benign *vs*. Malignant

Biomarkers in lung cancer screening: achievements, promises and challenges



Seijo LM et al. J Thorac Oncol. 2019; 14: 343–357

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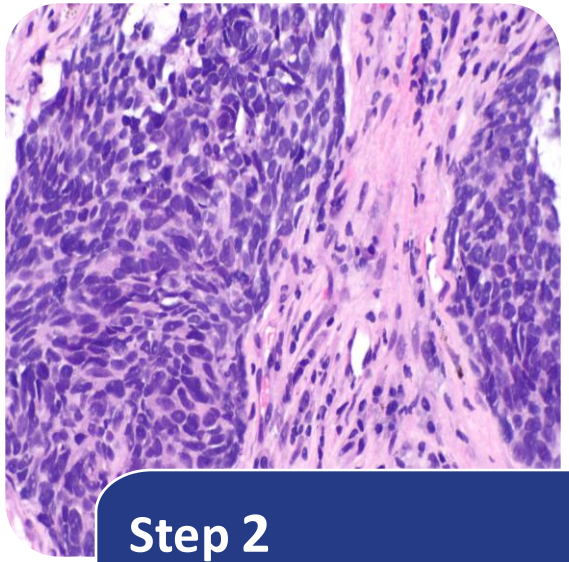
Major Pathologic Response Project

Step 1

MPR multidisciplinary recommendations paper for standardized tissue processing and pathologic assessment



Step 2

Conduct interobserver reproducibility study based on recommendations for assessment

Step 3

Collect data to compare pathologic response and other biomarkers to survival – ultimate goal is surrogate marker for outcome

european cancer ORGANISATION

ILC2 :Initiatives in Lung Cancer Care

ILC^2 invites local PAGs around the world to develop and submit projects with a potential to transform care and improve survival of lung cancer pts.

60 applications received

30 applications were reviewed

14 were selected by the committee for a total of $1,035,812 to be distributed during this application cycle

Awardees by Region

Round 2 is Now Open!

To complete your application please click here

ILC^2 grant applications are reviewed and selected by the four founding partners of the Lung Ambition Alliance: the Global Lung Cancer Coalition, Guardant Health, the International Association for the Study of Lung Cancer and AstraZeneca. Funding for the ILC^2 grant is provided by AstraZeneca.

All applications must be completed by 31 December 2020.

Organisation	Project		
Hope Foundation for Cancer Care	Patient Centered Quality Care for Lung Cancer: Research Based De		00
Swedish Medical Center Foundation	Native American Community Lung Cancer Screening Road Map		00
LUNGevity Foundation	Model for improved patient participation in shared decision-making t biomarker testing report results		00
Lung Health Foundation Canada	Bridging the Gaps in Lung Cancer Care		00
GO2 Foundation for Lung Cancer	Lung Cancer Advocate Media Training & Network	United States	$ 100,000
Roy Castle Lung Cancer Foundation	L-Can Connect: lung cancer advocacy network	United Kingdom	$ 98,918
KENYA HOSPICES AND PALLIATIVE CARE ASSOCIATION	Collective Hope and Quality Life for Lung Cancer Patients	KENYA	$ 95,335
Mersal Civil Society Foundation for charities and catering	LUng Cancer Advanced patient Support (LUCAS) Program	Egypt	$ 93,728
Lung Foundation Australia	Australian Lung Cancer Nurse Telehealth service	Australia	$ 90,831
Lung Cancer Canada	Airways of Hope	Canada	$ 58,000
Dusty Joy Foundation	New Lung Cancer Support Group Chapters	United States	$ 25,000
RWANDA PALLIATIVE CARE AND HOSPICE ORGANIZATION	Support and advocacy for lung cancer patients in Rwanda.	Rwanda	$ 25,000
Asociación Tour Rosa de Costa Rica	Lung Cancer in Costa Rica: Current Situation and Challenges for a Person-Centered Approach	Costa Rica	$ 25,000
Fundacion Pacientes de Cancer de Pulmón	Learning with the patient	Argentina	$ 24,000
		Grand Total	**$ 1,035,812**

LAA: Other Funded Projects

COVID-19 Research Grants

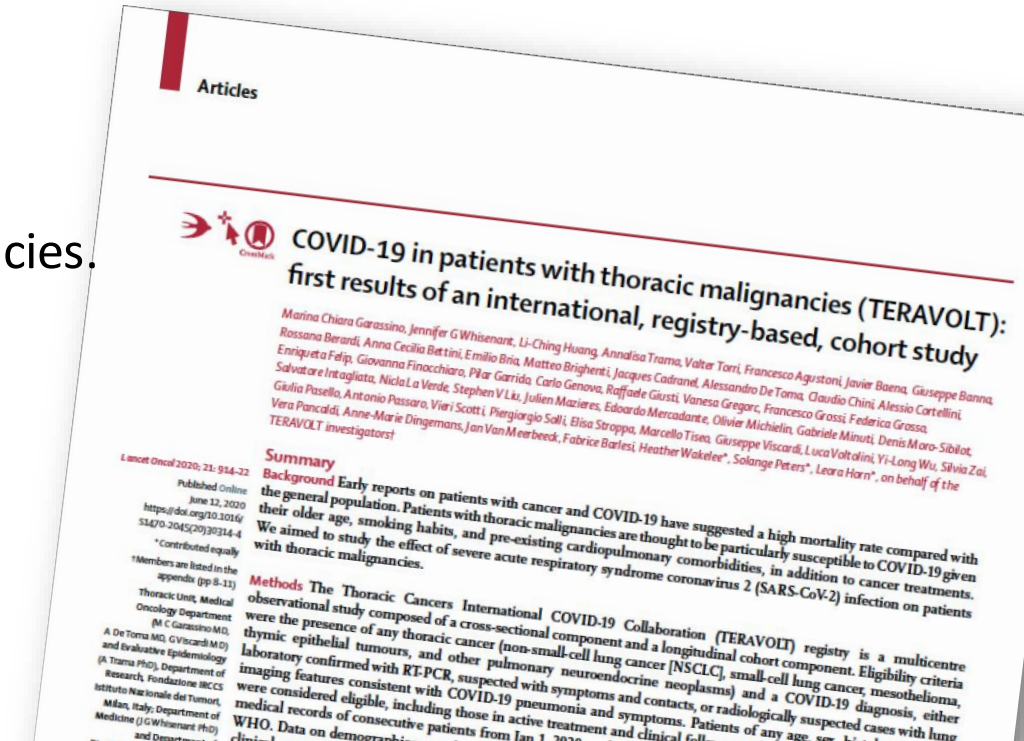
Junior Faculty Research Grants for the Study of Lung Cancer and COVID-19

3 Grants for $50,000 each

Goal: Obtain preliminary data to enable successful competition for national peer-reviewed grants

With this effort Novartis and Eli Lilly became Project Partners of LAA

- **TERAVOLT Project**
- The IASLC, through the LAA, funded TERAVOLT.
- Goal: Understanding the impact of COVID-19 on thoracic malignancies.
  - Risk factors associated with morbidity and mortality
  - Therapies that may impact survival
  - Guidance on the management of patients



Articles

COVID-19 in patients with thoracic malignancies (TERAVOLT): first results of an international, registry-based, cohort study

Marina Chiara Garassino, Jennifer G Whisenant, Li-Ching Huang, Annalisa Trama, Valter Torri, Francesco Agustoni, Javier Baena, Giuseppe Banna, Rossana Berardi, Anna Cecilia Bettini, Emilio Bria, Matteo Brighenti, Jacques Cadranel, Alessandro De Toma, Claudio Chini, Alessio Cortellini, Enriqueta Felip, Giovanna Finocchiaro, Pilar Garrido, Carlo Genova, Raffaele Giusti, Vanesa Gregorc, Francesco Grossi, Federica Grosso, Salvatore Intagliata, Nicla La Verde, Stephen V Liu, Julien Mazieres, Edoardo Mercadante, Olivier Michielin, Gabriele Minuti, Denis Moro-Sibilot, Giulia Passello, Antonio Passaro, Vieri Scotti, Piergiorgio Solli, Elisa Stroppa, Marcello Tiseo, Giuseppe Viscardi, Luca Voltolini, Yi-Long Wu, Silvia Zai, Vera Pancaldi, Anne-Marie Dingemans, Jan Van Meerbeeck, Fabrice Barlesi, Heather Wakelee*, Solange Peters*, Leora Horn*, on behalf of the TERAVOLT investigators†

Lancet Oncol 2020; 21: 914–22

Published Online June 12, 2020 https://doi.org/10.1016/S1470-2045(20)30314-4

*Contributed equally

†Members are listed in the appendix (pp 8–11)

Thoracic Unit, Medical Oncology Department (M C Garassino MD, A De Toma MD, G Viscardi M D) and Evaluative Epidemiology (A Trama PhD), Department of Research, Fondazione IRCCS Istituto Nazionale dei Tumori, Milan, Italy; Department of Medicine (J G Whisenant PhD) and Department

Summary

Background Early reports on patients with cancer and COVID-19 have suggested a high mortality rate compared with the general population. Patients with thoracic malignancies are thought to be particularly susceptible to COVID-19 given their older age, smoking habits, and pre-existing cardiopulmonary comorbidities, in addition to cancer treatments. We aimed to study the effect of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection on patients with thoracic malignancies.

Methods The Thoracic Cancers International COVID-19 Collaboration (TERAVOLT) registry is a multicentre observational study composed of a cross-sectional component and a longitudinal cohort component. Eligibility criteria were the presence of any thoracic cancer (non-small-cell lung cancer [NSCLC], small-cell lung cancer, mesothelioma, thymic epithelial tumours, and other pulmonary neuroendocrine neoplasms) and a COVID-19 diagnosis, either laboratory confirmed with RT-PCR, suspected with symptoms and contacts, or radiologically suspected cases with lung imaging features consistent with COVID-19 pneumonia and symptoms. Patients of any age, sex, were considered eligible, including those in active treatment and clinical follow-up. Data on demographic, medical records of consecutive patients from Jan 1, 2020, WHO.

Developing Partnerships through Data Sharing with Academic Institutions, Societies & Industry

- Enhance and improve DATA SHARING
- Recognizing Patterns in Large Volume of Data
- Identifying Characteristics that cannot be perceived by the human brain, e.g., mutations with non-invasive techniques
- Ultimately improve the survival of lung cancer patients

The
LungAmbition
Alliance

Accelerating advances
for people with lung cancer.

european cancer ORGANISATION

Thank you!

Giorgio V. Scagliotti
giorgio.scagliotti@unito.it

Open Discussion

Please use the Chat feature to ask questions and make comments

Final Remarks

Co-Chair:

Françoise Bartoli, VP, Head of Europe and Canada, Oncology Business, AstraZeneca

Molecular Diagnostics in Lung Cancer – Considerations and Relevance for Treatment Selection

Co-Chair:

Geoff Oxnard, Vice President, Global Medical Lead, Liquid Franchise at Foundation Medicine

Precision cancer care & precision cancer diagnostics

EMPIRIC CANCER CARE

- Treatment based on tumor location verses genomic drivers of disease
- Potential for more toxicity with less reliable treatment outcomes

PRECISION CANCER CARE

- Finding the right treatment for the right patient
- Potential for less toxicity with more reliable treatment outcomes

Precision cancer care & precision cancer diagnostics

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- Treatment based on tumor location verses genomic drivers of disease
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Precision cancer diagnostics

Targeted therapy biomarkers

Kinase activation (EGFR, ALK, NTRK, etc.)

HRD biomarkers (BRCA1/2, ATM, etc.)

Immunotherapy biomarkers

PDL-1 IHC

Microsatellite instability

Tumor mutational burden

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PRECISION CANCER CARE

- Finding the right treatment for the right patient
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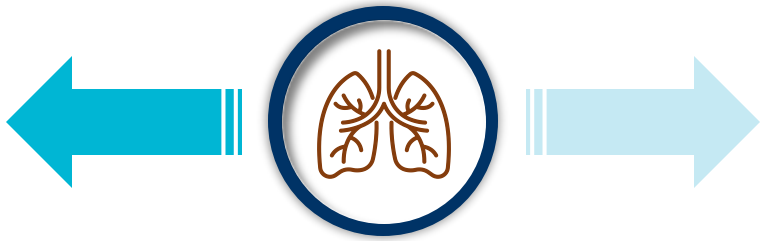
Multi-drug chemo-immunotherapy

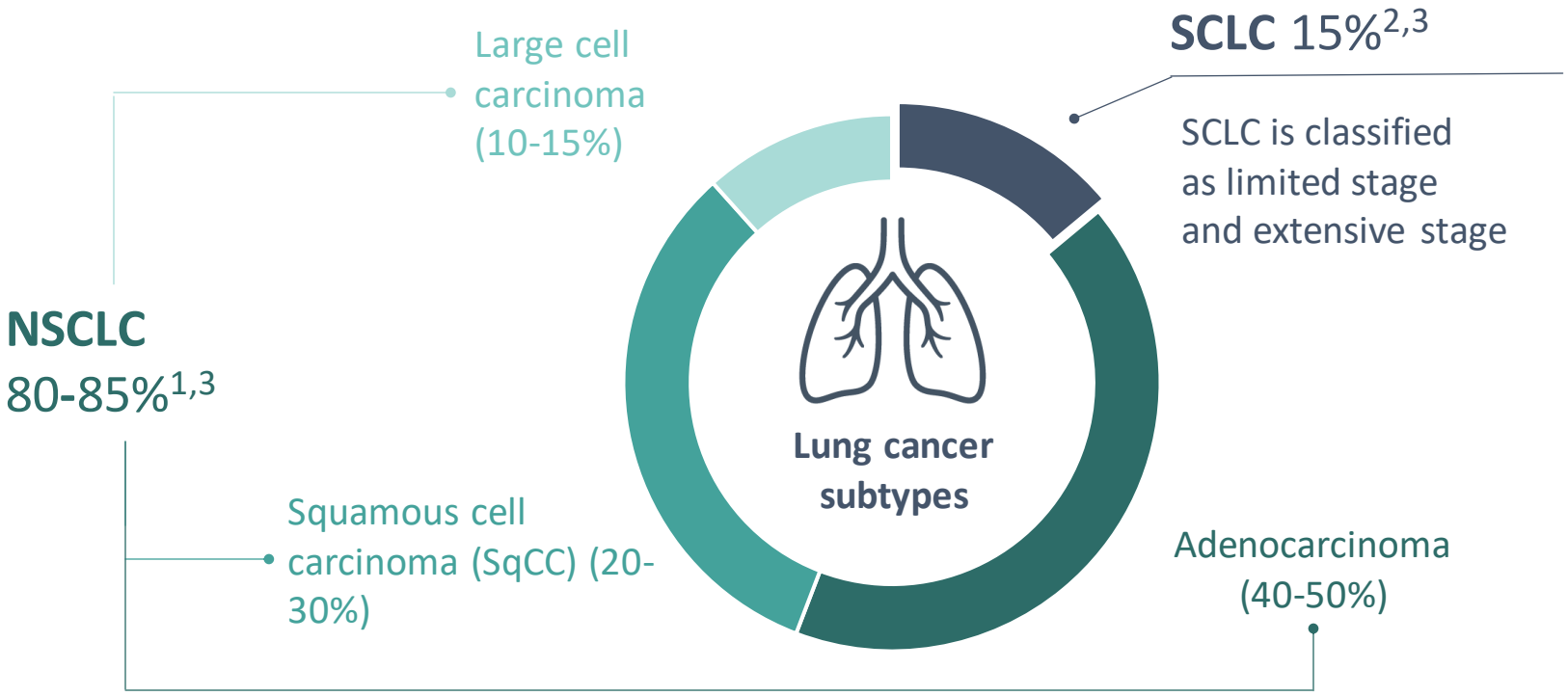


Single-agent precision therapies

Molecular Diagnostics in Lung Cancer – Considerations and Relevance for Treatment Selection

Matthew Krebs, Clinical Senior Lecturer in Experimental Cancer Medicine, University of Manchester and Consultant in Medical Oncology, The Christie NHS Foundation Trust, Manchester, UK

Traditionally lung cancer divided into histological sub-types



Pathologists are required to categorise lung cancer into adenocarcinoma and SqCC, because the same drugs used to treat adenocarcinoma can be inappropriate for treatment of SqCCs due to side effects, e.g. in the case of bevacizumab[3,4]

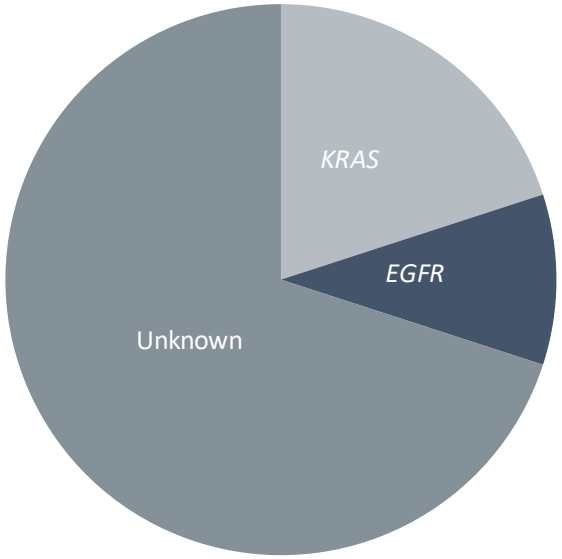
NSCLC: non-small cell lung cancer; SCLC, small cell lung cancer; SqCC, squamous cell carcinoma.

1. Osmani, L., et al. (2018) *Semin Cancer Biol* 52:103–109; 2. SCLC NCCN Guidelines Version 2.2020; 3. Inamura, K., (2017) *Front Oncol* 7:193; 4. Reck, M., et al. (2012) *Ann Oncol* 23:1111-1120.

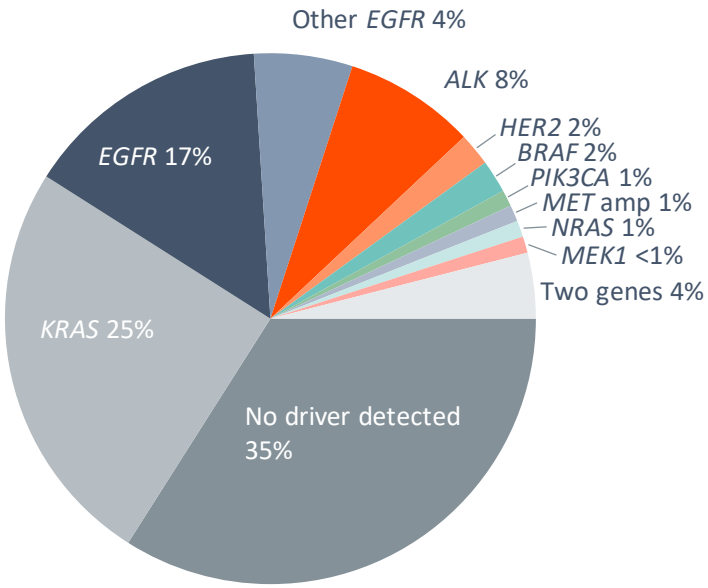
Understanding of genomic landscape of lung cancer has dramatically evolved in recent years

Adenocarcinoma

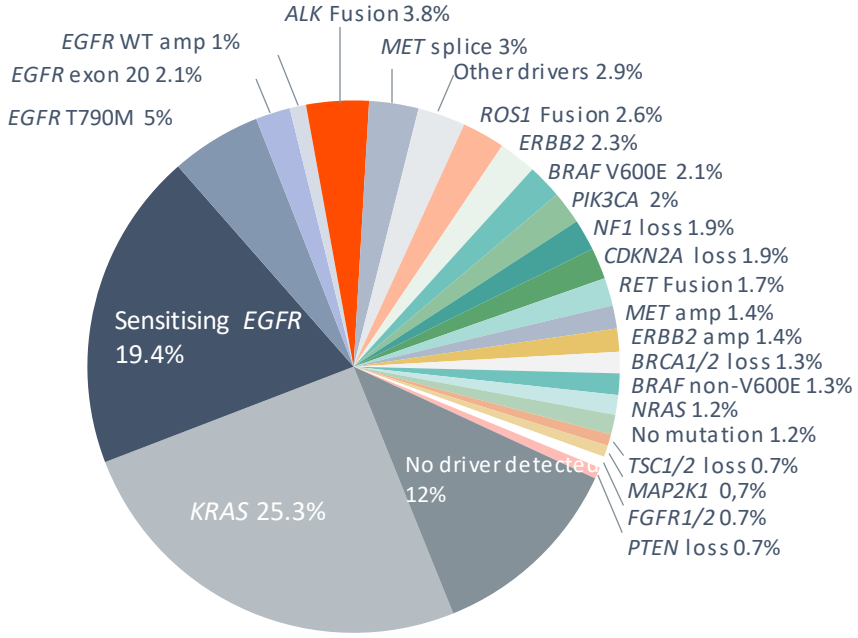
2004[1]



2014[2]

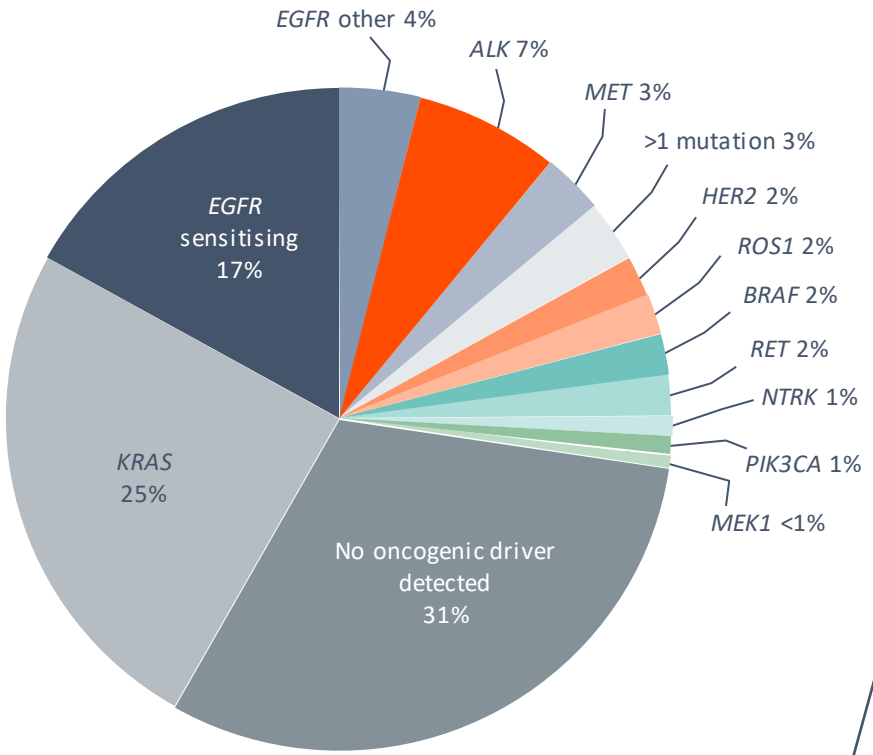


2017[3]



Advanced diagnostics inform therapy selection in lung cancer

Targetable mutations in lung cancer[1]



Identifying actionable mutations with broad genomic profiling[2]

Approved drugs

Investigational drugs

EGFR

- Afatinib
- Dacomitinib ▼
- Erlotinib (±anti-VEGF / VEGFR)
- Gefitinib
- JNJ-372[3]
- Necitumumab ▼[1]
- Osimertinib ▼
- Poziotinib[6]
- TAK-788[5]
- U3-1402[4]

BRAF

- Dabrafenib (± trametinib)
- Vemurafenib

NTRK

- Cabozantinib ▼[1]
- Entrectinib
- Larotrectinib ▼
- Repotrectinib[7]
- Selitrectinib[17]

ALK

- Alectinib ▼
- Brigatinib ▼
- Ceritinib ▼
- Crizotinib
- Ensartinib[8]
- Lorlatinib ▼
- Repotrectinib[7]

RET

- Apatinib[1]
- Cabozantinib ▼
- Lenvatinib ▼[1]
- Selpercatinib[15]
- Ponatinib ▼[1]
- Pralsetinib[16]
- Vandetanib ▼

ROS1

- Ceritinib ▼
- Crizotinib
- DS-6051b[1]
- Entrectinib
- Lorlatinib ▼
- Repotrectinib[7]

MET

- Cabozantinib ▼[1]
- Crizotinib
- Capmatinib[9]
- Savolitinib[10]
- Tepotinib[11]

HER2

- Afatinib[1]
- Dacomitinib ▼[1]
- Pertuzumab + trastuzumab ▼[13]
- Poziotinib[6]
- TAK-788[5]
- Trastuzumab emtansine[1] / deruxtecan[14]

PIK3CA

- Copanlisib[12]

MEK1

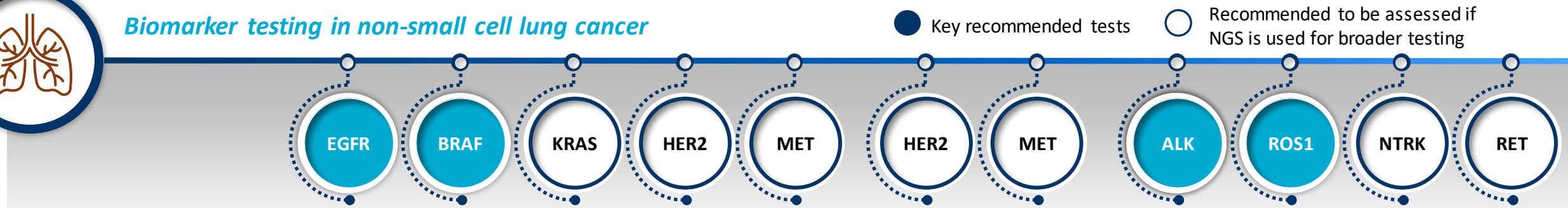
- Cobimetinib ▼[1]
- Selumetinib[1]
- Trametinib[1]

All drugs listed are included in NSCLC NCCN Guidelines unless otherwise indicated.

Some drugs are investigational and not approved in any indication. Some non-investigational drugs are only approved for use in specific indications in Europe and / or USA and / or Japan. Therapies marked with ▼ are subject to additional monitoring. Reporting suspected adverse reactions after authorisation of the medicinal product is important. Adverse events should be reported to your respective local office. Amgen Europe B.V.: Trastuzumab (Kanjinti); AstraZeneca AB: Osimertinib; Bayer AG: Larotrectinib; Celltrion Healthcare Hungary Kft.: Trastuzumab (Herzuma); Eli Lilly Nederland B.V.: Necitumumab; Eisai Europe Limited: Lenvatinib; Genzyme Europe B.V.: Vandetanib; Incyte Biosciences Distribution B.V.: Ponatinib; Ipsen Pharma: Cabozantinib; Mylan S.A.S.: Trastuzumab (Oqivri); Novartis Europharm Limited: Ceritinib; Pfizer Europa MA EEG: Trastuzumab (Trazimera); Pfizer Europe MA EEIG: Dacomitinib, Lorlatinib; Roche Registration GmbH: Alectinib, Cobimetinib; Samsung Bioepis UK Limited: Trastuzumab (Ontruzant); Takeda Pharma A/S: Brigatinib. 1. Adapted from Tsao, A.S., et al. (2016) *J Thorac Oncol* 11:613-38; 2. NSCLC NCCN Guidelines Version 2.2020; 3. NCT02609776; 4. NCT03260491; 5. NCT02716116; 6. NCT03318939; 7. NCT03093116; 8. NCT02767804;9. NCT03693339; 10. NCT03778229; 11. NCT02864992; 12. NCT02465060; 13. NCT03845270; 14. NCT03505710; 15. NCT04268550; 16. NCT04204928; 17. NCT03206931.

Clinical guidelines do not always match clinical practice

Biomarker testing in non-small cell lung cancer



Molecular testing method	Point mutations and small indels	Copy number alterations	Rearrangements
PCR and conventional sequencing	✓		
FISH			✓
IHC		✓ *	✓ *
NGS (amplicon-based)	✓		
NGS (hybrid capture-based)	✓	✓	✓

CAP / IASLC / AMP[1] / ESMO[2]

Molecular testing guideline

"In general, capture-based [NGS] methods may be preferable for initial testing of lung cancer samples in order to detect rearrangements… as well as a broader range of potential genetic markers"[1]

"If available, multiplex platforms (NGS) for molecular testing are preferable"[2]

ASCO Educational Book[3]

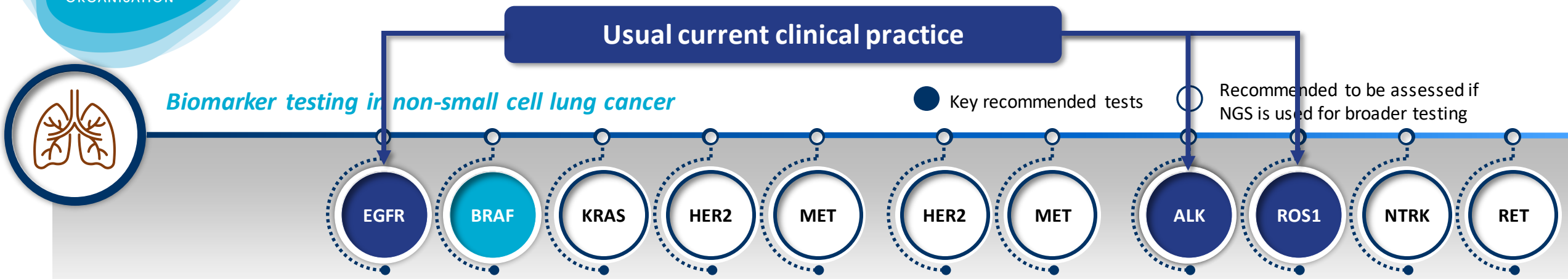
Biomarker testing for advanced NSCLC

"For very limited samples… for which multiple tests cannot be performed, [hybrid capture-based] assays are preferable for upfront comprehensive assessment"

* IHC is used to detect *MET* overexpression and *ALK* translocations respectively.

AMP: Association for Molecular Pathology; ASCO: American Society of Clinical Oncology; CAP: College of American Pathologists; ESMO: European Society for medical oncology; FISH: fluorescence in situ hybridisation; IASLC: International Association for the Study of Lung Cancer; NSCLC: non-small cell lung cancer; PCR: polymerase chain reaction. Table adapted from Pennell, N.A., et al. (2019). 1. Lindeman LI, *et al. J Mol Diagn* 2018; **20**:129–159; 3. Pennell NA, *et al. ASCO Educational Book* 2019; **39**:531–542; 4. Domagala-Kulawik J, *et al. Front Med (Lausanne)* 2019; **6**:284.

Clinical guidelines do not always match clinical practice



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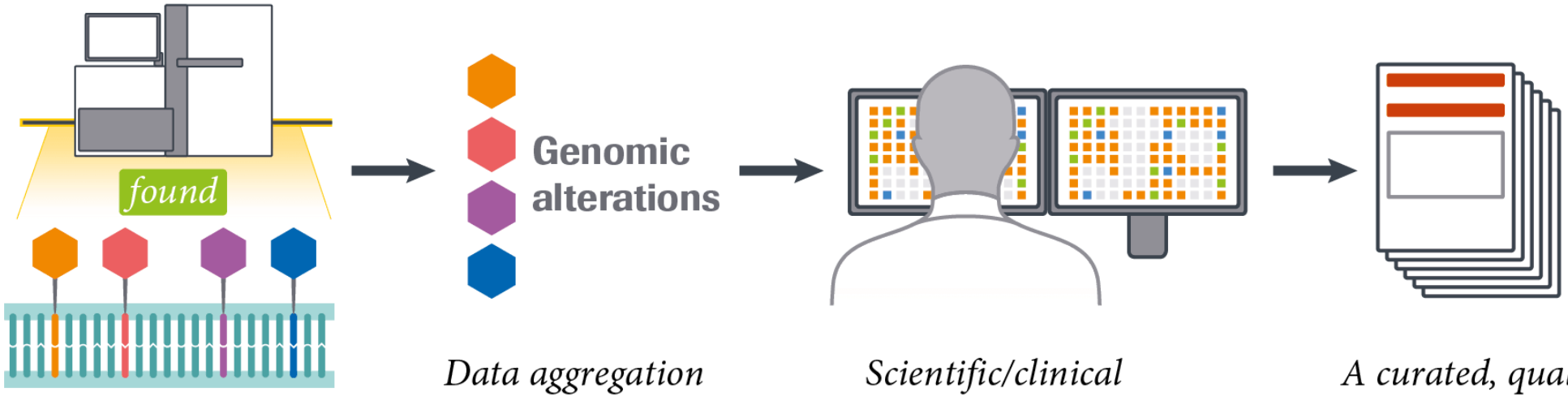
Next generation sequencing – analysis *and bioinformatics*



Hybrid capture-based next-generation sequencing (NGS) identifies clinically relevant genomic alterations in a sample

Data aggregation and analysis allow translation of NGS information into actionable knowledge

Scientific/clinical expert review further aids clinical decision making

A curated, quality-controlled report aims to help physicians identify targeted or immunotherapy treatment options

Source: https://cup-syndrome.com/en/home/comprehensive-genomic-profiling.html

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Tissue versus liquid biopsy testing for genomic alterations

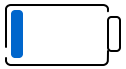
Tissue based genomic profiling remains standard of care with advantages such as higher sensitivity for certain types of alterations[13] but suffers from limitations impacting patient care.

solid biopsy is **difficult** or poses a **high risk**[12]

Does not capture tumour **heterogeneity**[6]

Robust and highly specific tests intensively validated

capture tumour **heterogeneity**[6]



tissue samples may be **insufficient**, inadequate or exhausted[5-7]

Enable **timely** personalised treatment decisions by shortening time to results

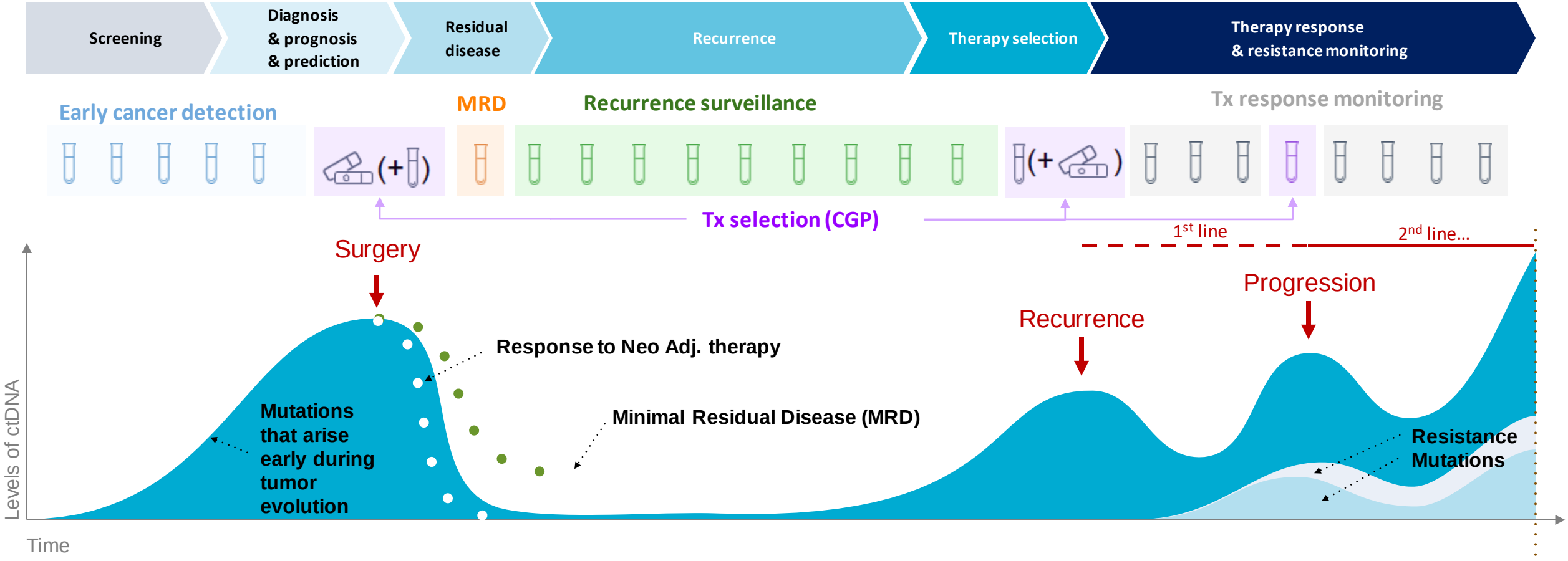
lower cost, **ease of collection**[7,9]

monitoring disease progression/recurrence [3,4]

Patient care plan may suffer if timely testing not available, leading to reduced therapy options with potential higher adverse events

1. Rolfo, C., et al. (2018) *J Thorac Oncol* 13:1248-68; 2. NSCLC NCCN Guidelines Version 2.2020; 3. Lindeman, N.I., et al. (2018) *J Mol Diagn* 20:129-59; 4. Zugazagoitia, J., et al. (2019) *Lung Cancer* 134:72-78;
5. Chouaid, C., et al. (2014) *Lung Cancer* 86:170-3. 6. Krishnamurthy, N., et al., (2017) *J Clin Med* 6:3; 7. Wan, J.C.M., et al., (2017) *Nat Rev Cancer* 17:223-38; 8. Dagogo-Jack, I., et al. (2018) *Nat Rev Clin Oncol* 15:81-94;
9. Siravegna, G., et al., (2015) *Nat Med* 21:795-801; 10. Francis, G. & Stein, S. (2015) *Int J Mol Sci* 16:14122-42; 11. Chouaid, C., et al., (2014) *Lung Cancer* 86:170-3; 12. Bardelli, A., et al., (2017) *Cell* 31:172–9.
13. Saarenheimo J, et al. Front Oncol. 2019;9:129; 2. Corcoran RB, et al. N Engl J Med. 2018;379(18):1754-1765.

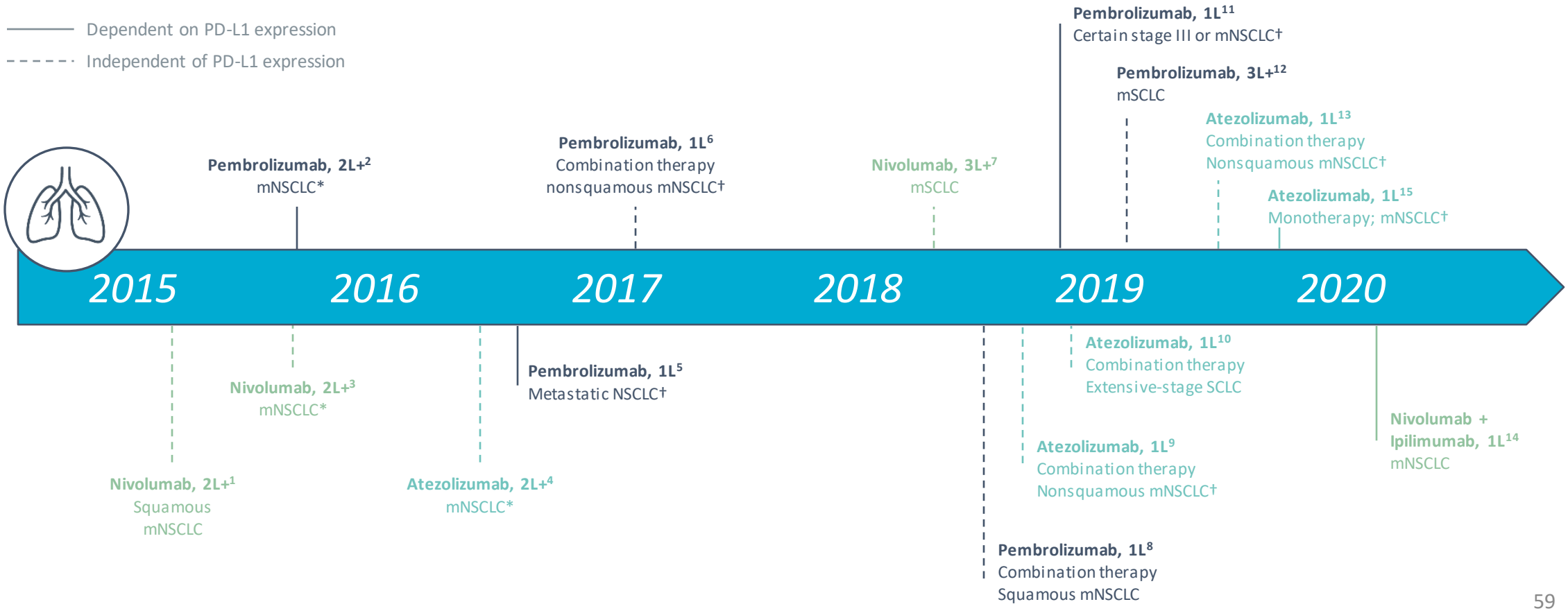
The potential clinical applications of liquid biopsy are wide-ranging



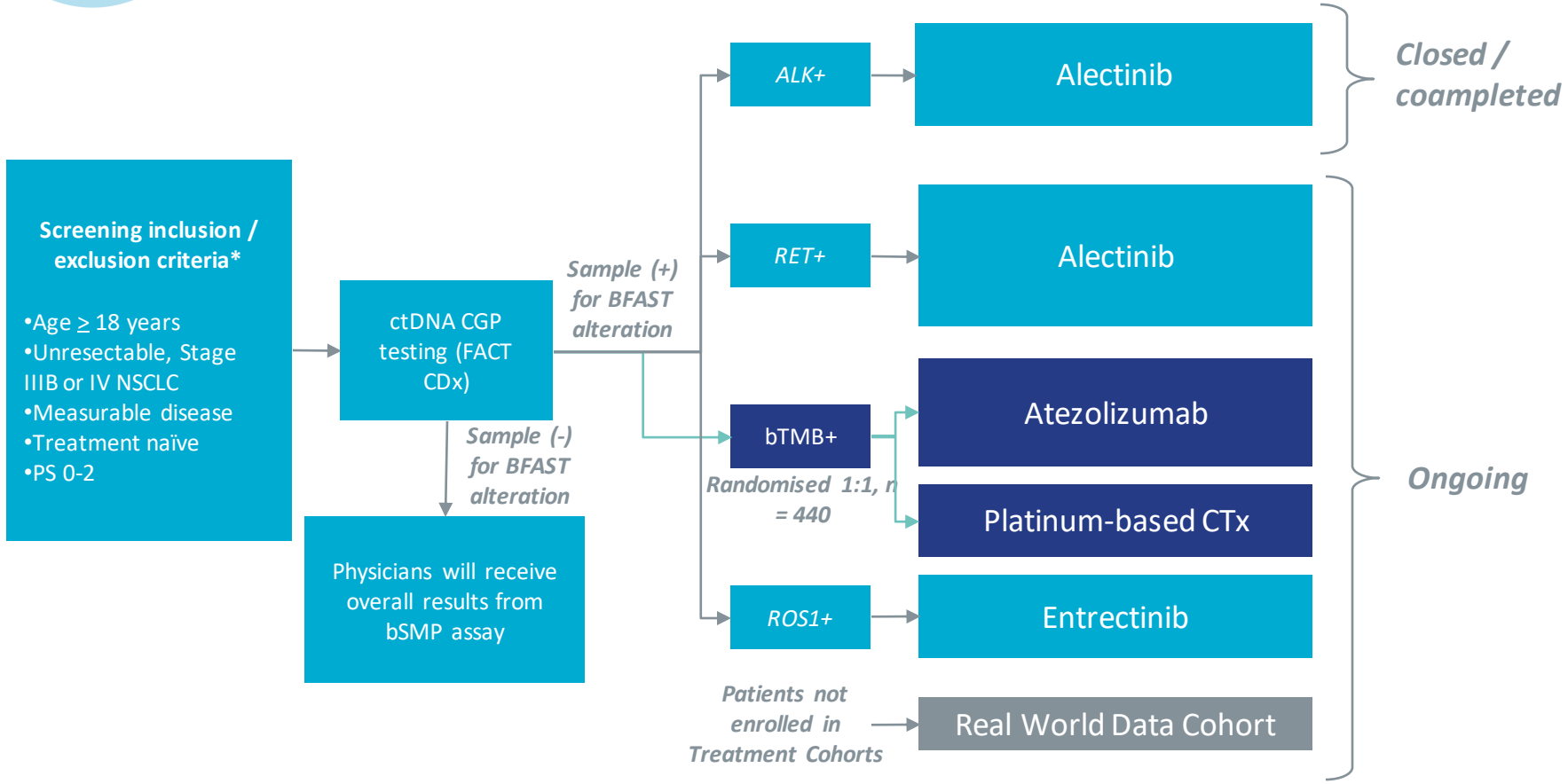
Adapted from: Wan, J.C.M., et al., (2017) *Nat Rev Cancer* 17:223-38.

Immunotherapy is well established in advanced lung cancer

Timeline of developments for immunotherapies in lung cancer



BFAST: blood-first assay screening trial measures bTMB to inform clinical decision making in NSCLC



Phase II/III BFAST trial[1]

- Treatment-naïve, aNSCLC patients screened using blood-based NGS assays and enrolled into targeted treatment / immunotherapy cohorts
- Median bTMB at baseline was 2 mutations
- 3/87 (3.4%) had bTMB ≥ 16 mutations
- LBx identified a similar proportion of patients with *ALK* mutations (5.4%) to that typically seen with traditional biopsy (5%)
- 12-month DoR was 75.9%

*All cohorts have additional, treatment-specific inclusion / exclusion criteria

aNSCLC: advanced non small cell lung cancer; BFAST: blood-first assay screening trial; BID: twice daily; bSMP: blood somatic mutation profiling; bTMB: blood based tumour mutational burden; ctDNA: circulating tumour DNA; CTx: chemotherapy; DoR: duration of response; FMI: Foundation Medicine Inc.; IV: intravenously; LBx: liquid biopsy; NSCLC: non-small cell lung cancer; PD: progressive disease; PO: orally; PS: performance status; Q3W: every 3 weeks. Gadgeel, S., et al. presented at ESMO 2019, abstract LBA81_PR.

Conclusions

- Lung cancer is the poster boy for precision medicine with effective targeted treatments licensed and in development
- Liquid biopsy is convenient, efficient and technologies have evolved to perform broad panel testing from ctDNA
- Tissue testing for NGS still has its place and will likely be complementary with liquid-based testing
- Serial sampling provides important insights into potential resistance mechanisms and will guide next generation of targeted therapies.
- Challenges will be funding of NGS in different health-care systems and reimbursement of therapies

How to integrate these advanced diagnostics tools into clinical routine?

Open Discussion

Please use the Chat feature to ask questions and make comments

Final Remarks

Co-Chair:

Geoff Oxnard, Vice President, Global Medical Lead, Liquid Franchise at Foundation Medicine

Removing health system delays in lung cancer

Co-Chair:

Ouzna Morsli, EMEAC Oncology Medical Lead, MSD

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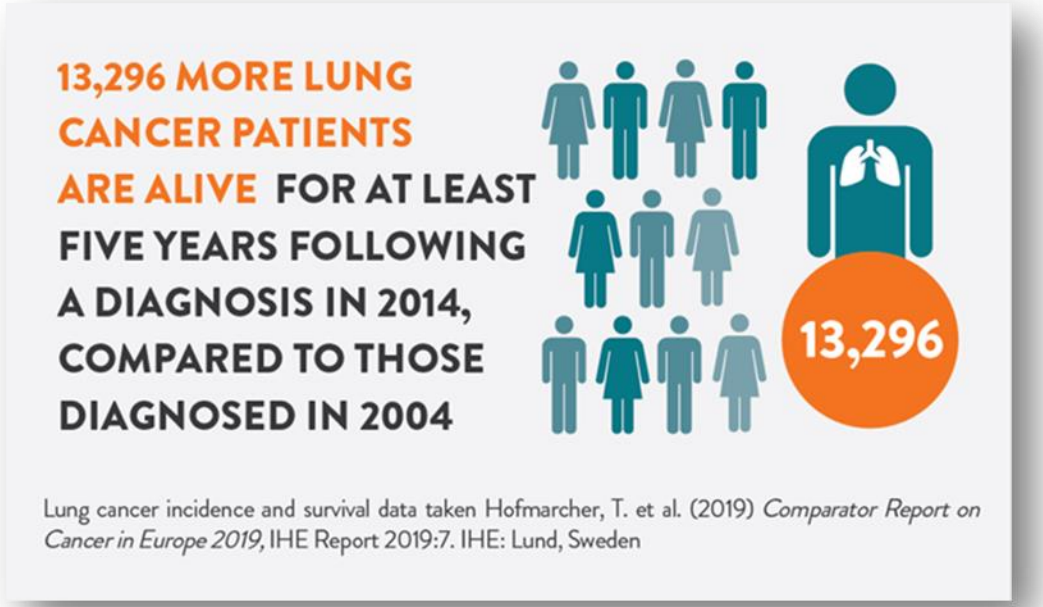
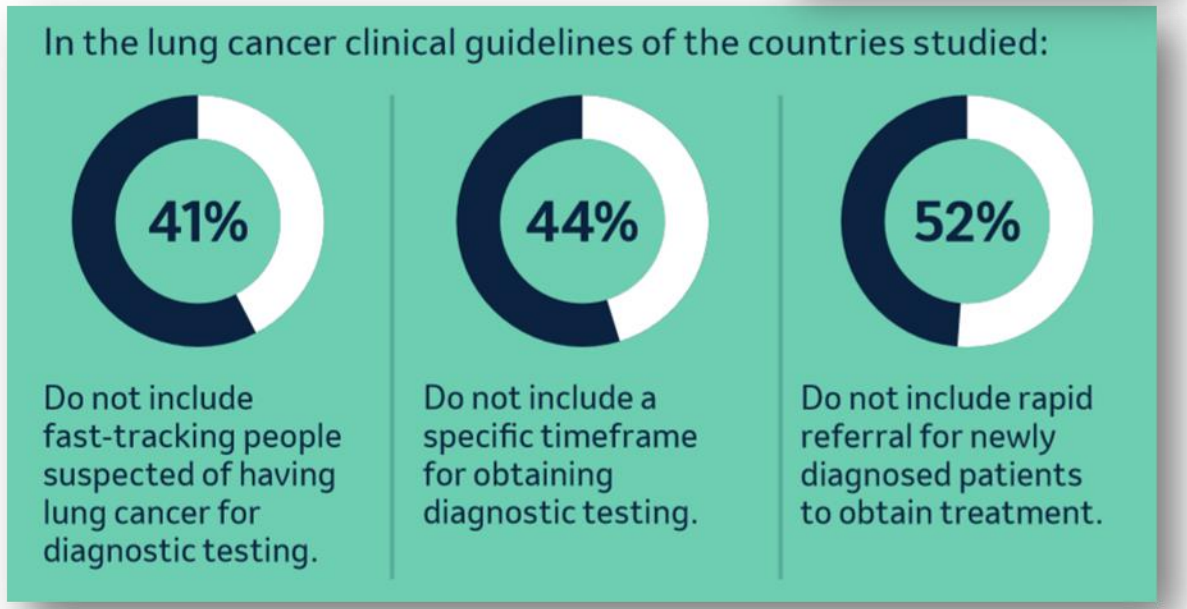
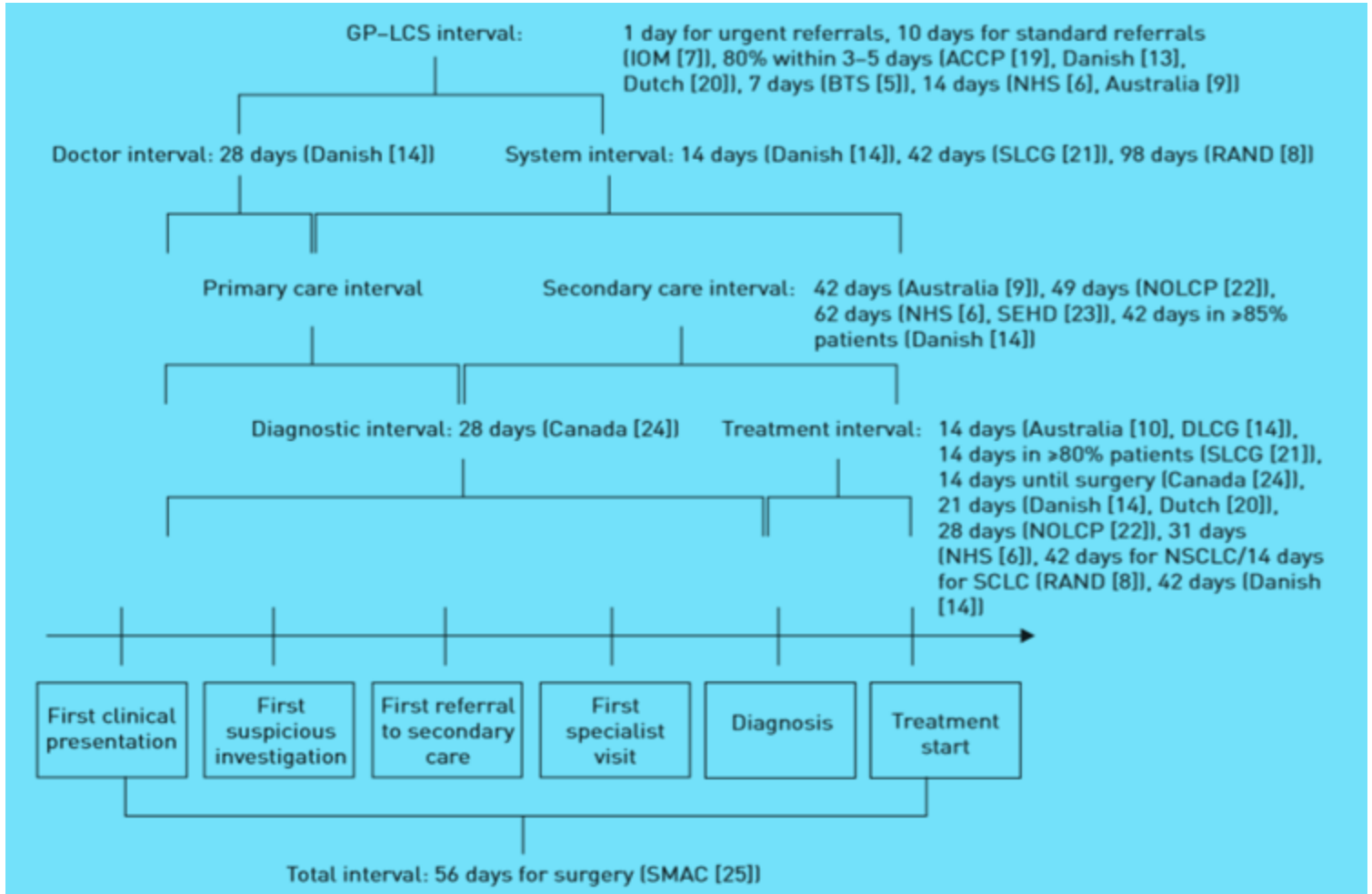
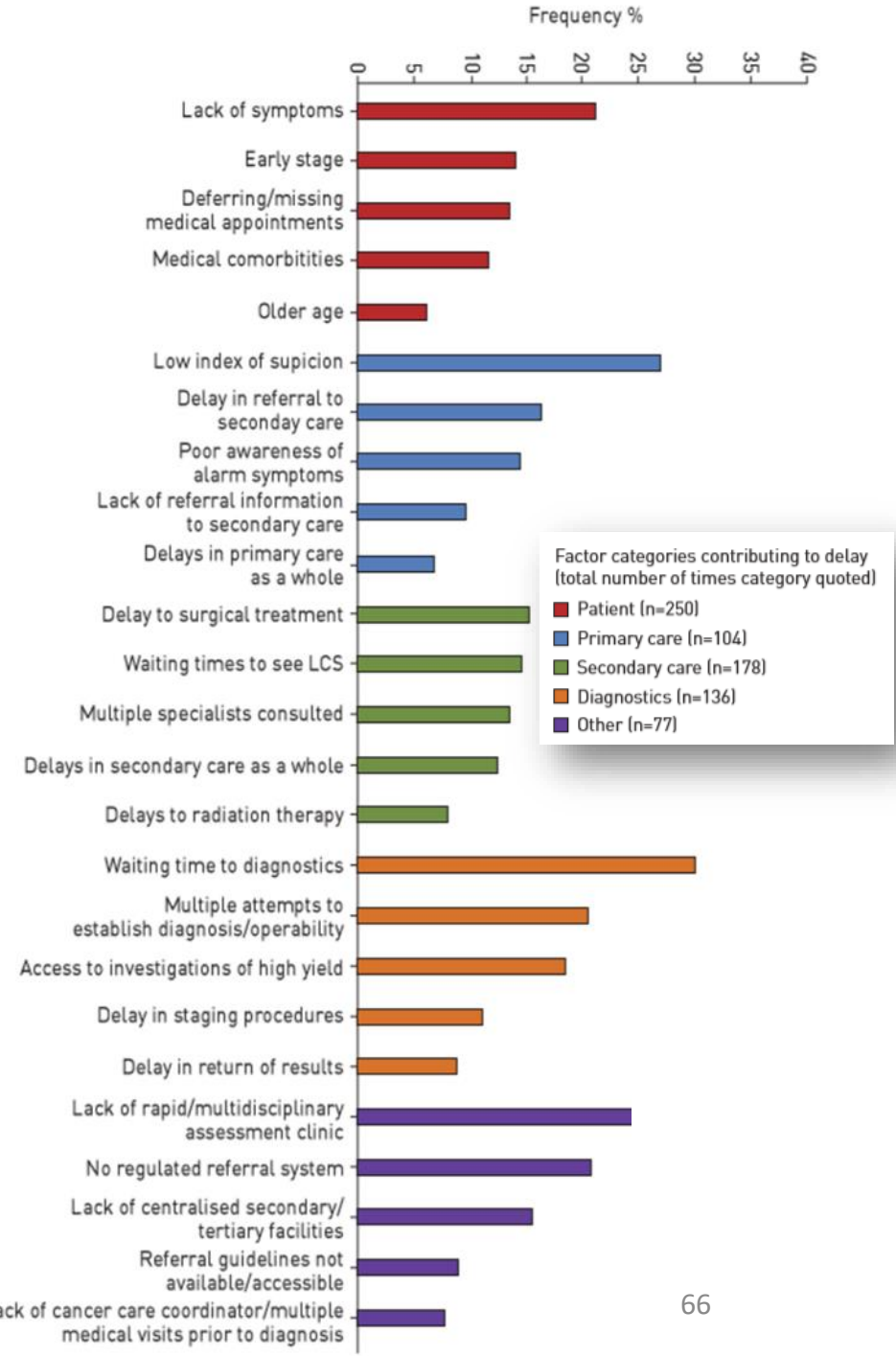
Time is of the essence for people living with lung cancer: delays in diagnostic testing and referral for treatment must be eliminated





Removing health system delays in lung cancer





Source: Malalasekera A, Nahm S, Blinman PL, et al. How long is too long? A scoping review of health system delays in lung cancer. Eur Respir Rev 2018; 27: 180045 [https://doi.org/10.1183/ 16000617.0045-2018].

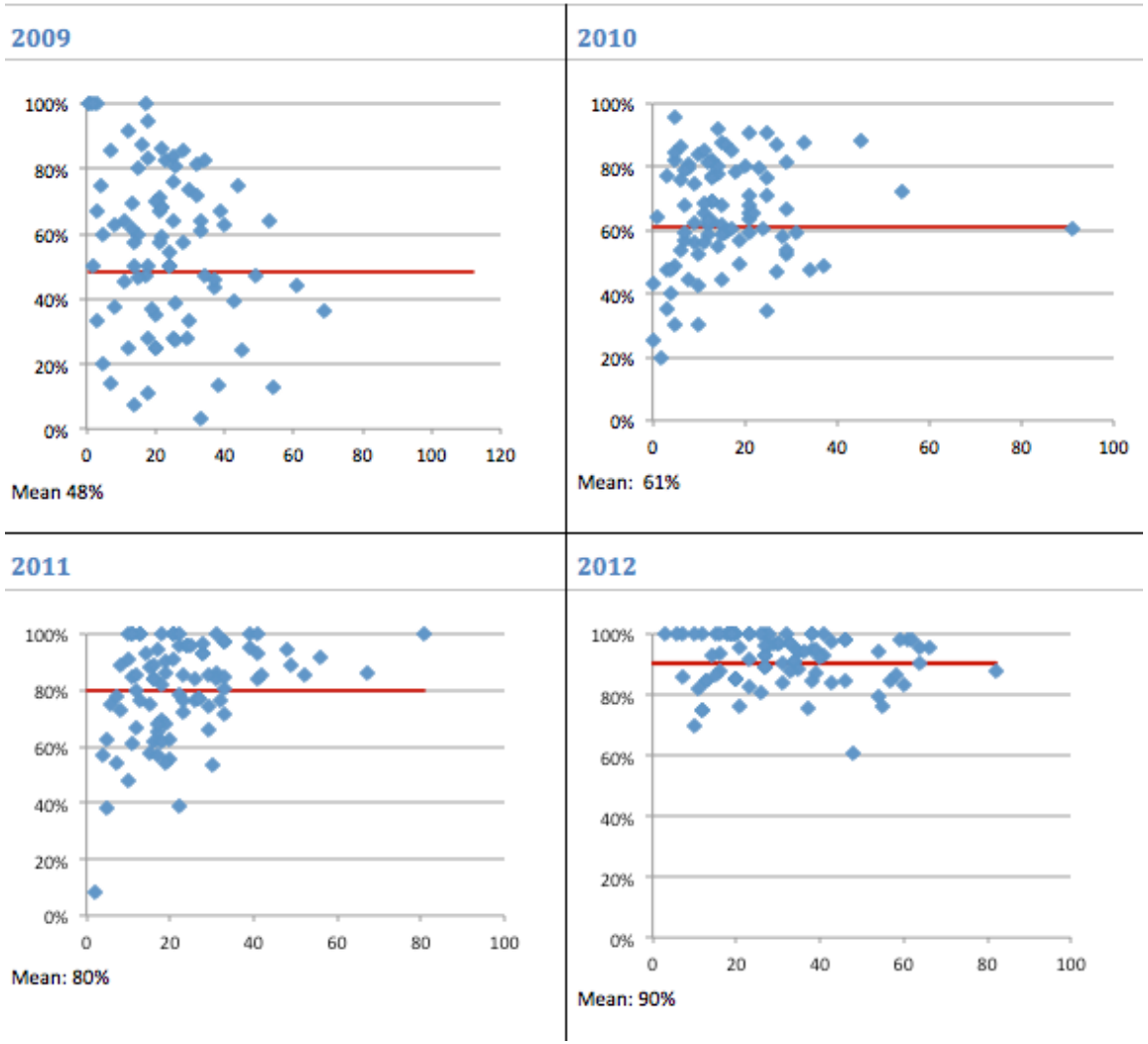
The Dutch Lung Cancer Audit: Nationwide Quality of Care Evaluation Using Quality Indicators

Hans J.M. Smit, Pulmonologist, Rijnstate Hospital, Chairman of the Dutch Lung Cancer Audit, Arnhem, The Netherlands

Rawa Ismail, PharmD and PhD Candidate DICA

What to achieve

- Improving quality by bench marking
- Preferably in a safe setting (anonymous)



DLCA
DUTCH LUNG CANCER AUDIT

Key messages

- Quality registries play an important role in quality care improvement
  - It takes time to initiate a nation-wide registry
  - Insight into own data leads to improved care
  - Benchmarking with other hospitals can lead to discussions and best-practice examples

- Quality indicators are important to measure the quality of care: start “simple”, improve over time
  - Be aware of the registration burden for hospitals
  - Indicators on processes in the hospital can lead indirectly to better care
  - Outcome indicators are of high value and should be measured when registry data are rich and trustworthy

Content

- What is DLCA?
- How was DLCA initiated?
- What is measured?
- What has been achieved?
- How to use it in clinical practice?

DLCA
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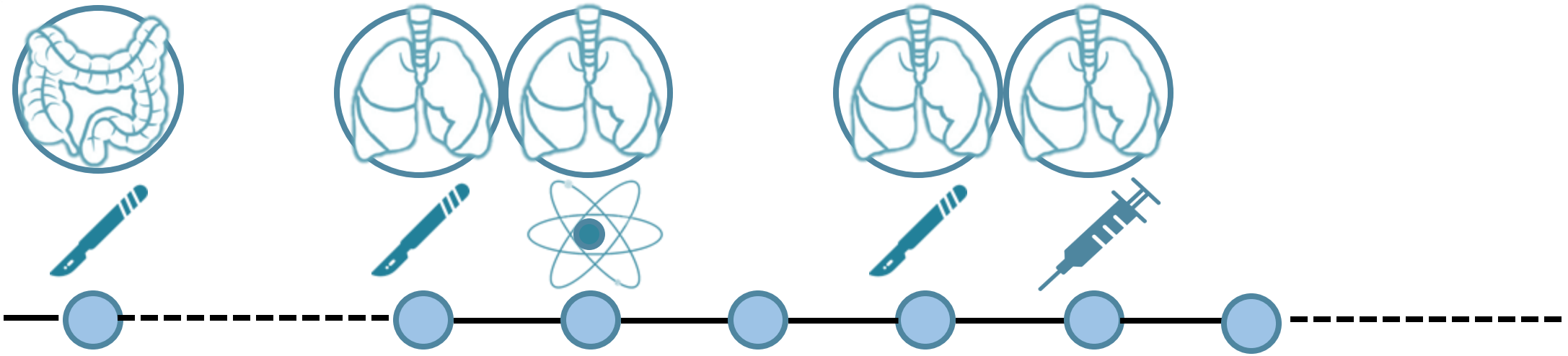
Multidisciplinary DLCA within DICA



2009

Start DICA: Dutch ColoRectal Audit (DCRA)

2012

Start Lung surgery (DLCA-S)

2013

Start Radiotherapy (DLCA-R)

2015

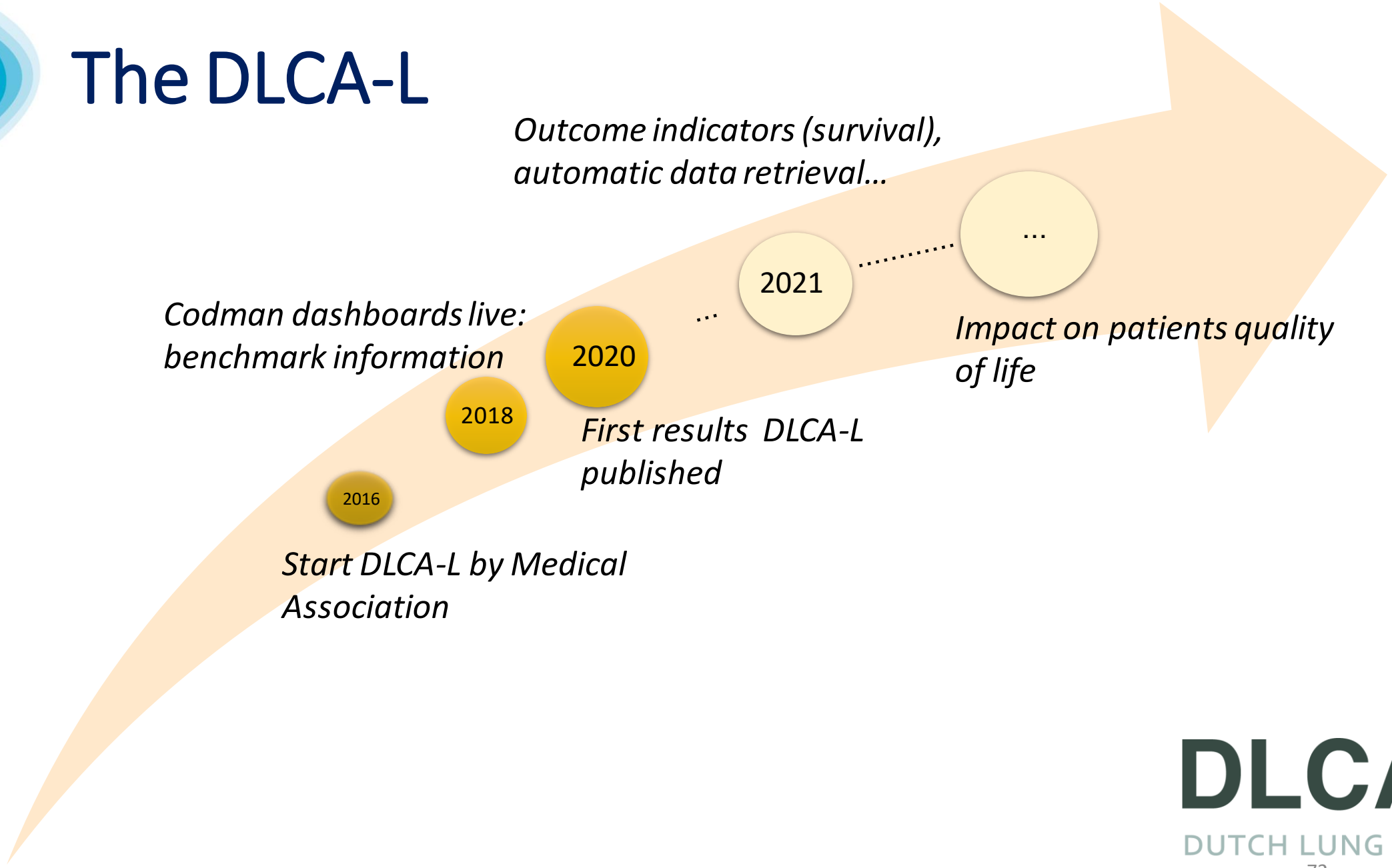
Start Cardio-Thoracic surgery *(DLCA-S)*

2016

Start Lung Oncology (DLCA-L): one DLCA

DLCA
DUTCH LUNG CANCER AUDIT

The DLCA-L


Outcome indicators (survival), automatic data retrieval…
…
2021
…
Impact on patients quality of life
Codman dashboards live: benchmark information
2020
2018
First results DLCA-L published
2016
Start DLCA-L by Medical Association

Finance by production payment

Hospital 1

Hospital 2

Hospital 3

Hospital 4

Hospital 5

Finance by government

DICA through MRDM

DICA Scientific buro

DICA supports law, ICT, epidemiology

DLCA board

Mandated from Specialists Association and Patient Representatives

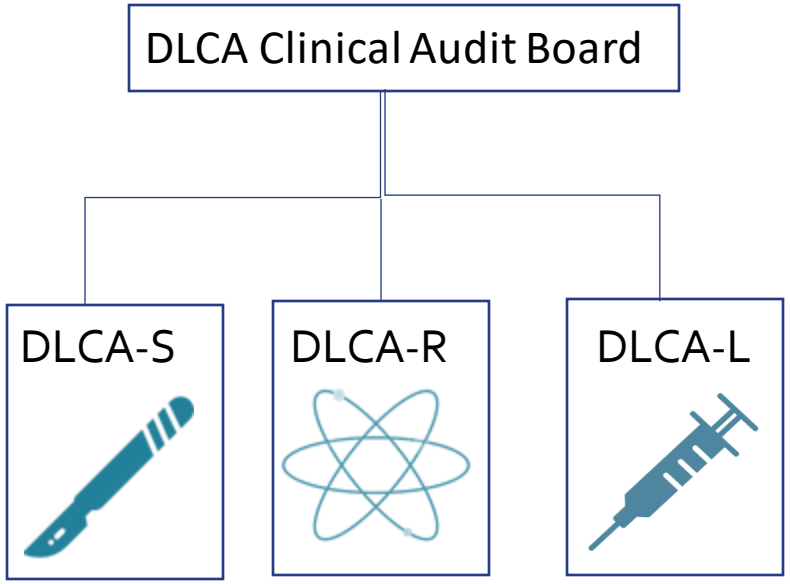
- Open character
- Publications
- Develop Indicators:

Based on guidelines
Based on science
Based on patient needs

Scientific board

Initiation of DLCA

- Initiated by professional association of chest physicians (NVALT)
- Facilitated by DICA
- Subregistries with own scientific committees and clinical audit board



Scientific committees

european cancer ORGANISATION

DLCA-L  >40.000 patients
73 hospitals

DLCA-S  >42.000 patients
43 hospitals

DLCA-R  >18.000 patients
19 hospitals

DLCA
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Initiation of the DLCA

Why?

Insights into quality of care of lung cancer patients

by focusing on

- Diagnostics
- Time to Diagnosis and Therapy
- Monitoring of in-hospital times,
- Outcomes of systemic therapy
- Including Best Supportive Care = complete

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Potential problems

Registration = time consuming

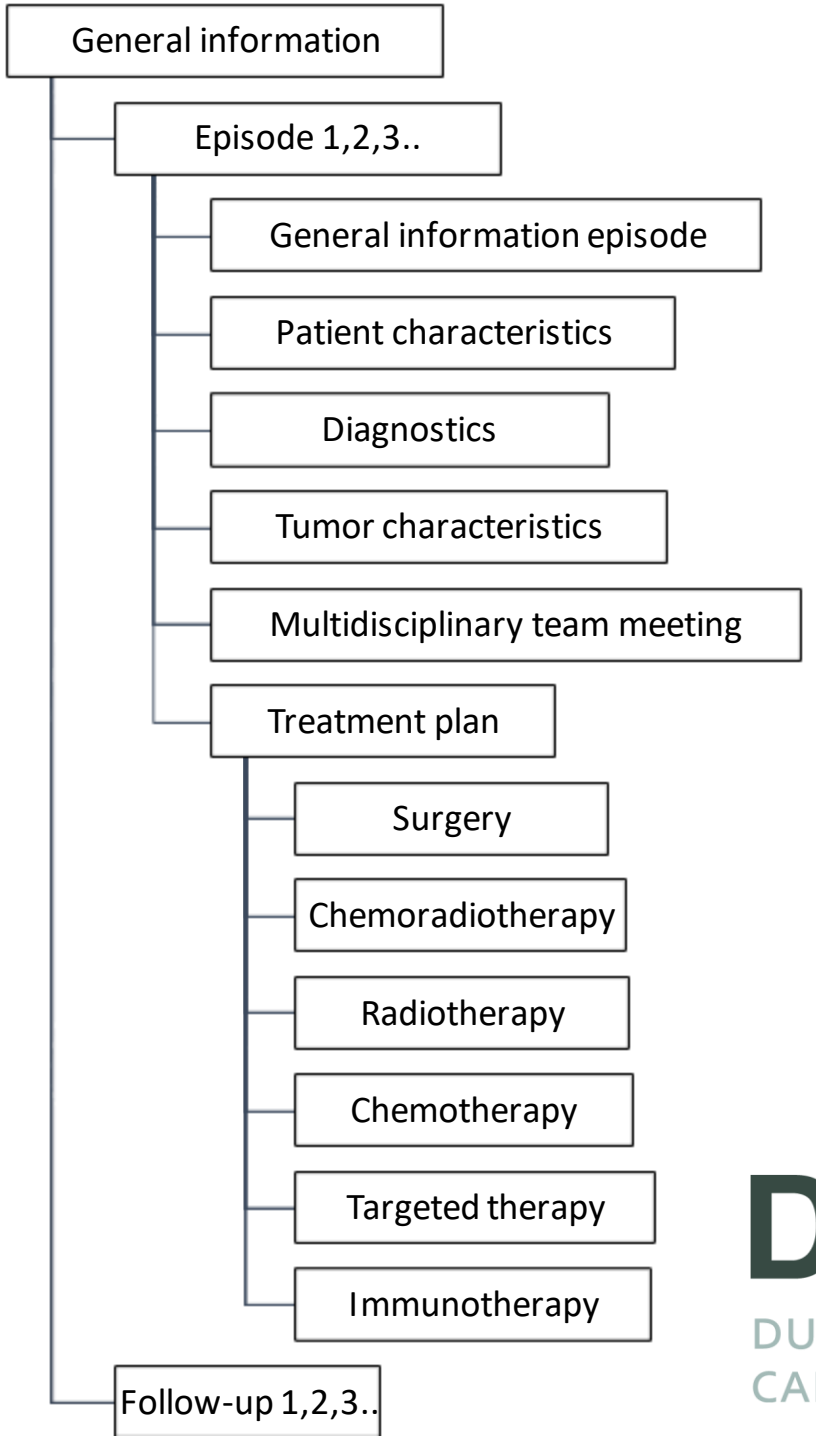
Time = competitive with patient care

Automic substraction = less control

Privacy law = reduction of possibilities and time consuming

The DLCA dataset

- Inclusion: all patients with lung carcinoma
- Including clinically suspected
- 153 variables
- >40% mandatory items



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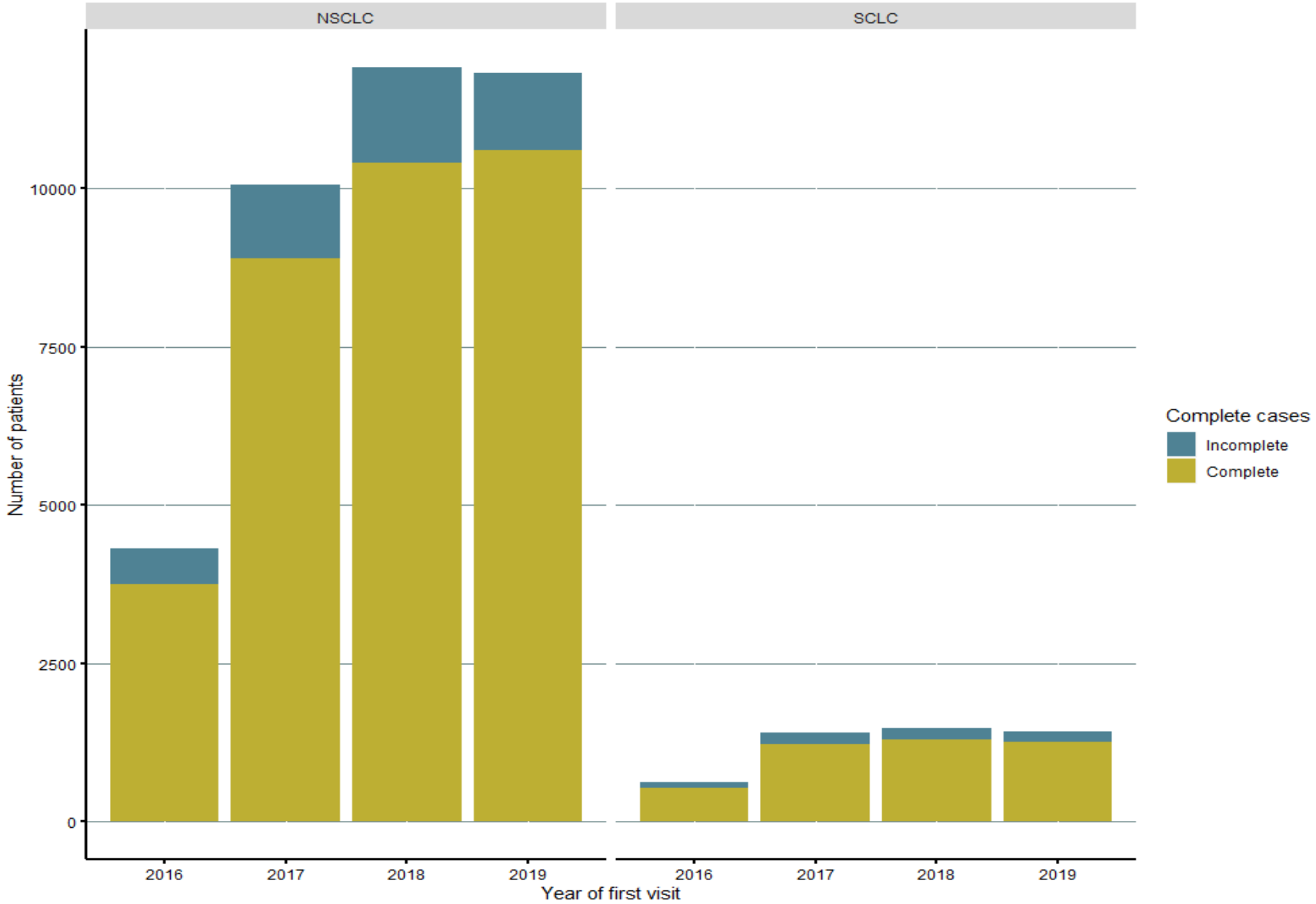
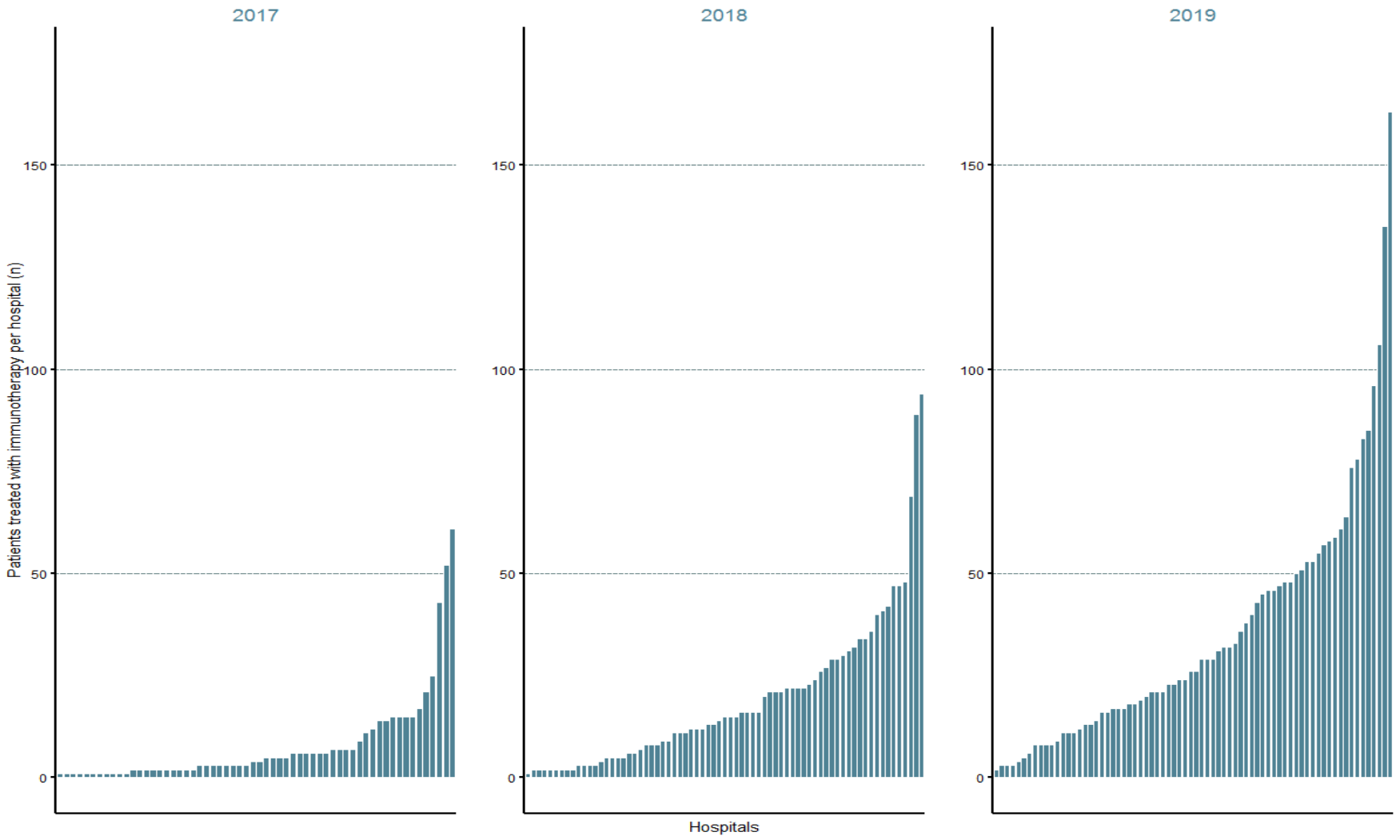
Results: Data set completeness



Results: Hospitals and immunotherapy



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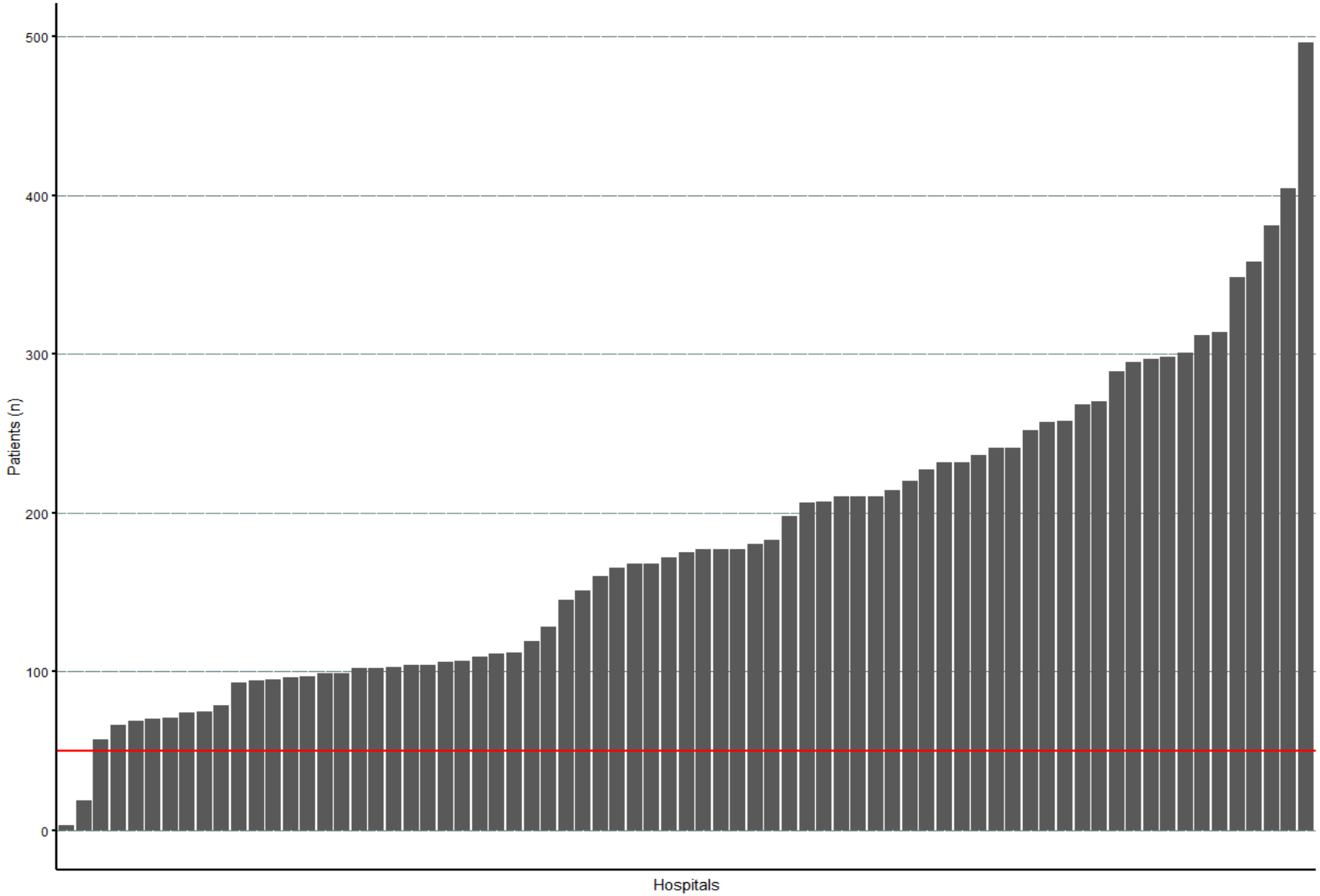
Results: Numbers of patients per hospital



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Results: Feedback process

Ernest Amory Codman, 1910

Results: Quality indicators

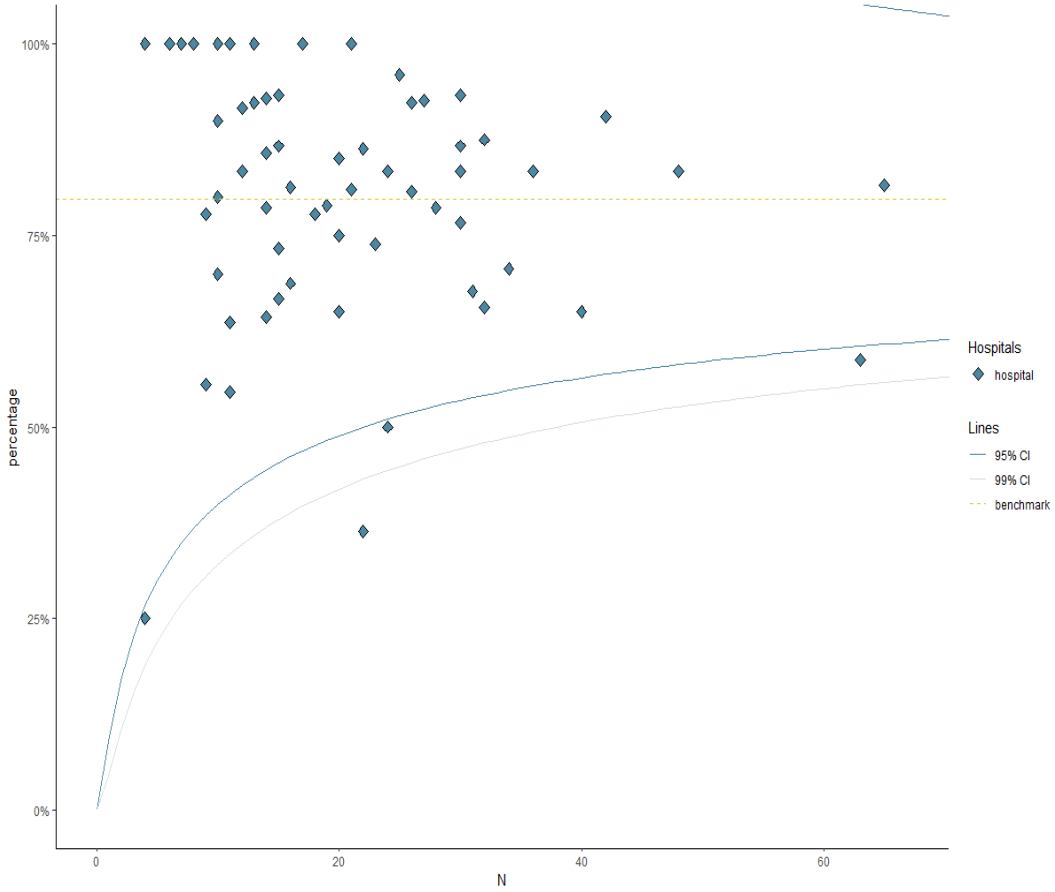
1) Structure quality indicators
   - *Number of patients*
   - *Completeness of registration*

2) Process quality indicators
   - *Brain imaging*
   - *Molecular diagnostics*
   - *Multidisciplinary consultation*
   - *Duration diagnostic trajectory*
   - *First-line treatments NSCLC/SCLC*
   - *Use of treatments in elderly*

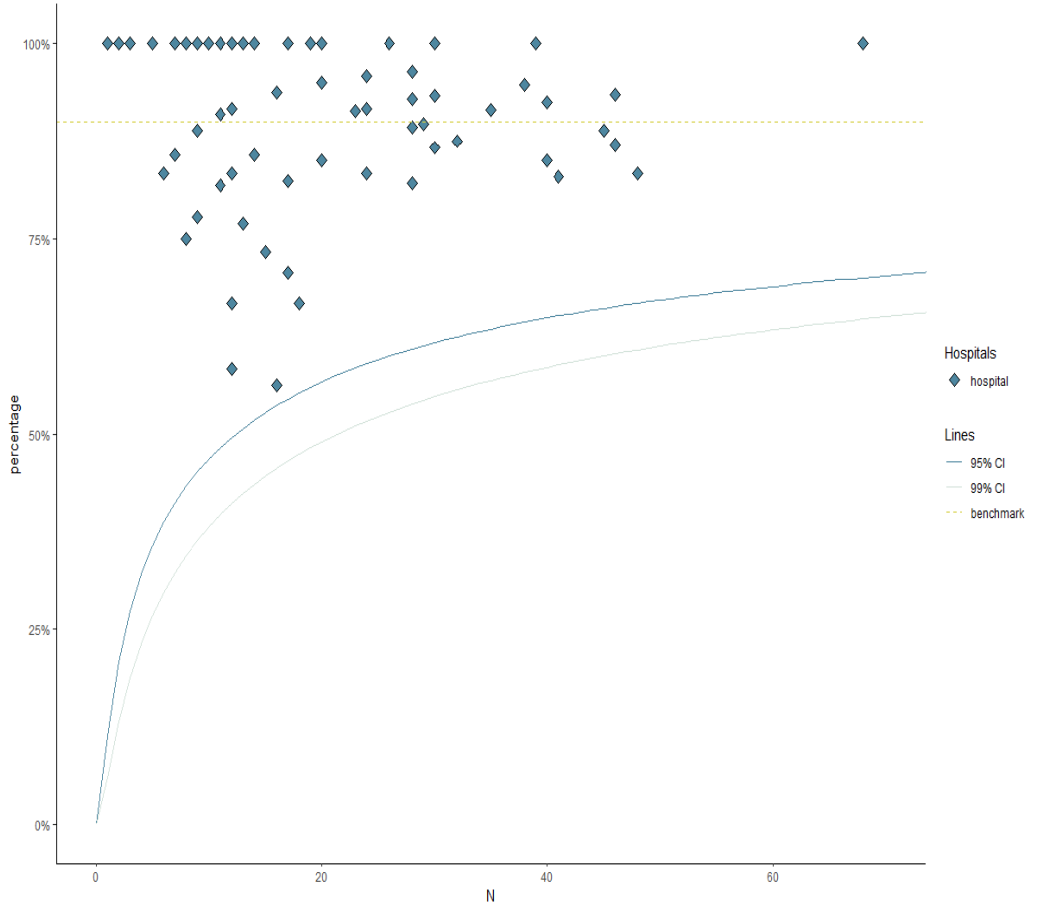
3) Outcome quality indicators
   - *Grade 3/4 toxicities related to systemic treatment*

Results: Improvement in brain imaging

2017



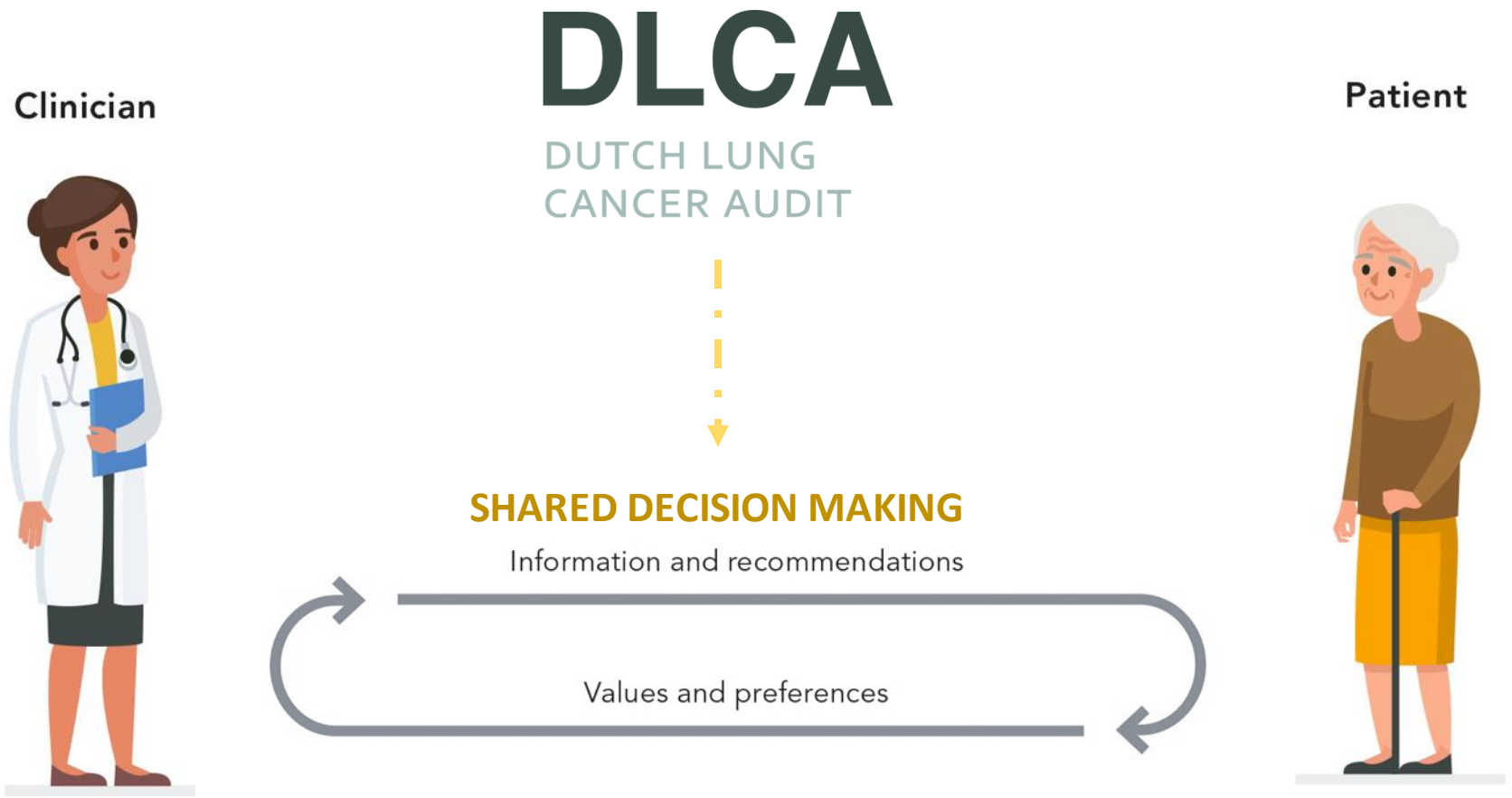
2019

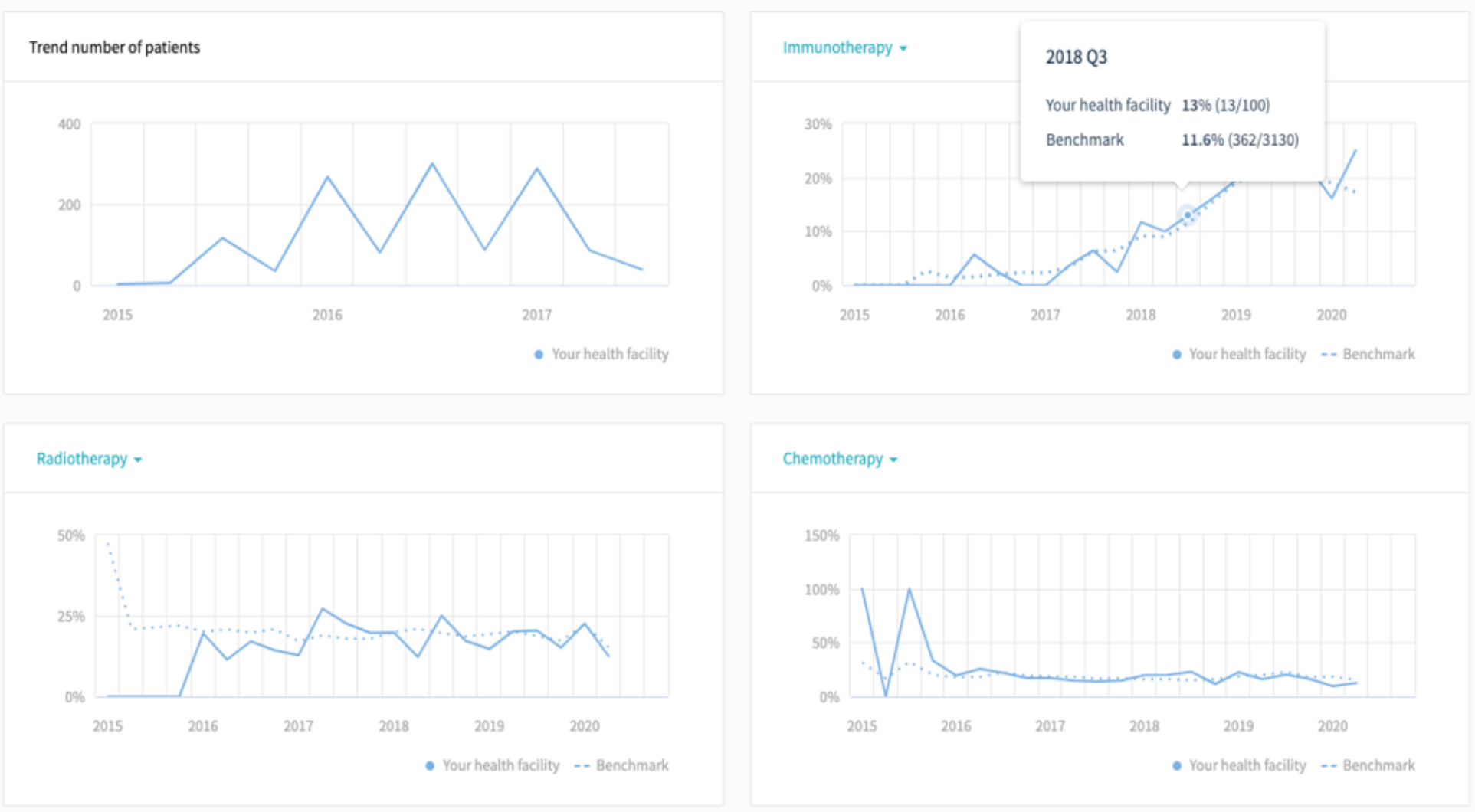


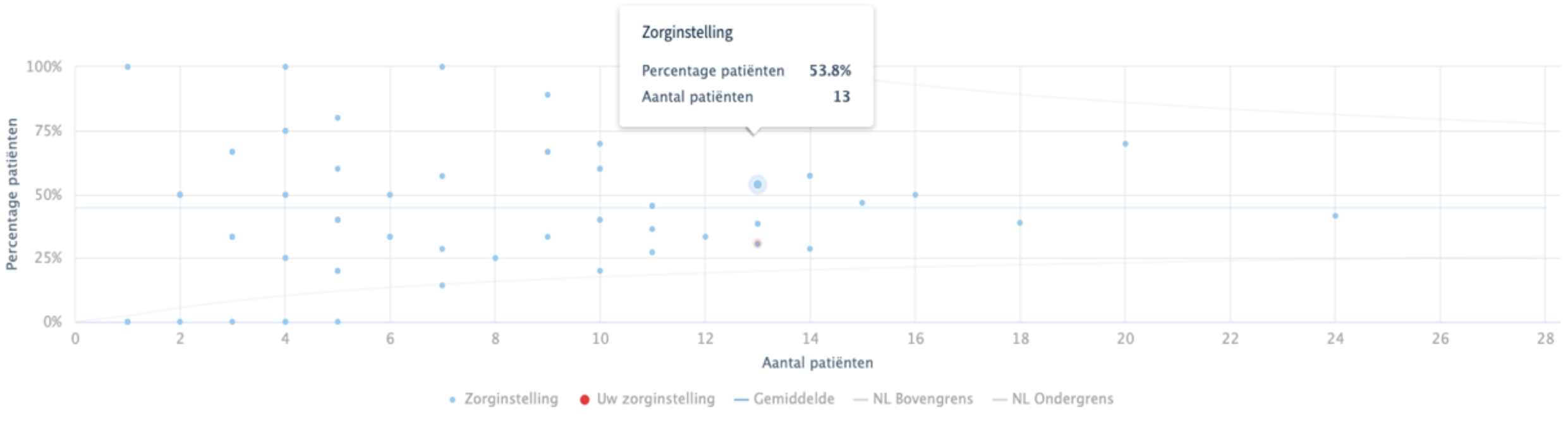
Results: Other examples of QIs

- Stage III NSCLC patients undergoing brain imaging:
- **82%** in 2017 → **90%** in 2019
- Stage IV adenocarcinoma patients undergoing molecular diagnostics:
- **89%** in 2017 → **93%** in 2019
- Time from diagnosis to start treatment
  - Without invasive mediastinal diagnostics (<21 days): **62%**
  - With EUS/EBUS (<21 days): **46%**
  - With mediastinoscopy (<35 days): **59%**

Use in clinical practice




Trend number of patients
400
200
0
2015
2016
2017
Your health facility
Immunotherapy
2018 Q3
Your health facility 13% (13/100)
Benchmark 11.6% (362/3130)
30%
20%
10%
0%
2015
2016
2017
2018
2019
2020
Your health facility
Benchmark
Radiotherapy
50%
25%
0%
2015
2016
2017
2018
2019
2020
Your health facility
Benchmark
Chemotherapy
150%
100%
50%
0%
2015
2016
2017
2018
2019
2020
Your health facility
Benchmark


Zorginstelling
Percentage patiënten 53.8%
Aantal patiënten 13
100%
75%
50%
25%
0%
Percentage patiënten
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Aantal patiënten
Zorginstelling
Uw zorginstelling
Gemiddelde
NL Bovengrens
NL Ondergrens

	Amount	Your health facility	Your health facility SD	Benchmark NL	Benchmark NL SD
Leeftijd ten tijde van diagnose	61	67.8	10.6	69.5	10.1

	Amount	Your health facility	Benchmark NL
Leeftijd ten tijde van diagnose			
20-59 jaar	14	22.6 %	13.6 %
60-69 jaar	40	64.5 %	57.7 %
70-79 jaar	7	11.3 %	14.1 %
> 80 jaar	1	1.6 %	14.6 %
Geslacht			
Man	33	53.2 %	53.8 %
Vrouw	29	46.8 %	44.9 %
Onbekend / niet ingevuld	–	–	1.4 %
ECOG score			
ECOG 0	22	35.5 %	24.2 %
ECOG 1	25	40.3 %	38.9 %
ECOG 2	8	12.9 %	14.1 %
ECOG 3	4	6.5 %	7.8 %
ECOG 4	–	–	1.4 %
Onbekend / niet ingevuld	3	4.8 %	13.5 %

Key messages

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Thank you!

Rawa Ismail
r.ismail@dica.nl

Open Discussion

Please use the Chat feature to ask questions and make comments

Final Remarks

Co-Chair:

Ouzna Morsli, EMEAC Oncology Medical Lead, MSD

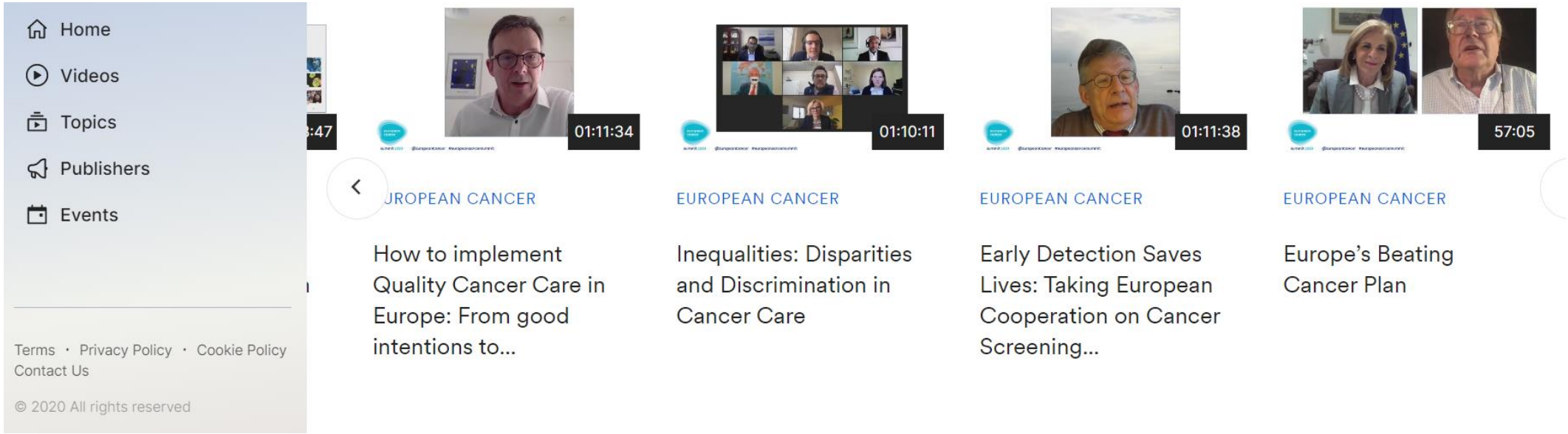
Community 365 Roundtable Meeting on Lung Cancer

Legacy from this meeting will include:

- Action report to be published in early January
- From tomorrow, video and slides on our website: **europeancancer.org/resources**
- Follow up with EU Commission ahead of publication Europe's Beating Cancer Plan
- Next steps on implementation of Essential Requirements in our Quality Cancer Care Network

European Cancer Summit 2020

All the sessions from this year's European Cancer Summit are now available free of charge on **wondrmedical.net/ch/european-cancer-organisation**



Quality Cancer Care Catalogue

- The European Quality Cancer Care Catalogue aims to provide a central repository to signpost individuals to the tools they will find helpful in improving the quality of cancer care

- The Catalogue is a continually evolving home for societies and other entities to profile and disseminate their work to broad audiences likely to have interest in their initiatives

europeancancer.org/resources