



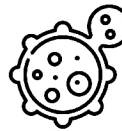
AI in Oncology



'The science of developing machine technologies that are capable of performing tasks usually associated with **intelligent beings**, including **problem solving** and **learning**'¹

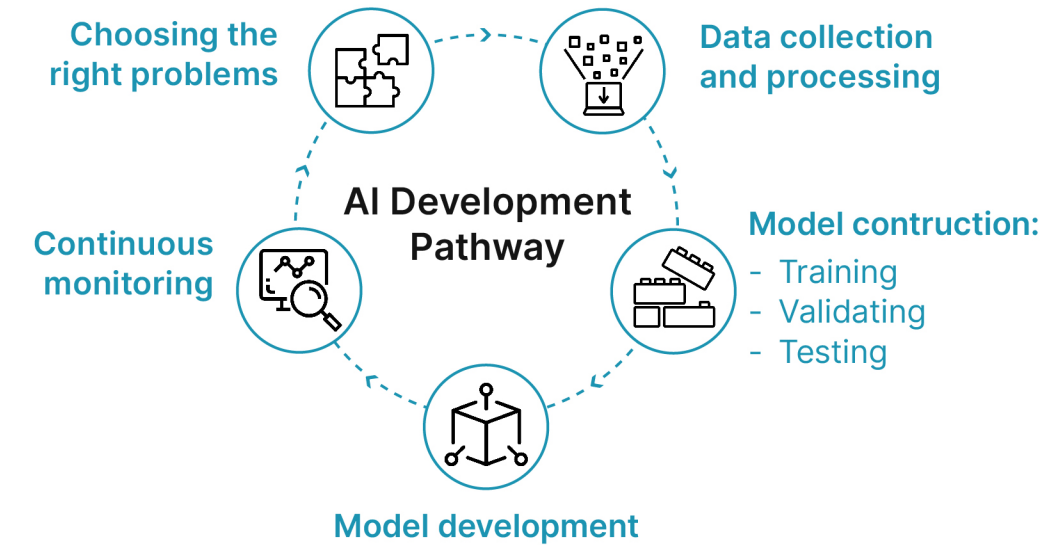
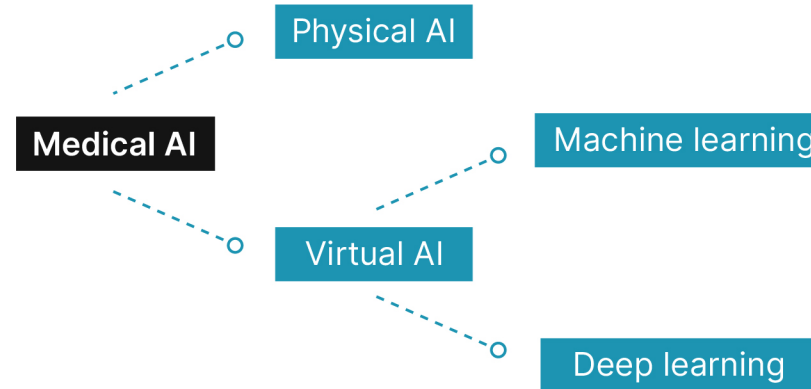


AI has the potential 'to fundamentally transform the practice of **medicine** and the delivery of **healthcare**'²

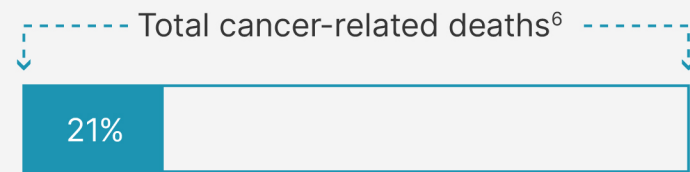


AI could be pivotal in **helping cancer care** as part of the European Digital Strategy³

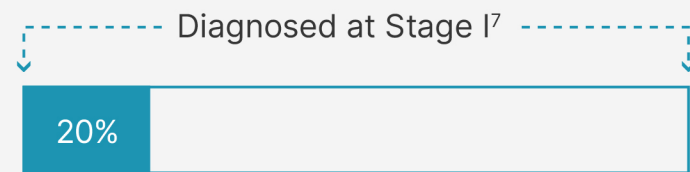
AI Subtypes in Healthcare



Spotlighting Lung Cancer⁵

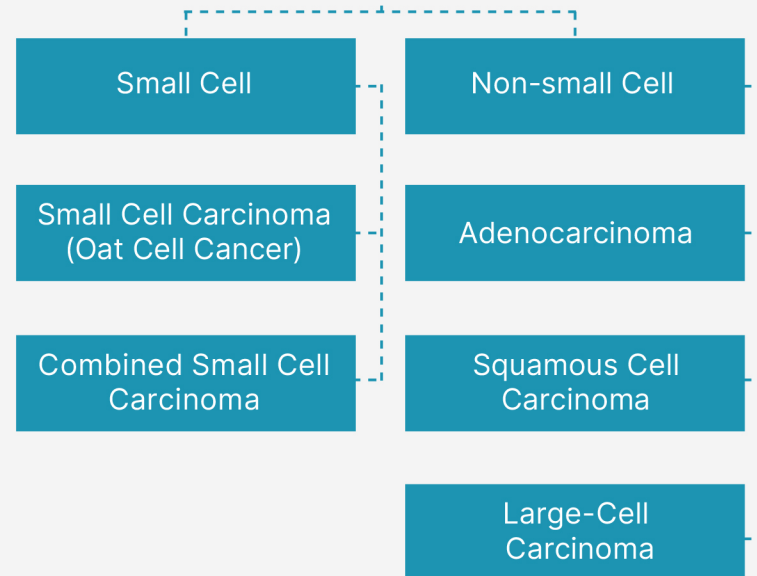


Highest mortality worldwide



Early diagnosis remains challenging

Two Main Types of Lung Cancer



Minimising radiation exposure

Accurately detecting/categorising lung nodules

Benefits of AI in Screening

LDCT interpretation in regions with a shortage of skilled radiologists

Personalising screening schedules

Screening

- LDCT screening is the gold standard for lung cancer detection
- Nodules can act as early indicators
- Early diagnosis in high-risk populations can reduce the death rate by 20%
- CNNs, a class of deep-learning artificial neural networks, have identified high-risk patients, and predicted 1-year lung cancer rate with excellent accuracy (overall AUC: 0.90)¹⁰

Diagnosis

- Predictive models combine CT images with AI algorithms
- The DL Cade system=higher nodule detection rate (86.2% versus 79.2%) per CT examination than that of a double reading by two radiologists¹¹
- 298 histopathological images analysed using deep CNNs classified adenocarcinoma, SCC, and SCLC with accuracies of 89%, 60%, and 70%, respectively¹²

Key

AI: artificial intelligence; AUC: area under the curve; CNN: convolutional neural network; HIPAA: Health Insurance Portability and Accountability Act; HCP: healthcare professional; LDCT: low-dose CT; NLST: National Lung Screening Trial; SCLC: small cell lung cancer; SCC: squamous cell carcinoma.

References

- Joiner IA. Artificial Intelligence: AI is Nearly Emerging Library Technologies (2018), Kingston up-on Hull: Chandos Publishing, pp.1-22.
- Bajwa J et al. Artificial intelligence in healthcare: transforming the practice of medicine. *Future Healthc J.* 2021;8(2):e188-94.
- European Commission. Europe's beating cancer plan: communication from the commission to the European Parliament and the Council. 2022. Available at: https://health.ec.europa.eu/system/files/2022-02/eu_cancer_plan_en_0.pdf. Last accessed: 7 December 2023.
- Farina E et al. An overview of artificial intelligence in oncology. *Future Sci OA.* 2022;8(4):FSO787.
- Gandhi Z et al. Artificial intelligence and lung cancer: impact on improving patient outcomes. *Cancers (Basel).* 2023;15(21):5236.
- Jacobs C, van Ginneken B. Google's lung cancer AI: a promising tool that needs further validation. *Nat Rev Clin Oncol.* 2019;16(9):532-3.
- Bidzińska J, Szurawska E. See lung cancer with an AI. *Cancers (Basel).* 2023;15(4):1321.
- Ballard DH et al. The role of imaging in health screening: screening for specific conditions. *Acad Radiol.* 2021;28(4):548-63.
- Yeh MC et al. Artificial intelligence-based prediction of lung cancer risk using nonimaging elec-tronic medical records: deep learning approach. *J Med Internet Res.* 2021;23(8):e26256.
- Zhang K, Chen K. Artificial intelligence: opportunities in lung cancer. *Curr Opin Oncol.* 2022;34(1):44-53.
- Chauvie S et al. Artificial intelligence and radiomics enhance the positive predictive value of digital chest tomosynthesis for lung cancer detection within SOS clinical trial. *Eur Radiol.* 2020;30(7):4134-40.
- Teramoto A et al. Automated classification of lung cancer types from cytological images using deep convolutional neural networks. *Biomed Res Int.* 2017;2017:4067832.

Emerging issues and directions



Lack of large **datasets** of clinical data to train models



Lack of **resources**, proper training, and education among HCPs



Patient privacy, data security, and **compliance with regulations** can be complex



A **framework** for AI model deployment in healthcare could ensure patient safety, while maintaining ethical standards



Creation of standardised dataset of lung cancer and longitudinal data through collaboration of healthcare institutions