A Review of AI Devices in Cancer Radiology for Breast and Lung Imaging and Diagnosis

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Abstract

The AI integration in oncology has transitioned from a speculative concept to a concrete reality. Across the stages of cancer care, various AI applications are at different stages of development and are being incorporated into practices. These range from early detection and diagnosis to treatment planning and follow-up care. This research outlines an inventory of devices introduced between 2015 and 2020 in three categories: devices for breast imaging and analysis, lung Imaging and Analysis, and devices for image reconstruction, quality assessment, and other diagnostic support. The Breast Imaging and Analysis category primarily features devices that target breast-related images, particularly in breast cancer context. These tools assist in detecting suspicious regions in mammograms, categorizing breast tissue types, and elevating the precision of breast cancer diagnoses. Such technologies are mostly compatible with mammograms and digital breast tomosynthesis (DBT) exams. In the Lung Imaging and Analysis segment, the devices listed are mainly developed to aid healthcare professionals in identifying, documenting, and analyzing pulmonary anomalies. Given the global significance and fatality rates associated with lung cancer, these devices aim to enhance the precision of detecting nodules, lesions, and other potential signs of lung ailments, primarily through CT chest exams. The image reconstruction, quality assessment, and other diagnostic support category encompasses devices focusing on general medical imaging. These devices employ innovative algorithms and deep learning methodologies for tasks such as image reconstruction, quality evaluation, and specific condition detection, including prostate cancer and colorectal polyps. The category also covers tools designed for radiation therapy planning.

Keywords: artificial intelligence, breast imaging, deep learning, diagnostics, digital breast tomosynthesis, lung imaging, mammograms, medical imaging

Introduction

Oncology currently places a significant emphasis on evidence-based medicine scoring systems. These systems serve as foundational tools in various stages of cancer care, from risk assessment and disease diagnosis to prognostic staging, devising treatment plans, and monitoring patients' post-treatment (*1*). The genesis of these scoring systems can often be traced back to rudimentary observations made through light microscopy. This early method allowed clinicians to visualize and assess cellular structures, abnormalities, and disease characteristics, providing a basic understanding and categorization of cancerous conditions.

However, with the technological advancements, these initially simple systems have evolved and become more sophisticated. The introduction of advanced testing methods has significantly augmented the precision and reliability of these evidence-based scoring systems (*2*, *3*). Modern techniques go beyond mere visualization, delving deeper into the molecular and genetic attributes of cancer cells. This enables a more nuanced understanding of the disease, taking into account the individual genetic makeup of tumors, which can vary substantially even among patients with the same type of cancer.

Artificial intelligence (AI) refers to a specialized domain within computer science that seeks to create systems capable of performing tasks that would typically necessitate human intelligence. These tasks encompass a wide array of cognitive functions such as visual perception, pattern recognition, decision-making, and problem-solving. By employing sophisticated computer algorithms, AI aims to emulate or even surpass human performance in these areas. The medical domain stands as a testament to AI's transformative power, with various specialties experiencing enhancements in diagnosis, treatment, and patient care. Specifically, radiation therapy, a cornerstone in cancer treatment, stands to benefit immensely from AI's capabilities. By addressing the inherent challenges of radiation therapy, AI can potentially elevate the quality and accessibility of cancer care on a global scale.

Historically, the foundational AI platforms were anchored in rule-based reasoning. In this approach, computer systems would execute tasks based on a predefined set of procedures and steps, which were crafted by human experts. Such systems, while valuable, exhibited limitations when confronted with input data or task scopes that deviated from the norm. Essentially, these platforms lacked the flexibility or "intelligence" to address "edge cases" - scenarios that weren't explicitly outlined within their knowledge base. Despite these constraints, rule-based AI systems found application in several clinical settings, showcasing a spectrum of utility.

However, the last decade has witnessed a significant paradigm shift in AI. This evolution is characterized by the reemergence of neural networks, a subset of machine learning algorithms. These networks draw inspiration from our current understanding of the human brain's workings. Unlike their rule-based predecessors, neural networks exhibit adaptability and can learn from data, offering enhanced performance, particularly in the analysis and interpretation of complex medical images. This advancement underscores the rapid progress in AI and its potential to redefine healthcare practices.

Breast and lung cancers remain critical areas of focus in oncology due to their prevalence and impact on patient outcomes. The continuous advancement in imaging technologies, especially with the integration of artificial intelligence, has played a pivotal role in enhancing diagnostic accuracy for these conditions.

Breast imaging is a critical component of modern healthcare, particularly in the early detection and diagnosis of breast diseases such as breast cancer. Various imaging modalities have been developed and refined over the years to facilitate comprehensive evaluation of breast tissue. Mammography, for instance, is a widely utilized technique that employs low-dose X-rays to visualize the internal structure of the breast. It has become the standard tool for breast cancer screening, given its ability to detect early-stage tumors and microcalcifications that may not be palpable or visible through other means (*4*, *5*). Digital mammography, an advancement of the traditional mammography, offers the advantage of digital capture and the ability to manipulate images, thus enhancing the clarity and detail of the radiographs.

Apart from mammography, there are other advanced imaging methods that provide valuable insights into breast tissue and pathology. Ultrasound imaging, which uses high-frequency sound waves, provides real-time imaging of the breast tissue, allowing clinicians to differentiate between cystic (fluid-filled) and solid lesions. Ultrasound is often used as an adjunct to mammography, especially in younger women with dense breast tissue where mammography may be less effective. Another innovative imaging modality is Magnetic Resonance Imaging (MRI) of the breast. This technique leverages the principles of magnetic resonance to produce detailed images of the breast tissue. It is particularly beneficial in high-risk populations, such as those with a strong family history of breast cancer or carriers of specific genetic mutations. MRI can detect tumors that may be missed by mammography or ultrasound, making it a crucial tool in certain clinical scenarios.

The survey of devices

Breast Imaging and Analysis

The primary objective of AI in the breast imaging is to enhance the accuracy, efficiency, and predictive capabilities of traditional breast imaging techniques. Machine learning algorithms, a subset of AI, are trained using vast datasets of breast images to recognize patterns, anomalies, and features that might be indicative of pathological conditions, especially breast cancer.

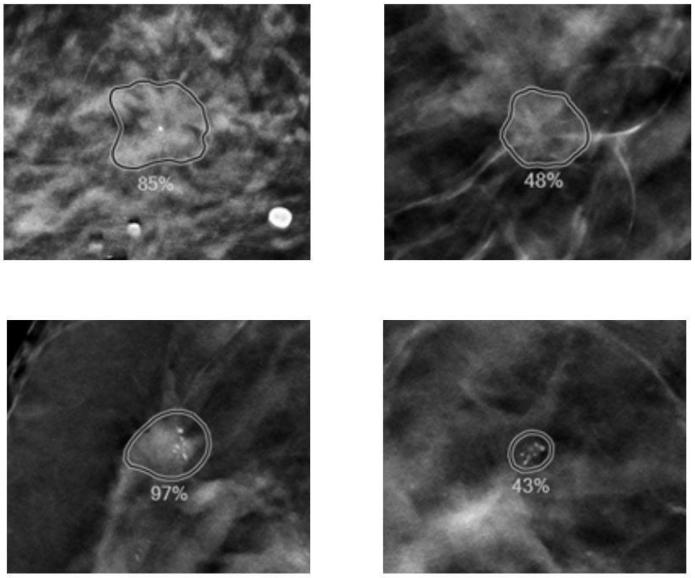

Figure 1. *Certainty of Finding Scores* are assigned to each detection identified by the ProFound AI algorithm. Soft Tissue Density Detections (top) Calcification Detections (bottom) source: (*6*)

These algorithms have demonstrated a remarkable ability to identify subtle changes in breast tissue that may be overlooked by the human eye, augmenting the capabilities of radiologists and potentially leading to earlier and more accurate diagnoses. Once abnormalities are identified, AI can assist in the classification and characterization of these lesions, determining their benign or malignant nature. For instance, in mammographic imaging, AI systems have been developed to assess the morphological features of detected masses or microcalcifications, providing insights into their potential malignancy. Additionally, in breast MRI, AI can aid in distinguishing between benign and malignant lesions based on their enhancement patterns and kinetic curves. Such advanced characterization is pivotal in guiding clinical decisions, whether it be the initiation of treatment, further biopsy, or simply increased surveillance.

Another offering from iCAD Inc. is the ProFound AI for Digital Breast Tomosynthesis (DBT). This computer-aided detection (CAD) software is for interpreting and analyzing digital breast tomosynthesis exams. DBT, a type of three-dimensional imaging, captures multiple images of the breast from different angles. ProFound AI's algorithms work to comb through this voluminous data, ensuring thorough and detailed examinations. The software aids radiologists in identifying abnormalities or suspicious areas within the breast, enhancing the accuracy of diagnosis and decreasing the likelihood of missed malignancies.

The ProFound AI algorithm is designed to identify malignant soft tissue densities and calcifications. For each detected instance and for each specific case, the system assigns a "Certainty of Finding" score and a "Case Score", respectively. These scores, calculated by the ProFound AI system, indicate the algorithm's level of confidence regarding the malignancy of a detection or a case. These scores range from 0% to 100%, with a higher score suggesting greater confidence in the malignancy. The purpose of the "Certainty of Finding" and "Case Scores" is to assist radiologists in deciding if a potentially suspicious detection or case warrants additional examination.

Transpara, developed by ScreenPoint Medical BV, is a tool designed primarily as a reading aid for radiologists in identifying regions on screening mammograms that are suspicious for breast cancer. This system employs advanced artificial intelligence (AI) algorithms that analyze mammographic images and highlight areas of concern, thus aiding radiologists in the early detection of potential breast cancer lesions that might be overlooked during manual examination. The primary aim of Transpara is to augment the diagnostic capabilities of radiologists, ensuring that potential malignancies are identified in their early stages.

QuantX, a product from Quantitative Insights, is an AI-driven diagnostic system tailored for breast cancer diagnosis. The core functionality of QuantX lies in its capacity to accurately and swiftly analyze complex breast tissue imagery to provide a more precise diagnosis. By leveraging sophisticated AI algorithms, this system extracts quantitative data from imaging studies and then uses this data to distinguish between benign and malignant lesions. As a result, QuantX enhances the diagnostic confidence of clinicians and may reduce the need for unnecessary biopsies or further tests.

QVCAD, presented by QView Medical Inc., serves as a crucial tool in the identification of mammography-occult lesions that might otherwise go undetected in conventional mammograms. These are lesions that are typically not visible or discernible in standard mammographic examinations. QVCAD's AI-powered algorithms work by scanning mammographic images and then signaling the potential presence of these hidden lesions to radiologists. This ensures that even subtle indications of potential cancerous growths are brought to the immediate attention of medical professionals.

syngo.Breast Care, a solution from Siemens Healthcare GmbH, provides radiologists with an advanced system for both reading mammographic images and reporting findings. Designed to offer diagnostic support, syngo.Breast Care integrates seamlessly with existing hospital systems, allowing for streamlined workflow. The system's AI algorithms are optimized to enhance image clarity and contrast, providing radiologists with high-quality visuals. This, in turn, facilitates a more detailed examination and accurate diagnosis. Moreover, the platform also features intuitive reporting tools that allow for efficient and clear communication of diagnostic results.

ProFound AI for 2D Mammography, a product by iCAD Inc., is an AI-powered tool specifically designed to assist in breast cancer detection using 2D mammograms. The system capitalizes on deep learning algorithms that scan and analyze two-dimensional mammographic images to pinpoint anomalies that may suggest the presence of cancerous tissues. Aside from its detection capabilities, ProFound AI for 2D Mammography also offers workflow solutions. By streamlining the analysis process, it not only improves the efficiency of radiologists but also potentially reduces reading times, allowing for prompt and effective patient care.

Transpara, another technological solution from ScreenPoint Medical, stands as an instrumental reading aid intended to assist physicians in interpreting screening mammograms. By harnessing the power of sophisticated AI algorithms, Transpara works by scrutinizing mammographic images and emphasizing regions that may indicate breast cancer. The system serves as an auxiliary tool, ensuring that potential malignancies, even if subtle, are brought to the forefront during a physician's examination. By providing an extra layer of analytic capability, Transpara aims to bolster the diagnostic accuracy and confidence of medical practitioners in their evaluations.

Breast-SlimView, a product from Hera-MI SAS, is a state-of-the-art tool designed to aid in breast cancer detection by providing diagnostic support from mammograms. This system is fortified with algorithms that scrutinize mammographic images, highlighting potential areas of concern that might indicate the presence of cancerous tissues. Its primary function is to serve as an adjunctive tool for radiologists, ensuring that even minute or subtle abnormalities in mammograms are identified. By enhancing the precision of mammographic readings, Breast-SlimView contributes significantly to the early detection and subsequent management of breast cancer.

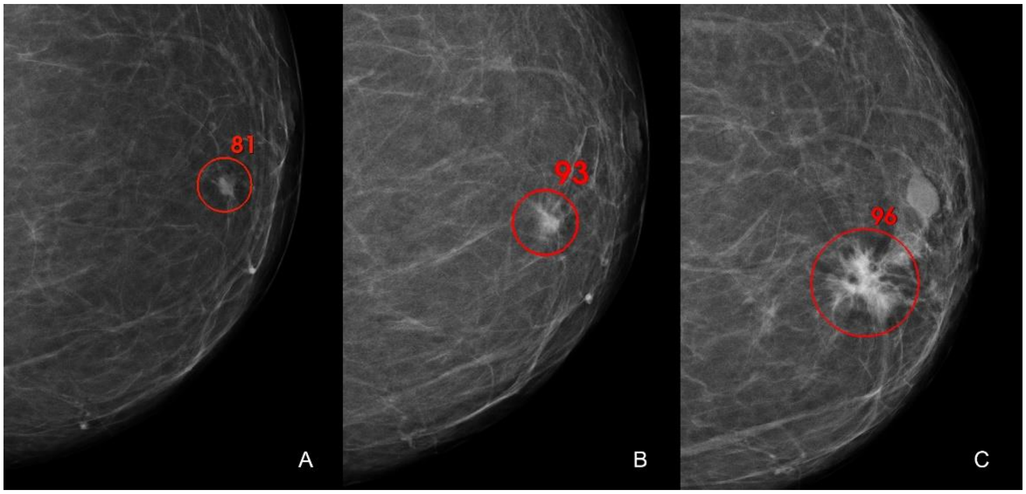

Figure 2. Transpara marked confidence levels.
source: (*7*)

Vara, developed by Merantix Healthcare GmbH, is tailored to offer robust support in breast cancer screening processes by analyzing mammograms. One of the standout features of Vara is its capability to triage mammographic findings. The system sifts through a multitude of mammograms, prioritizing those that show potential signs of malignancies. By doing so, it ensures that cases requiring urgent attention are addressed promptly. This triaging ability, combined with its advanced analytic algorithms, positions Vara as an indispensable tool in streamlining breast cancer screenings and ensuring timely interventions.

The ProFound AI Software V2.1 is a CAD (computer-aided detection) software developed specifically for concurrent use while radiologists are reading Digital Breast Tomosynthesis (DBT) exams. DBT, with its multi-angle image capture, provides a comprehensive view of the breast, making the reading process intricate. ProFound AI V2.1 seamlessly integrates with this reading workflow, assisting radiologists by flagging potential areas of concern within the voluminous data from DBT. By providing real-time insights and analyses, this software ensures that radiologists have an enhanced layer of support, bolstering diagnostic accuracy during their evaluations.

JBD-01K, a diagnostic tool developed by JLK Inspection Inc., is dedicated to breast cancer detection by offering support during the examination of mammograms. The system is embedded with intricate algorithms that analyze mammographic images, highlighting areas that might suggest the existence of cancerous growths. Its primary objective is to provide an additional layer of analysis for radiologists, enhancing the accuracy of mammogram readings. By aiding in the early detection of abnormalities, JBD-01K plays a crucial role in facilitating timely interventions and treatments.

b-box, a product of b-rayZ GmbH, specializes in assessing the quality of mammography images and measuring breast density. Given that the clarity of mammographic images is paramount for accurate diagnosis, b-box employs algorithms that review and evaluate the quality of these images, ensuring that they meet the required diagnostic standards. Additionally, considering that breast density can be an indicator of increased breast cancer risk, b-box also offers tools to precisely measure and classify breast density. This dual functionality makes it an invaluable asset in both ensuring optimal image quality and providing insights into breast health.

DensitasAI, presented by Densitas Inc., focuses primarily on providing breast density assessment support during the interpretation of mammograms. Understanding breast density is essential as denser breasts can mask potential malignancies in mammograms and may be associated with a higher risk of breast cancer. densitasAI leverages sophisticated algorithms to analyze mammographic images, producing accurate and consistent measurements of breast density. By providing radiologists with these precise density evaluations, densitasAI ensures that potential risks are identified, guiding further clinical decisions and patient management strategies.

Table 1. contemporary ai devices in breast imaging and analysis

Year	Device Name	Main function
2019	ProFound AI Software V2.1 (iCAD)	CAD software for concurrent use while reading DBT
2015	Transpara (ScreenPoint Medical BV) (*8*)	Reading aid for identifying regions suspicious for breast cancer in screening mammograms
2017	QuantX (Quantitative Insights)	AI-equipped system for accurate breast cancer diagnosis
2018	QVCAD (QView Medical Inc.) (*9–11*)	Aid to detect mammography-occult lesions in unknown regions
2019	syngo.Breast Care (Siemens Healthcare GmbH) (*12*)	Reading and reporting for diagnostic support from mammograms
2019	ProFound AI for 2D Mammography (iCAD Inc.)	Breast cancer detection assistance and workflow solution from 2D mammograms
2019	ProFound AI for Digital Breast Tomosynthesis (iCAD Inc.)	CAD software for reading digital breast tomosynthesis (DBT) exams
2019	Transpara (ScreenPoint Medical) (*8, 13*)	Reading aid for physicians interpreting screening mammograms
2019	Breast-SlimView (Hera-MI SAS)	Breast cancer detection for diagnostic support from mammograms
2019	Vara (Merantix Healthcare GmbH)	Breast cancer screening support and triaging from mammograms
2020	JBD-01K (JLK Inspection Inc.)	Breast cancer detection for diagnostic support from mammograms
2020	b-box (b-rayZ GmbH)	Assessment of mammography image quality and breast density
2020	densitasAI (Densitas Inc.) (*14*)	Breast density assessment support from mammograms

Lung Imaging and Analysis:

AI has shown significant promise is in the detection of lung nodules and early-stage lung cancers in computed tomography (CT) scans. By training on large datasets comprising thousands of annotated images, AI models have been able to detect subtle lung abnormalities that may sometimes be missed by the human eye. AI-driven tools applications in the analysis of other lung diseases such as chronic obstructive pulmonary disease (COPD), pulmonary fibrosis, and infectious diseases like tuberculosis. For instance, in patients with COPD, AI can quantify the extent of emphysema or airway abnormalities, enabling clinicians to stage the disease and guide treatment decisions.

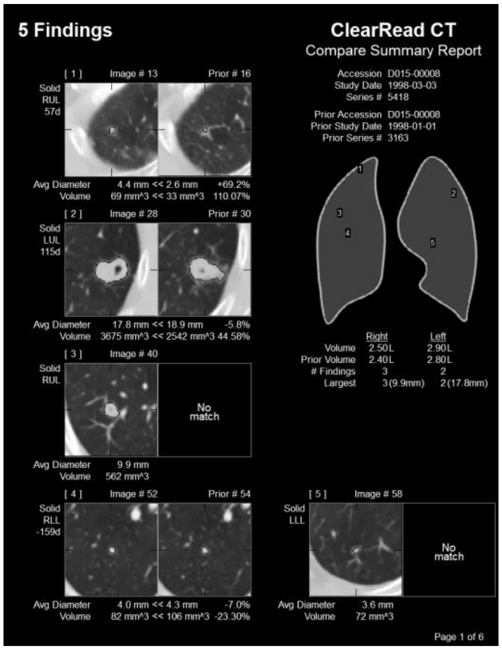

Figure 3. ClearRead CT screen. For each image in the gallery, the current exam is displayed on the left, and the prior exam is on the right. The parts at the bottom offer a detailed view of the specific finding, accompanied by extracted measurements.
Source: (*15*)

Radiologists can sometimes interpret images differently, leading to variability in diagnosis. AI can act as a second reader, providing an objective assessment of lung abnormalities, which can then be validated by a radiologist. This collaboration between humans and AI aims to improve the diagnostic accuracy and reduce false positives and negatives, which are of paramount importance in conditions where early detection can significantly impact patient outcomes.

The primary function of ClearRead CT developed by Riverain Technologies LLC. is to assist medical professionals in the review of CT exams of the chest. It aids in the identification and detection of potential nodules, which are small growths or lumps that might be indicative of a disease like cancer. The software uses advanced image processing algorithms to enhance the visibility of nodules in chest CT scans, thereby making it easier for radiologists to identify and monitor them. By enhancing the contrast and minimizing the visual clutter, the system enables accurate and efficient nodule detection, reducing the chances of missed diagnoses.

LungQ, a product of Thirona Corp., is designed to provide support in the diagnosis and documentation of abnormalities in pulmonary tissues that are detected in CT thoracic datasets. Its main function is to offer a more detailed and precise assessment of thoracic images. The system operates by analyzing CT scans to recognize and quantify different tissue types, like emphysema or fibrosis, and their respective severities. Through advanced imaging analytics, LungQ can discern patterns and deviations in thoracic datasets, thereby aiding clinicians in making informed diagnostic decisions about pulmonary conditions.

Aidence BV's Veye Chest is specialized software intended for the detection of pulmonary nodules in CT scans. Its main role is to provide radiologists with additional support in identifying early-stage lung cancer or other pulmonary conditions that present as nodules. By employing deep learning algorithms and artificial intelligence, Veye Chest analyzes the CT images and automatically highlights potential areas of concern. This system not only aids in the timely detection of nodules but also assists in monitoring their growth and evolution over time, aiding in the clinical decision-making process.

Samsung Electronics Co. Ltd.'s Auto Lung Nodule Detection system is specifically designed to provide diagnostic support by detecting lung nodules from X-ray images. Utilizing cutting-edge imaging algorithms, this software emphasizes areas in X-ray images where there is a presence of potential lung nodules. Its primary aim is to enhance the accuracy and efficiency of lung nodule detection in X-ray examinations, ensuring that medical professionals have a reliable tool to identify early indicators of conditions like lung cancer.

The InferRead CT Lung, developed by Beijing Infervision Technology Co. Ltd., serves as a lung cancer screening and management tool derived from CT scans. This software employs artificial intelligence and advanced image analysis techniques to sift through CT scan data and detect early signs of lung cancer. Besides the identification of potential cancerous growths, the tool aids in the management of patient cases, tracking the evolution of detected nodules, and suggesting potential follow-up actions, thus facilitating a streamlined process for radiologists and oncologists.

Broncholab, a creation of Fluidda Inc, is an innovative software designed to offer support in the diagnosis and documentation of abnormalities found in pulmonary tissue images acquired from CT thoracic datasets. By integrating advanced computational algorithms, Broncholab provides detailed assessments of pulmonary tissues, assisting medical professionals in understanding the intricacies of the lung's structure and potential anomalies present. This tool aids in ensuring that any abnormalities in the pulmonary tissue are promptly and accurately identified, enabling timely intervention and treatment.

Siemens Medical Solutions Inc.'s Syngo.CT Lung CAD is a computer-aided detection system tailored for the detection of solid pulmonary nodules during CT examinations of the chest. With the primary function of enhancing the diagnostic accuracy of CT scans, the software works by automatically identifying and highlighting potential nodules in the pulmonary region. This emphasis on potential areas of concern ensures that radiologists have an efficient and reliable tool at their disposal, aiding them in detecting even minute nodules which might be indicative of early-stage pulmonary conditions.

Table 2. contemporary ai devices in lung imaging and analysis

Year	Device Name	Main function
2015	ClearRead CT (Riverain Technologies LLC.) (*15*)	Assistance in review of CT exams of the chest and detection of potential nodules
2016	LungQ (Thirona Corp.)	Support in diagnosis and documentation of pulmonary tissues abnormalities from CT thoracic datasets
2017	Veye Chest (Aidence BV) (*16*)	Pulmonary nodule detection support from CT scans
2019	Auto Lung Nodule Detection (Samsung Electronics Co. Ltd.)	Lung nodule detection for diagnostic support from X-ray images
2020	InferRead CT Lung (Beijing Infervision Technology Co. Ltd.) (*17*)	Lung cancer screening and management tool from CT scans
2020	Broncholab (Fluidda Inc) (*18*)	Support in diagnosis and documentation of pulmonary tissue images from CT thoracic datasets
2020	Syngo.CT Lung CAD (Siemens Medical Solutions Inc.) (*19*)	Detection of solid pulmonary nodules during CT examinations of the chest

Image Reconstruction, Quality Assessment, and Other Diagnostic Support:

Image reconstruction, a process that transforms raw data into a comprehensible visual format, has benefited immensely from AI methodologies. Traditional techniques, especially in modalities like Magnetic Resonance Imaging (MRI) or Positron Emission Tomography (PET), often require prolonged acquisition times. AI-enhanced reconstruction techniques have been developed to speed up this process, allowing for faster imaging without compromising the quality of the final image. Manual quality control can be resource-intensive and might not always capture subtle artifacts or inconsistencies. AI-driven algorithms have been devised to automatically assess the quality of radiological images, checking for artifacts, noise, or other inconsistencies that might impede accurate diagnosis. These algorithms can be integrated into the imaging workflow to provide real-time feedback to radiographers, ensuring that only images of the highest quality are used for diagnosis and further analyses.

The primary function of Arterys Oncology DL is to provide software assistance in the measurement and tracking of lesions and nodules present in MRI and CT scans. It is designed to enhance the accuracy and efficiency of radiologists in evaluating these abnormalities. The system utilizes sophisticated deep learning algorithms to analyze imaging data. Once an image is fed into the system, the software identifies potential areas of concern, measures them, and keeps track of their progression over time. This not only aids in early detection but also provides a consistent and repeatable measure of lesion and nodule size.

Deep Learning Image Reconstruction by GE Medical Systems offers a solution that integrates deep-learning capabilities into the CT image reconstruction process. Traditional CT image reconstructions can sometimes produce images with noise or artifacts. By leveraging artificial intelligence, this system is designed to improve the clarity and quality of CT images. During the reconstruction phase, the deep learning model processes raw data and refines the image, reducing noise and enhancing details. As a result, clinicians are presented with clearer images, potentially aiding in better diagnosis and treatment planning.

JPC-01K, developed by JLK Inspection Inc., focuses on the critical task of detecting prostate cancer using MRI images. The software employs deep learning algorithms to assist diagnostic radiologists in identifying potential cancerous regions within the prostate. When an MRI scan of the prostate is uploaded into the system, the software examines the image and flags areas that might represent malignant tissues. By offering this kind of diagnostic support, the system aids radiologists in early detection, potentially increasing the chances of successful treatment and patient recovery.

Discovery AI, a product of Pentax Medical GmbH, is specially crafted to assist medical professionals during a colorectal examination. Its primary function is the detection of polyps, which are abnormal growths that may develop into colorectal cancer if left unchecked. The system integrates artificial intelligence to analyze real-time imagery during a colorectal procedure. If a potential polyp is detected, the system alerts the clinician, ensuring that such growths are not overlooked. By doing so, Discovery AI provides an additional layer of safety, ensuring a more thorough examination and potentially reducing the risk of missed polyps.

RayStation, developed by RaySearch Laboratories AB, is a sophisticated system dedicated to the planning and analysis of radiation therapy. As an integral component in cancer treatment, accurate radiation therapy is essential to target cancerous cells while sparing healthy tissues. RayStation employs advanced algorithms and computational techniques to design optimal radiation treatment plans tailored for individual patients. By analyzing diagnostic imaging data, the system determines the precise location, shape, and size of tumors. Then, using this information, RayStation calculates the most effective radiation dose distribution, ensuring that the malignancy receives adequate radiation while minimizing exposure to surrounding healthy tissues. Through this, the software aids oncologists in delivering more precise and personalized radiation treatments.

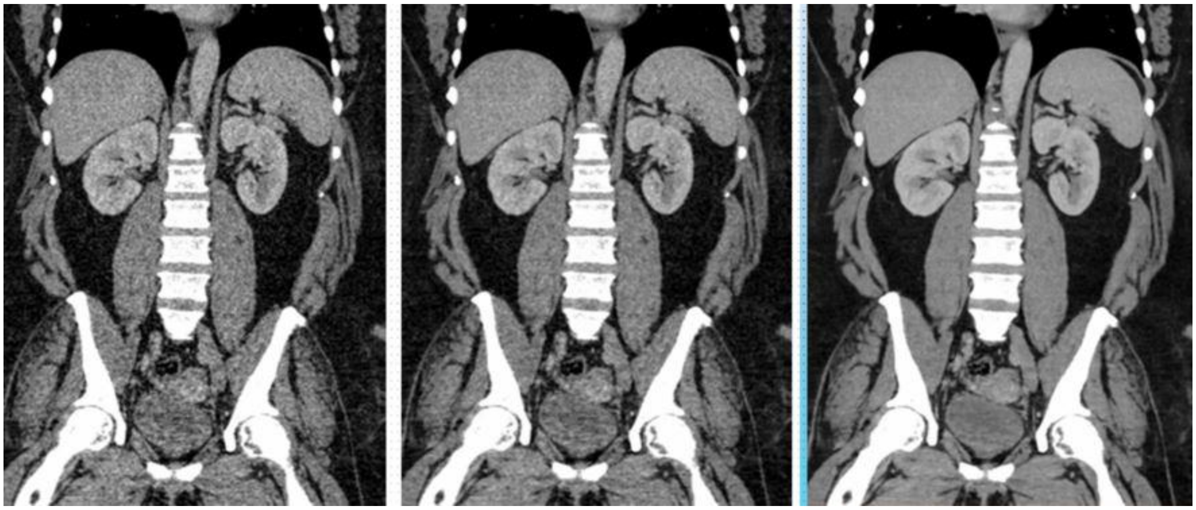

Figure 4. Achieving higher resolution and more precise representations of internal structures
Source: Image Reconstruction gehealthcare (*20*)

Table 2. contemporary ai devices in image reconstruction, quality assessment, and other diagnostic support		
Year	Device Name	Main function
2018	Arterys Oncology DL (Arterys) (*21*, *22*)	Software for measuring and tracking lesions and nodules in MRI and CT images
2019	Deep Learning Image Reconstruction (GE Medical Systems) (*20*)	Deep-learning-based CT image reconstruction technology
2019	JPC-01K (JLK Inspection Inc.) (*23*)	Prostate cancer detection for diagnostic support from MRI images
2019	Discovery AI (Pentax Medical GmbH)	Polyp detection support during a colorectal examination
2019	RayStation (RaySearch Laboratories AB) (*24*, *25*)	Treatment planning and analysis of radiation therapy

Conclusion

The integration of Artificial Intelligence (AI) into oncology signifies a notable advancement in medical technology. The main objective of this research was creating survey of AI devices introduced between 2015 and 2020, with an emphasis on breast and lung imaging and diagnosis. Both breast and lung cancers constitute a major portion of global cancer-related morbidity and mortality. AI in their diagnostic processes can substantially impact early detection and intervention. Breast cancer consistently ranks as one of the most diagnosed cancers among women globally. Ensuring timely and precise detection stands paramount for effective treatment and better survival outcomes. Devices in this category mainly focus on analyzing breast-related images, especially concerning breast cancer. Lung cancer remains one of the predominant causes of cancer-related deaths globally. Devices listed under the lung imaging and analysis segment of this research offer insights into AI's capacity to refine the accuracy of lung cancer diagnoses. Their design aids healthcare professionals in more accurately identifying, documenting, and analyzing pulmonary anomalies.

The emergence and growing use of artificial intelligence (AI) models in healthcare bring to the fore distinct ethical and legal issues. One of the primary concerns surrounding AI is the limitation posed by its broad application and reproducibility, particularly stemming from the biases inherent in the models. When these AI systems are trained on data sets that predominantly lack representation from certain demographic groups or populations, the resultant models can display skewed or inaccurate predictions. Such biases not only undermine the utility of the AI model but also raise significant ethical issues, especially if these models perpetuate or exacerbate existing disparities in healthcare outcomes. Apart from these inherent biases, several other challenges hinder the widespread adoption of AI in healthcare settings. Ideological concerns, from deeply-rooted beliefs or skepticism about AI's role in healthcare, can act as deterrents. Many practitioners might be wary of relying on automated systems for critical clinical decisions, fearing the loss of human touch or intuition in the process. Furthermore, the integration of AI systems into existing clinical workflows can present practical obstacles. Healthcare professionals, already burdened with significant workloads, might view the introduction of AI tools as another layer of complexity, requiring training and adaptation.

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