1. CAD4TB - Kiran
2. RADIFY - Kiran
3. InferRead DR Chest - Zichen
4. JLD-02K (JVIEWER-X) - Zichen
5. INSIGHT CXR - Andersen
6. ChestEye - zheyuan
7. AXIR -zheyuan
8. VUNO - Andersen

# qXR vs InferRead DR(Zichen)

## Title

Comparison between qXR and InferRead DR

## Rationale

Benchmark these 2 AI products to find which one is more suitable for detecting TB.

## Objectives

The purpose of this review is to find which product is more suitable in detecting TB.

## Criteria

## Information Sources

<https://www.thelancet.com/journals/landig/article/PIIS2589-7500(21)00116-3/fulltext>

## Search Strategies

Chest x-ray test results of these 2 AI products will be used as the data evidence.

## Selection Process

## Data Collection Process

Chest x-rays of 23954 individuals are included in the analysis. The data process is conducted by the author which is not available to readers.

## Data Items

The raw data is not available to readers. We can only find the results of the evaluation.

## Risk of Bias

## Effect Measures

The sensitivity for qXR is 80.6% with 95% CI 79.2-81.8 and for InferRead DR is 69.3% with 95% CI 67.7-70.8.

The specificity for qXR is 74.3% with 95% CI 73.3-74.9.

## Synthesis Method

According to the effect measures, qXR should be the stronger candidate than InferRead DR.

## Reporting Bias

## Certainty

The article clearly concludes that qXR is better than InferRead DR.

# qXR vs JLD-02K(Zichen)

Not found any relevant study yet

Helpful article

<https://stoptb.org/assets/documents/dhthub/Screening%20and%20Triage%20for%20TB%20using%20Computer-Aided%20Detection%20(CAD)%20Technology%20and%20Ultra-portable%20X-Ray%20Systems-A%20Practical%20Guide%20.pdf>

# Risks of using AI system

* Patient harm due to AI errors
* Misuse of biomedical AI tools
* Bias in medical AI
* Lack of transparency
* Privacy and security
* Gaps in accountability

<https://www.europarl.europa.eu/RegData/etudes/STUD/2022/729512/EPRS_STU(2022)729512_EN.pdf>

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# Search Queries

CAD4TB + RADIFY

1. “qXR” AND “CAD4TB” comparison
2. “qXR” AND “RADIFY” comparison
3. “RADIFY” AND “tuberculosis”

InferRead DR + JLD-02K

* “qXR” AND “InferRead DR” comparison
* “qXR” AND “JLD-02K” comparison
* “InferRead DR” AND “tuberculosis”
* “JLD-02K” AND “tuberculosis”
* “qXR” AND “InferRead DR” AND “tuberculosis”
* “qXR” AND “JLD-02K” AND “tuberculosis”

AXIR + ChestEye

* ‘qXR’ and ‘ChestEye’ comparison
* ‘qXR’ and ‘AXIR’ comparison
* ‘ChestEye’ and ‘tuberculosis’ comparison
* ‘AXIR’ and ‘tuberculosis’ comparison
* ‘ChestEye’
* ‘AXIR’

Lunit/Insight CXR + qXR(for these two popular ai products, there are a lot of information, so I do not need to prepare many search queries)

* “Lunit” + “qXR” + tb (focus on products and area)

VUNO + qXR

* “VUNO” + “qXR” + tb

| Title | Database | Link |  |
| --- | --- | --- | --- |
| “qXR” AND “CAD4TB” comparison | | | |
| Using artificial intelligence to read chest radiographs for tuberculosis detection: A multi-site evaluation of the diagnostic accuracy of three deep learning systems | Google Scholar | <https://www.nature.com/articles/s41598-019-51503-3> | Keep - good comparisons (includes LUNIT) |
| Comparing different versions of computer-aided detection products when reading chest X-rays for tuberculosis | Google Scholar | <https://journals.plos.org/digitalhealth/article?id=10.1371/journal.pdig.0000067> | Keep - clear comparisons |
| Tuberculosis detection from chest x-rays for triaging in a high tuberculosis-burden setting: an evaluation of five artificial intelligence algorithms | Google Scholar | <https://www.sciencedirect.com/science/article/pii/S2589750021001163> | Keep |
| Diagnostic accuracy of three computer-aided detection systems for detecting pulmonary tuberculosis on chest radiography when used for screening: analysis of an international, multicenter migrants screening study | Google Scholar | <https://www.medrxiv.org/content/10.1101/2022.03.30.22273191v1.full-text> | Keep |
| Can artificial intelligence (AI) be used to accurately detect tuberculosis (TB) from chest X-rays? An evaluation of five AI products for TB screening and triaging in a high TB burden setting | Google Scholar | <https://arxiv.org/abs/2006.05509> | Keep |
| Chest x-ray analysis with deep learning-based software as a triage test for pulmonary tuberculosis: a prospective study of diagnostic accuracy for culture-confirmed disease | Google Scholar | <https://www.sciencedirect.com/science/article/pii/S2589750020302211> | Keep |
| ​​Can artificial intelligence (AI) be used to accurately detect tuberculosis (TB) from chest x-ray? A multiplatform evaluation of five AI products used for TB screening in a high TB-burden setting | Google Scholar | <https://www.researchgate.net/profile/Kishor-Paul/publication/342094695_Can_artificial_intelligence_AI_be_used_to_accurately_detect_tuberculosis_TB_from_chest_x-ray_A_multiplatform_evaluation_of_five_AI_products_used_for_TB_screening_in_a_high_TB-burden_setting/links/5f0f5469a6fdcc3ed7089871/Can-artificial-intelligence-AI-be-used-to-accurately-detect-tuberculosis-TB-from-chest-x-ray-A-multiplatform-evaluation-of-five-AI-products-used-for-TB-screening-in-a-high-TB-burden-setting.pdf> | Duplicate |
| A new resource on artificial intelligence powered computer automated detection software products for tuberculosis programmes and implementers | Google Scholar | <https://www.sciencedirect.com/science/article/pii/S147297922030216X> | Exclude - not technical more definitions (could be useful for learning/write up of each product) |
| Evaluation of an artificial intelligence (AI) system to detect tuberculosis on chest X-ray at a pilot active screening project in Guangdong, China in 2019 | Google Scholar | <https://content.iospress.com/articles/journal-of-x-ray-science-and-technology/xst211019> | Exclude - Not qXR or CAD4TB |
| Utilization of Artificial Intelligence for Tuberculosis Screening in Nepal | Google Scholar | <https://www.sciencedirect.com/science/article/abs/pii/S001957072200107X> | Exclude - nothing about qXR |
| Evolution of Machine Learning in Tuberculosis Diagnosis: A Review of Deep Learning-Based Medical Applications | Google Scholar | <https://www.mdpi.com/2079-9292/11/17/2634> | Exclude - No data |
| Chest X-ray Analysis With Deep Learning-Based Software as a Triage Test for Pulmonary Tuberculosis: An Individual Patient Data Meta-Analysis of Diagnostic Accuracy | Google Scholar | <https://academic.oup.com/cid/article/74/8/1390/6324830?login=true> | Duplicate |
| Deep learning, computer-aided radiography reading for tuberculosis: a diagnostic accuracy study from a tertiary hospital in India | Google Scholar | <https://www.nature.com/articles/s41598-019-56589-3> | Keep |
| Deep features to detect pulmonary abnormalities in chest X-rays due to infectious diseaseX: Covid-19, pneumonia, and tuberculosis | Google Scholar | <https://www.sciencedirect.com/science/article/pii/S0020025522001001> | Exclude - broad and only one reference to our product |
| Distinguishing nontuberculous mycobacteria from *Mycobacterium tuberculosis* lung disease from CT images using a deep learning framework | Google Scholar | <https://link.springer.com/article/10.1007/s00259-021-05432-x> | Excluded - limited reference |
| Priority Areas for Research on Tuberculosis Diagnosis | Google Scholar | <https://link.springer.com/chapter/10.1007/978-3-030-66703-0_44> | Exclude - References an already used paper |
| The Application of Artificial Intelligence in the Diagnosis and Drug Resistance Prediction of Pulmonary Tuberculosis | Google Scholar | <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9366014/> | Exclude - not it’s own paper |
| Evaluation of chest X-Ray with automated interpretation algorithms for mass tuberculosis screening in prisons | Google Scholar | <https://repositorio.ufgd.edu.br/jspui/handle/prefix/4941> | Exclude - language |
| Diagnosis of Pulmonary Tuberculosis through Intelligent Techniques: A Review | Google Scholar | <https://ieeexplore.ieee.org/abstract/document/9784651> | Exclude - restricted access |
| Effectiveness and Costs of Identification Pathways for Tuberculosis: Modelling the Impact of Dual Energy X-Ray Technology | Google Scholar | <https://assets.researchsquare.com/files/rs-1386070/v1/bd851050-d42d-4a52-a23c-5fc89db6f11f.pdf?c=1659972566> | Exclude - no reference |
| Pattern of abnormalities amongst chest X-rays of adults undergoing computer-assisted digital chest X-ray screening for tuberculosis in Peri-Urban Blantyre, Malawi: A cross-sectional study | Google Scholar | <https://onlinelibrary.wiley.com/doi/full/10.1111/tmi.13658> | Exclude - different data form |
| Adaptable Intelligent Models for Pulmonary Tuberculosis Detection and Classification | Google Scholar | <https://ieeexplore.ieee.org/abstract/document/9596084> | Exclude - restricted access |
| A DEEP LEARNING HYBRID ENSEMBLE FUSION FOR CHEST RADIOGRAPH CLASSIFICATION | Google Scholar | <http://www.nnw.cz/doi/2021/NNW.2021.31.010.pdf> | Exclude - not technical no comparison |
| Deep Learning Classification of Active Tuberculosis Using Chest XRays: Efficacy of Transfer Learning and Generalization Performance of Cross-Population Datasets | Google Scholar | ​​<https://assets.researchsquare.com/files/rs-1235165/v1/33e3ade0-af85-452d-9592-d092b620e282.pdf?c=1645516764> | Exclude - not useful technical data |
| Diagnostic accuracy of a commercially available, deep learning-based chest X-ray interpretation software for detecting culture-confirmed pulmonary tuberculosis | Google Scholar | <https://www.sciencedirect.com/science/article/pii/S1201971222002983> | Exclude - LUNIT solo evaluation |
| Early risk assessment in paediatric and adult household contacts of confirmed tuberculosis cases by novel diagnostic tests (ERASE-TB): protocol for a prospective, non-interventional, longitudinal, multicountry cohort study | Google Scholar | <https://bmjopen.bmj.com/content/12/7/e060985.abstract> | Exclude - restricted access |
| Triage of Persons With Tuberculosis Symptoms Using Artificial Intelligence–Based Chest Radiograph Interpretation: A Cost-Effectiveness Analysis | Google Scholar | <https://academic.oup.com/ofid/article/8/12/ofab567/6459543?login=true> | Exclude - limited reference |
| Evaluación de la respuesta al tratamiento anti tuberculoso a través de un índice radiográfico de severidad en una cohorte de pacientes con tuberculosis pulmonar en Lima, Perú | Google Scholar | <https://repositorio.upch.edu.pe/handle/20.500.12866/7836> | Excluded - Language |
| Application of Artificial Intelligence in Healthcare | Google Scholar | <https://link.springer.com/chapter/10.1007/978-981-13-8114-0_4> | Exclude - not a technical eval of qXR |
| Accuracy of computer-aided chest X-ray screening in the Kenya National Tuberculosis Prevalence Survey | Google Scholar | <https://www.medrxiv.org/content/10.1101/2021.10.21.21265321v1> | Exclude - qXR not evaluated |
| Detection of Tuberculosis based on Deep Learning based methods | ProQuest | <https://www.proquest.com/docview/2513008562/C59A0863650F41BFPQ/2> | Exclude - not useful |
| Independent evaluation of 12 artificial intelligence solutions for the detection of tuberculosis | ProQuest | <https://www.proquest.com/docview/2609525298/C59A0863650F41BFPQ/3> | Duplicate |
| Using artificial intelligence to read chest radiographs for tuberculosis detection: A multi-site evaluation of the diagnostic accuracy of three deep learning systems | ProQuest | <https://www.proquest.com/docview/2306795231/C59A0863650F41BFPQ/6> | Duplicate |
| Performance of Qure.ai automatic classifiers against a large annotated database of patients with diverse forms of tuberculosis | ProQuest | <https://www.proquest.com/docview/2344551058/C59A0863650F41BFPQ/8> | Exclude - duplicated data |
| “RADIFY” AND “tuberculosis” | | | |
| Artificial intelligence and healthcare in South Africa : ethical and legal challenges | Google Scholar | <https://uir.unisa.ac.za/handle/10500/28134> | Excluded - Lack of technical data |
| The Roles of New Technology and the Law in the Fight Against Covid-19 | Google Scholar | <https://journals.uj.ac.za/index.php/The_Thinker/article/view/294/221> | Excluded - Lack of tuberculosis information |
| qXR and inferRead  qXR and JLD-02K | | | |
| Independent evaluation of 12 artificial intelligence solutions for the detection of tuberculosis | Google Scholar | <https://www.nature.com/articles/s41598-021-03265-0#Sec2> | Keep |
| A new resource on artificial intelligence powered computer automated detection software products for tuberculosis programmes and implementers | Google Scholar | <https://www.sciencedirect.com/science/article/pii/S147297922030216X> | Excluded - lack of technical data |
| Can AI technologies close the diagnostic gap in tuberculosis? | Google Scholar | <https://www.thelancet.com/journals/landig/article/PIIS2589-7500(21)00142-4/fulltext> | Keep |
| Tuberculosis detection from chest x-rays for triaging in a high tuberculosis-burden setting: an evaluation of five artificial intelligence algorithms | The Lancet | <https://www.thelancet.com/journals/landig/article/PIIS2589-7500(21)00116-3/fulltext> | Duplicate |
| Evolution of Machine Learning in Tuberculosis Diagnosis: A Review of Deep Learning-Based Medical Applications | Google Scholar | <https://www.mdpi.com/2079-9292/11/17/2634/htm> | Keep |
| The Applications of Artificial Intelligence in Chest Imaging of COVID-19 Patients: A Literature Review | ProQuest | <https://www.proquest.com/docview/2565118756/554E417BCA34168PQ/2> | Excluded - lack of TB |
| Deep Learning Classification of Active Tuberculosis Using Chest XRays: Efficacy of Transfer Learning and Generalization Performance of  Cross-Population Datasets | Google Scholar | <https://assets.researchsquare.com/files/rs-1235165/v1/33e3ade0-af85-452d-9592-d092b620e282.pdf?c=1645516764> | Excluded - lack of data |
| Lunit | | | |
| Tuberculosis detection from chest x-rays for triaging in a high tuberculosis-burden setting: an evaluation of five artificial intelligence algorithms | Google Scholar | <https://www.sciencedirect.com/science/article/pii/S2589750021001163> | Duplicate |
| Using artificial intelligence to read chest radiographs for tuberculosis detection: A multi-site evaluation of the diagnostic accuracy of three deep learning systems. | Google Scholar | <https://www.nature.com/articles/s41598-019-51503-3> | Duplicate |
| Chest X-Ray Analysis with Deep Learning-Based Software as a Triage Test for Pulmonary Tuberculosis: An Individual Patient Data Meta-Analysis of Diagnostic Accuracy. | Google Scholar | <https://academic.oup.com/cid/article/74/8/1390/6324830?login=false> | Duplicate |
| VUNO | | | |
| Added Value of Deep Learning–Based Detection System for Multiple Major Findings on Chest Radiographs: A Randomized Crossover Study | Google Scholar | <https://pubs.rsna.org/doi/full/10.1148/radiol.2021202818> | Excluded - too good to be true + from VUNO official = biased |
| A Deep Learning Framework for Interpretable Diagnoses of Pulmonary Diseases through Odds-Ratio Analysis in Radiographic Findings - VUNO, View the Invisible, Know the Unknown. | VUNO Evidence(from VUNO website) | <https://www.vuno.co/en/publication/view/588> | Excluded  This article only provides AUC |
| Artificial Intelligence Solutions for Analysis of X-ray Images  Dropped (low relevance) | Google Scholar | <https://journals.sagepub.com/doi/full/10.1177/0846537120941671> | Exclude - low relevance |
| VUNO Inks Deal with Samsung Electronics to Embed AI-Powered Algorithms in Samsung’s X-ray System | VUNO Evidence(from VUNO website) | <https://www.proquest.com/docview/2547151174?pq-origsite=gscholar&fromopenview=true> | Exclude - lack of data |
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| ChestEye |  |  |  |
| AI-based software for lung nodule detection in chest X-rays -- Time for a second reader approach? | Google Scholar | <https://arxiv.org/abs/2206.10912> | Excluded |
| Oxipit ChestEye secures medical device certification in Australia | Oxipit | <https://oxipit.ai/news/oxipit-ai-medical-imaging-australia/> | Exclude - No data |
| Oxipit partners with HealthCare Konnect to bring AI diagnostics to Africa | Oxipit | <https://bioalps.org/app/uploads/2020/01/Oxipit-partners-with-HealthCare-Konnect-to-bring-AI-diagnostics-to-Africa.pdf> | Excluded |
| Compare Products | AI4Health | <https://www.ai4hlth.org/compare> | Excluded |
| ChestEye-Radiology Quality Assurance | Oxipit | <https://oxipit.ai/products/chesteye/> | Excluded |
| Информационно-аналитическая система для автоматизированной диагностики патологий органов грудной клетки | Google Scholar | <https://earchive.tpu.ru/handle/11683/61460> | Excluded-language |
| Independent evaluation of 12 artificial intelligence solutions for the detection of tuberculosisAA | Google Scholar | <https://www.nature.com/articles/s41598-021-03265-0> | Duplicate |
| Currently Available Artificial Intelligence Softwares for Cardiothoracic Imaging | Google Scholar | <https://link.springer.com/chapter/10.1007/978-3-030-92087-6_21> | Excluded |
|  |  |  |  |
| AXIR |  |  |  |
| Deep Learning-Based Decision-Tree Classifier for COVID-19 Diagnosis From Chest X-ray Imaging | Google Scholar | <https://www.frontiersin.org/articles/10.3389/fmed.2020.00427/full> | Excluded |
| Screening and Triage for TB using Computer-Aided Detection (CAD) Technology and Ultra-portable X-Ray Systems: A Practical Guide | Google Scholar | <https://stoptb.org/assets/documents/dhthub/Screening%20and%20Triage%20for%20TB%20using%20Computer-Aided%20Detection%20(CAD)%20Technology%20and%20Ultra-portable%20X-Ray%20Systems-A%20Practical%20Guide%20.pdf> | Excluded |
|  |  |  |  |