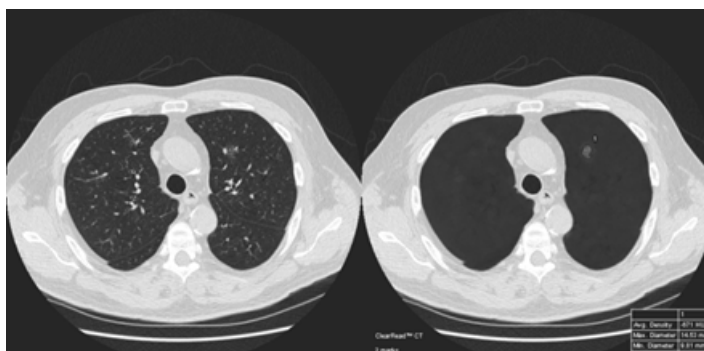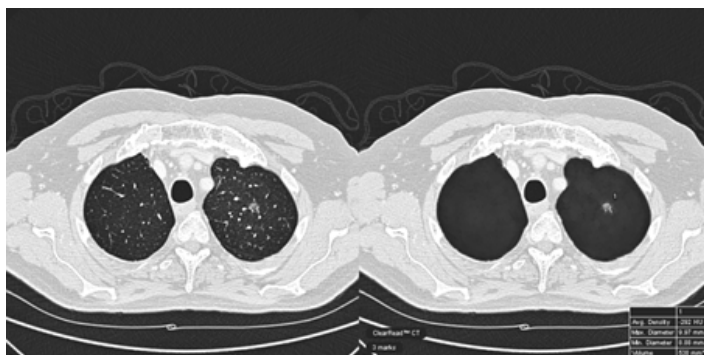# ClearRead CT | Detect
Empowering Clinicians

ClearRead CT | Detect is a novel machine learning solution that leverages the removal of interfering vascular structures based on Riverain's ClearRead CT | Vessel Suppress, to obtain unprecedented detection and measurement accuracy.

Powered by ClearRead CT | Vessel Suppress

ClearRead CT | Detect utilizes Riverain's ClearRead CT | Vessel Suppress as the foundation of its computer aided detection (CAD) technology. Vessel Suppress removes normal vascular structures using state of the art machine learning methods, resulting in previously unattainable detection, segmentation and characterization accuracy for all nodule types. Examples of non-solid and part-solid nodules that have been located by Detect are shown below. As shown, regions are marked, segmented, and characterized, with the results displayed in an embedded table.
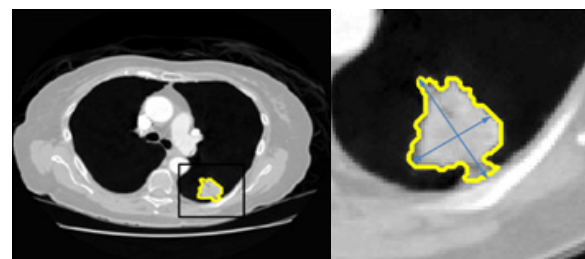

Original   ClearRead CT | Detect
(Non-solid opacity detected in the ClearRead CT | Detect slice)

Original   ClearRead CT | Detect
(Sub-solid nodule detected in the ClearRead CT | Detect slice)

Precise Nodule Characterization

Detect provides four measurements related to each detected region of interest (ROI) – volume, maximum axial plane diameter, minimum axial plane diameter, and average density in Hounsfield units. The nodule segmentation contour is provided for each detected region of interest along with the associated nodule measurements. The characteristics of each finding are conveniently displayed in the bottom right or top right corners of the vessel suppressed image. In the figure below we provide an example of how the finding characteristics are derived and presented.

Finding Characteristics	
Volume	7001 mm^3
Max Axial Diameter	29.93 mm
Min Axial Diameter	26.22 mm
Average Density	113 HU

Key Advantages

- Improved detection of all nodule types including, solid, part-solid and ground glass
- FDA cleared for concurrent reading allowing radiologists to utilize the original and ClearRead CT images simultaneously
- Enterprise wide capability that allows "plug-in" ability across all CT manufacturers
- Precise nodule segmentation and characterization
- High specificity based on targeting of 5mm and above nodules

"Every imaging mode has its strengths and limitations, so innovations to improve a study's accuracy and usefulness are always welcome. Riverain has shown vision, and invested resources and talent into improving imaging's potential."

- Dr. John C. Ruff, Associate Professor, Virginia Commonwealth University

Acquisition Normalization and Vendor Neutrality

ClearRead CT handles a broad range of acquisition protocols, a notoriously difficult problem for computer aided detection systems. Riverain utilizes adaptive algorithms so each scan is normalized for factors such as noise, reconstruction kernels, and slice thickness in a systematic fashion. This process enables ClearRead CT to operate across your entire network, whether using data from older scanners, or data from state of the art hardware.

Installation

The acquisition normalization technology supports rapid installation of ClearRead CT based on the elimination of the requirement to tune to specific scanners. ClearRead CT is designed to be computationally efficient, allowing it to be installed on existing hardware as a virtual application.
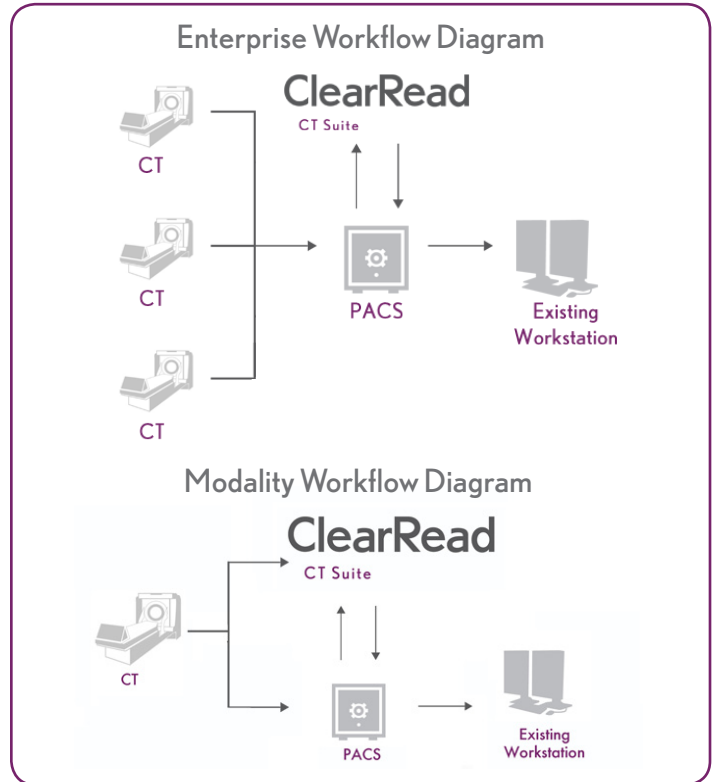
Reader Study

As part of an independent reader study, ClearRead CT was found to reduce radiologists reading time by 26%, and decrease the number of missed actionable nodules by 29% across solid, part-solid and ground glass nodules.

26%
Reduction in Reading Time[1]

29%
Reduction in Missed Actionable Nodules[1]

Workflow

ClearRead CT | Detect supports DICOM overlay or marks and associated characterizations can be exported as a secondary volume. Alternatively, a summary report showing the detected regions of interest and associated measurements can be automatically exported and archived, or, if preferred, reviewed and selectively archived using a browser based viewing tool.

Enterprise Workflow Diagram

Modality Workflow Diagram

References

1. Riverain Technologies. ClearRead CT, FDA Reader Study Results, 2016.

About Riverain

Riverain Technologies™ is a medical software innovator that develops solutions to aid radiologists in the early detection of disease. With the use of Riverain's ClearRead X-ray Suite and ClearRead CT, radiologists are able to optimize the use of existing equipment for enhanced image interpretation. This enables radiologists to better utilize their diagnostic expertise in image interpretation for identification of diseases, such as lung cancer.

ClearRead
CT | Detect