

## User Report

### **Save time and improve diagnostic quality**

*contextflow ADVANCE Chest CT improves lung diagnostics at  
St. Bernhard-Hospital Kamp-Lintfort*

PD Dr. Hilmar Kühl was employed at the University Medical Center Essen for 16 years, half of this time at the Ruhrlandklinik, the major West German lung center. He now brings this expertise to bear as head physician of the Department of Radiology at St. Bernhard-Hospital Kamp-Lintfort. The regional provider with 356 beds treats around 15,000 inpatients and 30,000 outpatients annually.

As a recognized thoracic radiologist, Dr. Kühl draws his patients to Kamp-Lintfort from a fairly large area between Wesel, Neuss, Duisburg and Straelen. The requirements range from outpatient questions and the primary diagnosis of various lung diseases to the staging of bronchial carcinoma. Together with his team, he performs up to 1,500 chest CTs per year.

In 2015 while still at the University Medical Center Essen, the chief radiologist had his first contact with artificial intelligence (AI) methods in thoracic diagnostics. Since June 2022, he has been working with ADVANCE Chest CT, contextflow's AI solution for detecting parenchymal changes in the lungs. "We are a member of the West German Teleradiology Network, which offers the solution. Via our image data management system (PACS) JiveX from VISUS, we can then use the algorithm on a pay-per-use basis," Dr. Kühl explains the construct. Advantages: no software installation, guaranteed data protection and secure communication infrastructure.

#### **Automated integration into the workflow**

The radiologists at St. Bernhard Hospital have defined examinations that are always subject to analysis by the AI. As soon as the questions "chronic bronchitis", "COPD", "pulmonary skeleton changes" and "fibrosis" appear, the image data is automatically sent to the platform of the West German teleradiology network and analyzed with ADVANCE Chest CT. The result is also automatically fed back into the PACS. "These automations are extremely helpful because they save us time-consuming, manual activities," says Dr. Kühn, citing one advantage of the process. "If our radiologists were to post-process and analyze the images, this would take up to ten minutes per examination. The AI analyzes a total of 19 image patterns in significantly less time and also provides me with differential diagnoses." In addition, it is also possible to display reference images.

The chief radiologist particularly appreciates the integration of the algorithm into the workflow. "Every mouse click means extra work and costs time. We save that with the solution we use," Dr. Kühn emphasizes. He is also impressed by the feedback, where all analysis results are clearly displayed on a PDF page. "This allows me to identify the relevant information very quickly and include it in the findings. The differential diagnoses are also very helpful."

### **Added value for daily work**

Lung parenchymal diseases, especially COPD with emphysema and interstitial parenchymal diseases, play a major role in diagnostics at St. Bernhard-Hospital Kamp-Lintfort. ADVANCE Chest CT detects and quantifies each of these pathologies. In selected patients, Dr. Kuehl applies a computer-assisted diagnosis (CAD) tool in addition to AI for comparison purposes. Using the CAD system does present challenges, however, as the chief radiologist elaborates: "That's when we use two modules: One provides information on the extent of emphysema, the other identifies pulmonary nodules. In total, a radiologist is quickly occupied for 15 minutes. ADVANCE Chest CT delivers both results together - and even more, for example, information on infiltrates. This means an immense reduction in workload and time savings for us."

In principle, AI solutions always raise the question of the data on which the learning process is based and how close they are to the ground truth, i.e. the verified clinical ground truth. This is particularly complicated as it relates to the differentiation of changes in the lung,

where image impression and clinical relevance do not always coincide. On CT, various parenchymal patterns besides emphysema regularly come into play here, such as ground-glass opacities and honeycombing, as well as interstitial changes such as traction bronchiectasis or reticular patterns. "Quantification in particular supports the diagnosis and increases the certainty of the findings," emphasizes Dr. Kühl.

### **Playing to the strengths of AI**

In general, ADVANCE Chest CT helps him to produce a very high quality report in less time. The gain in speed primarily comes from quantifying the pathological changes, which must be done manually without IT support. Detection and quantification are crucial for therapy, which ranges from the application of a spray to surgery. "And if I can then provide the attending physician with reliable data, this increases the value of my findings in a relevant way and improves the therapy for the patient. Last but not least, this leads to increased satisfaction among clinicians and referring physicians," says Dr. Kühl.

Radiologists also expect real added value when diagnosing rare diseases. Here the AI can support less experienced colleagues by pointing out possible differential diagnoses based on analyzed parameters - as ADVANCE Chest CT already does today. "This simplifies the path from pattern quantification to diagnosis. I'm offered a reference pattern and told in what percentage of cases it is verified with a specific disease. On the one hand, limiting the differential diagnoses simplifies the reporting, but on the other hand, it also raises the quality of the findings in a relevant way. This can make it possible to bring AI to a wider audience." The work is facilitated by the fact that the software is self-explanatory and easy to use even after a brief introduction.

In the context of the close cooperation, PD Dr. Hilmar Kühl perceives contextflow as an extremely committed partner. "The company has a genuine interest in our feedback and values its clinical partners who use the software in their daily routine. Accordingly, contextflow has also supported me very well throughout the process." It sounds like the collaboration has a bright future.