Automated Image System for Scoring Changes in Quantitative Interstitial Lung Disease

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BACKGROUND

Increasing evidence supports that the extent of interstitial lung disease (ILD) is an important predictor of prognosis for idiopathic pulmonary fibrosis (IPF) and scleroderma. The median survival of IPF patients is 2-5 years. In U.S., about 100,000 people are affected by IPF and 30,000 new cases are diagnosed every year. Currently, high resolution CT (HRCT) is the best mode of investigation to diagnosis ILD. The visual semi-quantitative scoring is the prevalent standard to evaluate ILD on HRCT. However, semi-quantitative scoring systems are limited by the requirement of expert radiologists and by inter-observer variation, so they tend to be subjective and unreliable for assessing changes in disease status. Development of computer-based scoring systems offers the potential of reducing reader variation and standardizing data across multiple sites. However, such quantitative scoring methods have not yet been developed to estimate the transitional change in the multi-levels of fibrotic reticulation, ground glass and normal patterns for testing treatment efficacy in ILD.

INNOVATION

Professor Hyun Kim and colleagues from UCLA's Department of Radiology have developed a new, fully-automated Computer Aided Diagnosis (CAD) scoring system that provides quantitative, repeatable, and retraceable measures of interstitial lung disease (ILD). The system provides increased sensitivity and consistency over visual scoring and can reliably estimate transitional changes in the levels of fibrotic reticulation, ground glass patterns, and normal, healthy patterns. The system also includes a de-nosing technique for a reduction in image variation from multi-center trials, which has been a significant improvement over existing quantitative scoring. Overall, this technology combines the de-nosing technique, robust feature selection, model classification and artificial intelligence of a computer-aid diagnosis system to calculate ILD quantitative metric.

APPLICATIONS

- Assess degree of interstitial lung disease
- Routine monitoring of lung function
- Monitor lung function in clinical trials

ADVANTAGES

- Increased accuracy, sensitivity and consistency over visual scoring
- Facilitating drug evaluation process with more rapid assessment, lower cost, and shortened clinical trials
- De-noising technique for multi-center trials

STATE OF DEVELOPMENT

The system is implemented as computer software. This software can be run on individual medical imaging workstation or at the image acquisition device or on a reading workstation. The software could also be run on a centralized server or cluster servers. This software can also be accessed remotely (via the internet).

PATENT STATUS

Country	Type	Number	Dated	Case
Germany	Issued Patent	602013078184.2	06/30/2021	2013-078

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OTHER INFORMATION

KEYWORDS

Interstitial lung disease, idiopathic pulmonary fibrosis, scleroderma, semi-quantitative scoring, Computer Aided Diagnosis scoring system, HRCT scoring, de-nosing, multi-site trials

CATEGORIZED AS

- Imaging
- Software

RELATED CASES

2013-078-0

France	Issued Patent	2916739	06/30/2021	2013-078
United Kingdom	Issued Patent	2916739	06/30/2021	2013-078
Sweden	Issued Patent	2916739	06/30/2021	2013-078
United States Of America	Issued Patent	9,582,880	02/28/2017	2013-078

RELATED MATERIALS

- A computer-aided diagnosis system for quantitative scoring of extent of lung fibrosis in scleroderma patients. Clin Exp Rheumatol. (2010)

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