103P - Effectiveness of artificial inteligence in retrospective COVID lung CT analysis for lung cancer detection.

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Introduction

In the context of the Covid-19 pandemic, due to the increasing volume of studies, the risk of missing nodules against the background of Covid-19 changes in the lungs increases.

Purpose

Evaluation of the effectiveness of using algorithms for automated processing of CT scans (Botkin.AI platform) to detect nodular formations in the lungs against the background of changes caused by a new coronavirus infection.

Materials and methods

As part of the provision of medical care to patients with a new coronavirus infection, more than 40,000 lung CT were performed in the CT department of the «Scandinavia» clinic from March 2020 to March 2021.

9035 studies were selected for the study. Inclusion criteria for studies were age over 45 years, no change, or less than 50% lung involvement.

All selected studies were performed on a Canon Toshiba Aquilion Prime CT scanner with a 160-row detector.

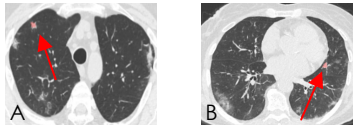
The obtained images were processed on the Botkin.AI platform, based on artificial intelligence technologies, and labeled in accordance with the identified pathology. The identified nodular formations were automatically divided into categories of the Lung-RADS system.

After automatic analysis of the CT images loaded into the Botkin.AI system, the results were analyzed by an expert doctor to assess the correctness of the data.

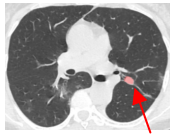
Results

The use of automatic image processing algorithms in 89.9% of cases confirmed the absence of nodules. Pathological nodules were detected in 10.1% of cases. Taking into account automatic staging according to the Lung-RADS system, the structure of the detected pathology was: Category Lung-RADS 2, 3 is 68% of the number of identified nodal changes and 7% of the total number of processed observations; Lung-RADS categories 4a, 4b account for 32% of the number of identified nodal changes and 3% of the total number of studies processed. During the retrospective expert assessment, the following results were obtained:

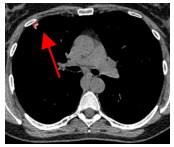
- nodular formations were confirmed in 48% of the number of nodal changes identified by artificial intelligence category Lung-RADS 4a, 4b (pic.2);
- nodular formations were not confirmed in 45% of the number of nodal changes identified by artificial intelligence category Lung-RADS 4a, 4b (pic.3, 4);
- the detected changes in 7% of the number of nodal changes identified by artificial intelligence of the category Lung-RADS 4a, 4b were classified as doubtful (pic.5).



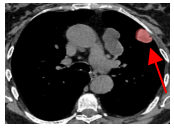
Pic.2 An example of a confirmed result of AI detection of nodular formations (A- in the right lung, B- in the left lung).



Pic.3 An example of an unconfirmed result of AI detection of nodular formations. A bronchocele was found in the left lung.



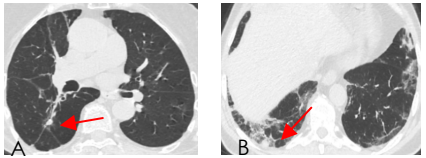
Pic.4 An example of an unconfirmed result of AI detection of nodular formations. In the right lung calcification is visualized (density 336HU)



Pic.5 An example of a dubious result of AI detection of nodular formations. In the left lung, subpleurally located formations. The patient has a parasitic lesion of the lungs.

When comparing the obtained data with the conclusions of doctors, in 27 cases, nodular formations detected by artificial intelligence were not noted, which is 9% of all detected changes of the Lung-RADS 4a, 4b category and 17% of all nodular formations of the Lung-RADS 4a, 4b category.

All nodules not described in the conclusions belonged to the Lung-RADS 4a category and were located in the peripheral regions against the background of severe, organized inflammatory changes, or against the background of ground-glass zones (pic 6).



Pic.6 An example of a nodules not described in the conclusions (A- in the right lung, B- in the left lung).

Conclusion

Thanks to artificial intelligence, the volume of research for the retrospective search for significant changes in the lungs belonging to the Lung-RADS 4a, 4c category is 3.2% of the total research volume. Automated image processing algorithms (Botkin.AI platform) make it possible to reliably identify or exclude nodules in the lungs against the background of inflammatory changes caused by the "new coronavirus infection". All missed nodules in the primary analysis of CT scans of the chest belonged to the Lung-RADS 4a category. This confirms the need for a "second opinion" even in the variant of retrospective analysis "post factum".