'ALGORITHM FOR QUANTIFICATION OF PULMONARY SEQUELAE IN CHEST X-RAY'

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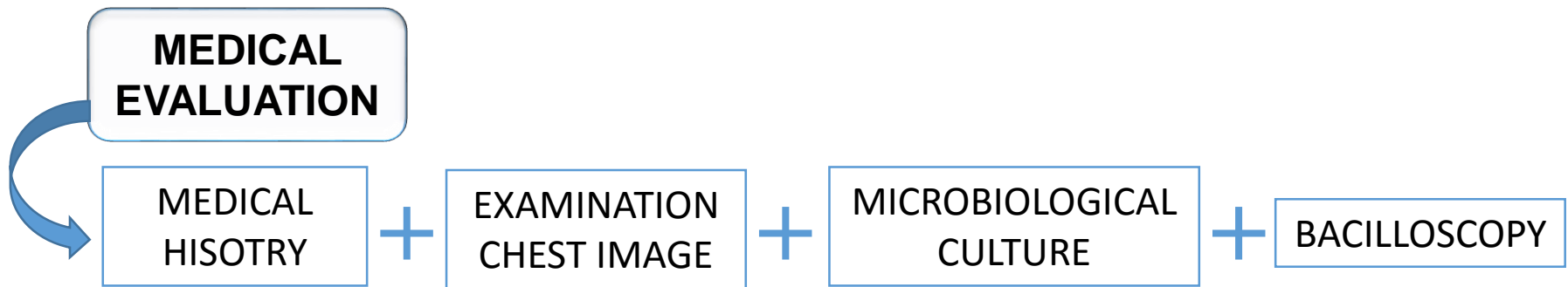
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INTRODUCTION:

- Tuberculosis (TB) is one of the oldest diseases and continues reaching humanity nowadays.

- *Mycobacterium tuberculosis* infection.

- Inhalation by air to the pulmonary alveoli → **LUNG**

  BLOOD FLOW → KIDNEYS BRAIN BONES

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1st EUROPEAN CONGRESS OF MEDICAL PHYSICS

EFOMP

September 1-4, 2016
Eugenides Foundation
Athens-Greece

INTRODUCTION:

MEDICAL EVALUATION

| MEDICAL HISOTRY | + | EXAMINATION CHEST IMAGE | + | MICROBIOLOGICAL CULTURE | + | BACILLOSCOPY |

- The diagnostic exam for more accurate image is → HIGH-RESOLUTION COMPUTED TOMOGRAPHY (HRCT)

- The imaging exam conducted with greater frequency in patients with TB is the X-RAYS.
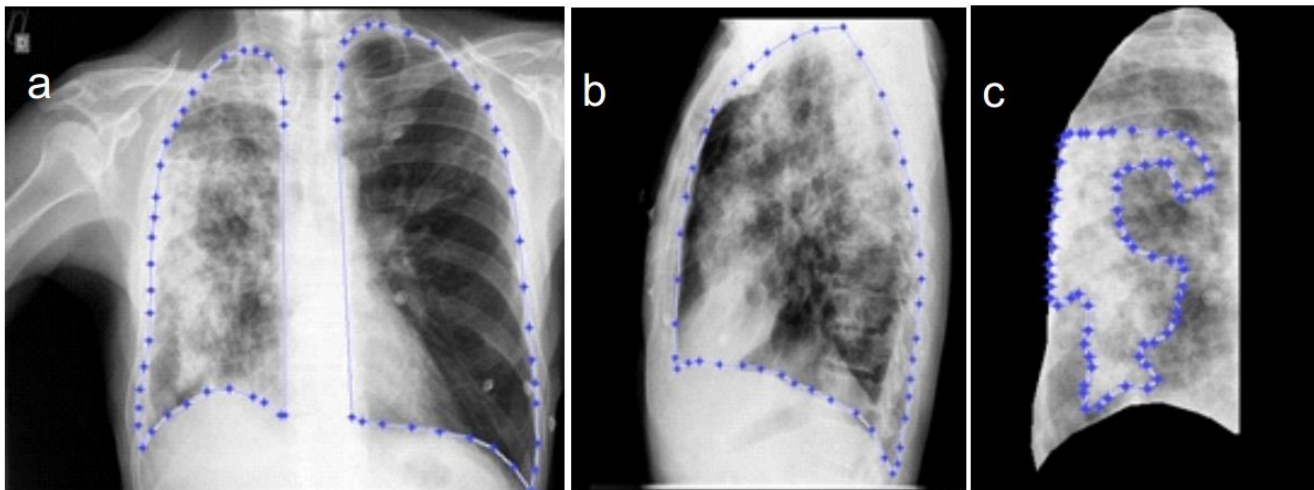
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INTRODUCTION:

- In both exams (HRCT and x-rays) evaluation of lung damage is done subjectively;

- HRCT provides higher dose to the patient and cost to the institution when compared with the x-rays;

- It is extremely important that lung damage is quantified more precisely;

- The use of COMPUTER SYSTEMS provides a more objective assessment.

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PURPOSE:

- The main purpose was to objectively quantify the pulmonary impairment pre- and post-treatment of patients with pulmonary TB through an computational algorithm.
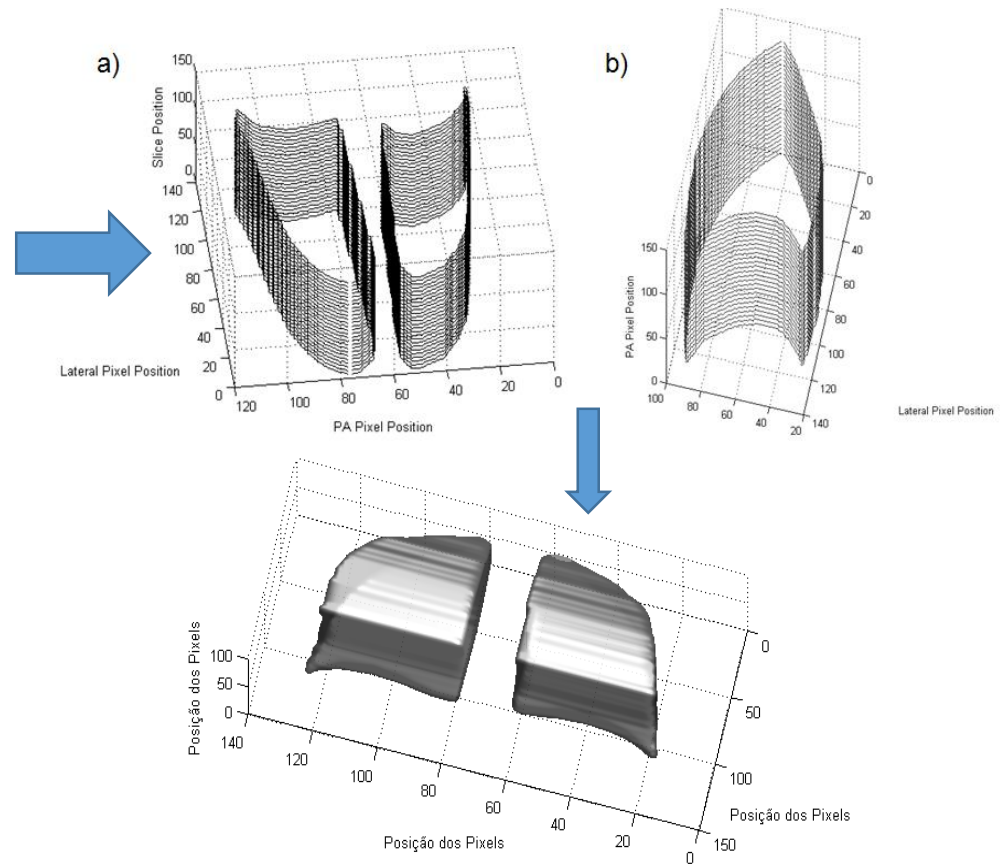
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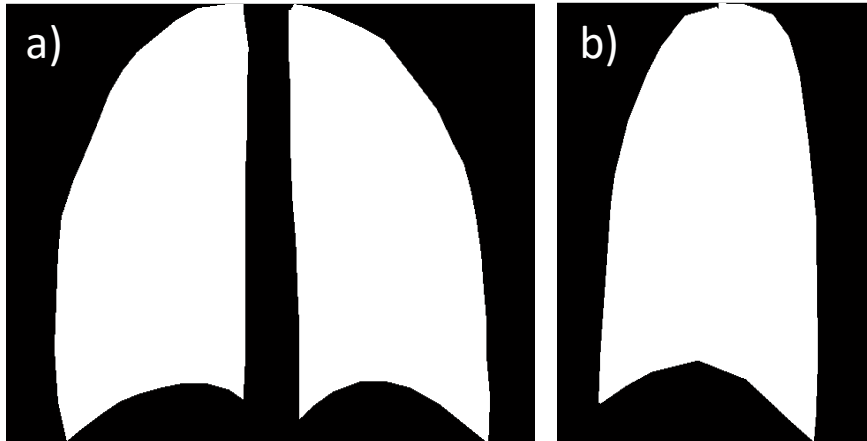
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METHODS:

- 20 x-ray exams, pre- and post-treatment of 10 patients with Tuberculosis;

- Lung area and affected regions were manually segmented in both postero-anterior and profile projections:
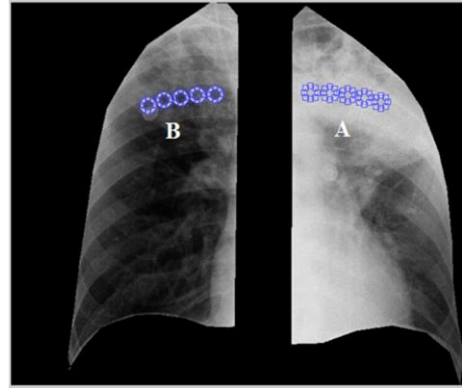
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METHODS:

- Creating binarized masks and expansion to build the 3D lung:

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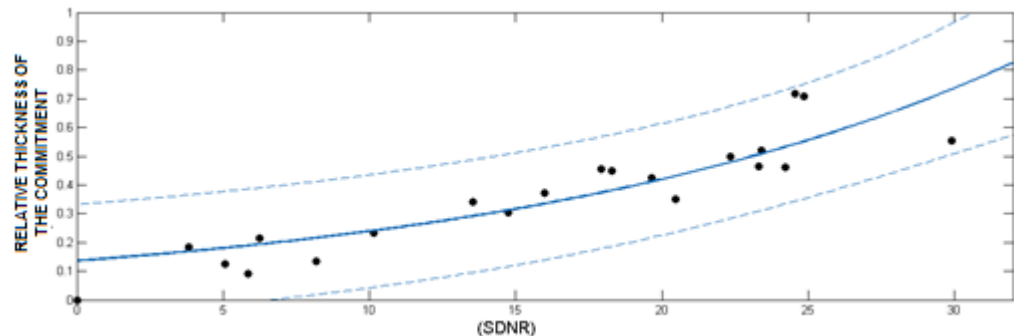September 1-4, 2016
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METHODS:

• Determination of compromised thickness:

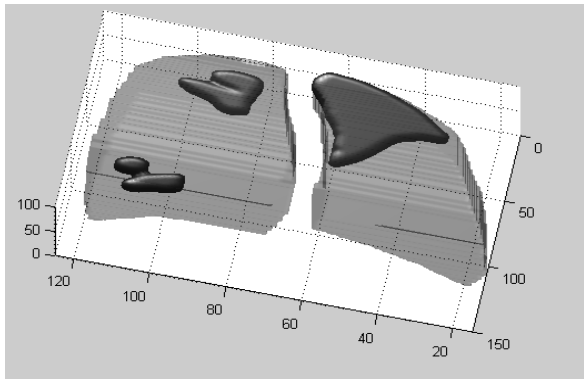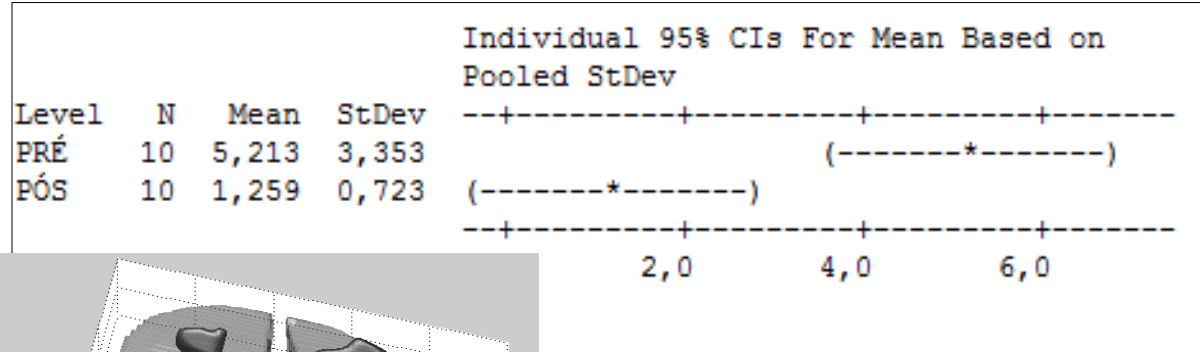SIGNAL DIFFERENCE TO NOISE RATIO:

$$SDNR = \frac{|A-B|}{C}$$

• <u>Establishment of the Reference Curve</u>: relationship between relative thickness of the commitment (obtained in HRCT) and SDNR (obtained in the examination of x-rays);

• This ratio is used as a reference standard for quantification of x-ray exams.

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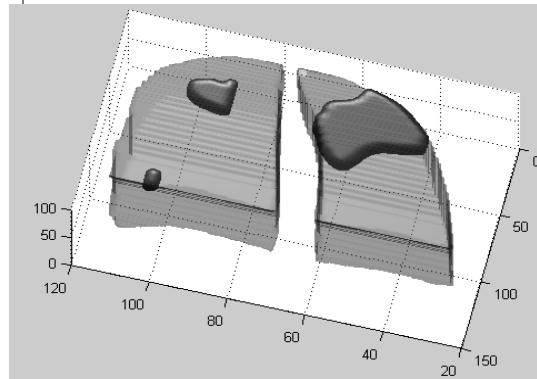Athens-Greece

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RESULTS:

- We observed a mean pulmonary impairment of 5.21%(±3.35) before treatment and 1.26%(±0.72) after treatment. This shows a reduction of 72.54% between pre- and post-treatment

PRE TREATMENT   POS- TREATMENT

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CONCLUSIONS:

- The computational algorithm allows the quantification of pulmonary impairment through chest x-ray;

- Detection and quantification aided by computer systems is of great importance for reliable assessment of pulmonary involvement, assisting radiologists in the diagnosis;

- Future studies will help the choice of the correct treatment for TB patients.