

## RESEARCH LETTER

**TITLE: Lung Ultrasound B-lines: Etiologies and Evolution with Age**

Running head: Clinical Etiologies of Lung B-line Artefacts

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**LETTER:** (*words count: 353*)

*To the Editor:*

Lung ultrasound is a field of growing importance in respiratory medicine[1, 2]. B-lines, previously termed “comet tails”, are vertical hyperechoic reverberations moving synchronously with the lung and represent key artifacts in interpreting pulmonary ultrasound findings.[3, 4] The physiologic basis of B-lines relates to decreased lung aeration[5], a finding that is nonspecific. Here, we aimed to explore the specific clinical diagnoses associated with the B-line pattern and their evolution with age. We therefore undertook a secondary analysis of a two-year audit of consecutive pulmonologist-performed lung ultrasounds in an Italian university hospital [2]. We included all lung ultrasound exams showing a B-line pattern (multiple close B-lines visible in one single scan) in at least one lung field. Ultrasound findings were standardized according to guidelines[4] and final diagnoses were adjudicated by the attending physician at patient discharge[2]. Overall, a B-line pattern was reported in 397 cases (34.5%) of the 1150 exams performed. Of these, 54 were obtained in children (18 females,  $4 \pm 3$  yo, mean $\pm$ SD), 69 in adults between 19 and 64 years of age (29 females,  $46 \pm 13$  yo), 178 in patients aged > 64 years (68 females,  $75 \pm 5$  yo), and 96 in patients of > 80 years old (50 females,  $86 \pm 5$  yo). The figure describes how community-acquired pneumonia (CAP) represents the main cause of B-line patterns in children (89%) and middle age adults (51%), whereas acute heart failure prevails in the elderly (37% between 64 and 80 years old, 50% if older than 80 years old). However, etiologies are heterogeneous since interstitial lung diseases, lung cancer, empyema, atelectasis, pulmonary infarction, and even the normal lung may show lung areas with a B-line pattern in about half of the adult population.

In conclusion, when a large population and multiple conditions are considered, we should expect that one third of the lung ultrasound studies show a B-line pattern in at least one thoracic area, with etiology varying throughout age groups. Since this pattern could be attributed to a wide range of conditions, its interpretation cannot withstand analysis of distribution, extension and severity of the B-line pattern together with an accurate clinical correlation.

**ACKNOWLEDGEMENTS:** *none.*

**DISCLOSURE STATEMENT:** *All authors declare that they have no conflict of interest concerning this paper.*

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## FIGURE LEGEND:

*Figure. B-line pattern lung ultrasound diagnoses accordingly to patient age.*

*AHF: acute heart failure; CAP, community-acquired pneumonia; ILD, interstitial lung disease; TEP, pulmonary thromboembolism with pulmonary infarction.*