# Ultrasound image patterns right after birth can predict healthy neonates – a nested case-control study

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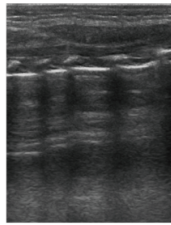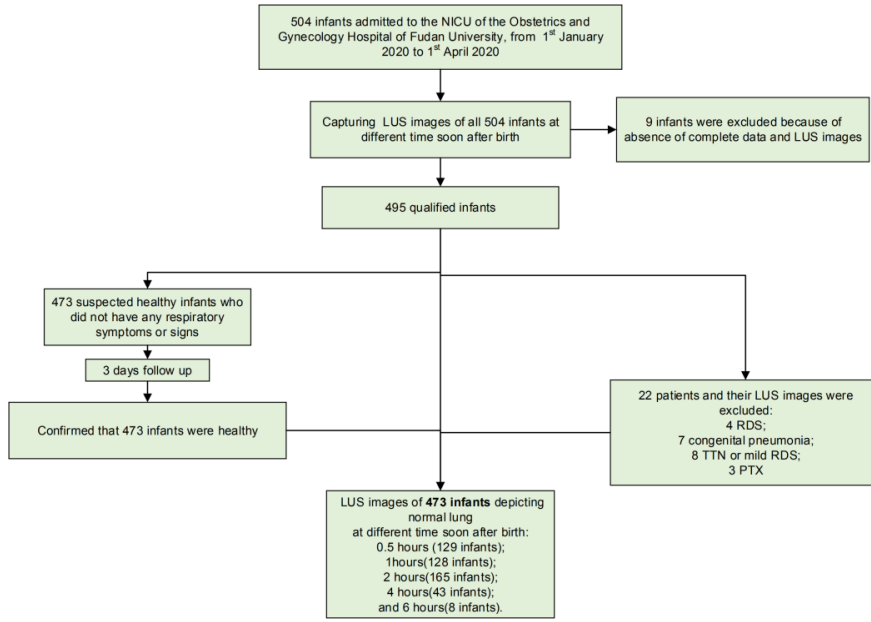June 10, 2020

## Abstract
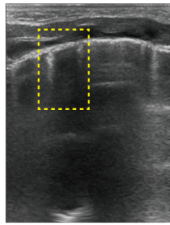
Abstract Purpose To distinguish healthy infants from potential lung disease patients immediately after birth using lung ultrasound (LUS). Design, Setting and Patients This is a nested case-control study containing 22 lung disease patients and 473 healthy infants from a total of 504 consecutive infants. The infants were admitted to the Obstetrics & Gynecology Hospital of Fudan University, Shanghai, China, from 1 January 2020 to 1 April 2020. A newly designed scanning protocol was used to capture LUS images. The sensitivity, specificity, PPV and NPV for predicting healthy infants and patients were calculated individually. The transition process image patterns and their variations are shown. The relationship between clinical signs and high-risk image patterns was calculated by Kendall's tau-b test. Measurements and main results LUS images were captured, and their predictive value was calculated. Four low-risk patterns could typically be seen only in healthy infants (specificity=86.4%, PPV=99.0%), whereas four high-risk patterns could be seen in both healthy infants and patients (specificity=62.4%, PPV=9.6%). High-risk patterns were more likely to be pathological signs when appearing at the oxter and lower back and physiological signs when appearing at the prothorax. These high-risk patterns are significantly related to clinical signs. All these patterns are consistent during the first 6 hours after birth. Conclusions LUS is a valid modality for differentiating healthy infants from potential patients with mild respiratory difficulty. Four low-risk patterns had high value in predicting healthy infants, but four high-risk patterns were not specific enough to discover lung disease patients.
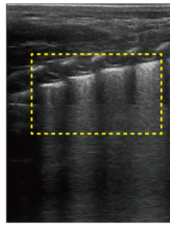
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Main text.doc available at https://authorea.com/users/328608/articles/458554-ultrasound-image-patterns-right-after-birth-can-predict-healthy-neonates-a-nested-case-control-study

504 infants admitted to the NICU of the Obstetrics and Gynecology Hospital of Fudan University, from 1st January 2020 to 1st April 2020

Capturing LUS images of all 504 infants at different time soon after birth → 9 infants were excluded because of absence of complete data and LUS images

495 qualified infants

473 suspected healthy infants who did not have any respiratory symptoms or signs

3 days follow up

Confirmed that 473 infants were healthy

22 patients and their LUS images were excluded:
4 RDS;
7 congenital pneumonia;
8 TTN or mild RDS;
3 PTX

LUS images of **473 infants** depicting normal lung at different time soon after birth:
0.5 hours (129 infants);
1hours(128 infants);
2 hours(165 infants);
4 hours(43 infants);
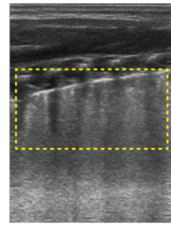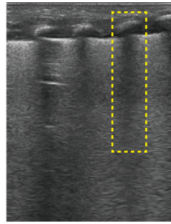and 6 hours(8 infants).



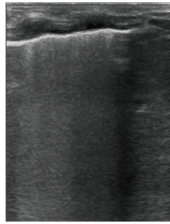**A** Pure A-line  **B** small amounts of DB  **C** moderate amounts of DB  **D** large amounts of DB
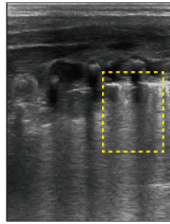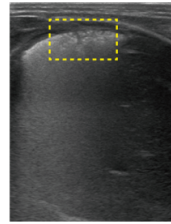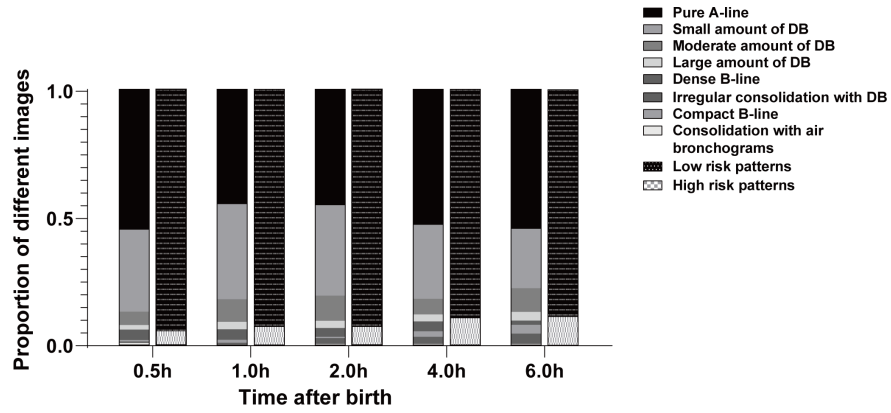
**LOW-RISK**

**HIGH-RISK**

**E** compact B-line  **F** Dense B-line  **G** irregular consolidation with DB  **H** mild consolidation with air bronchograms

2

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