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# Novel patterns for the growing main bronchi in the human fetus – an anatomical, digital and statistical study

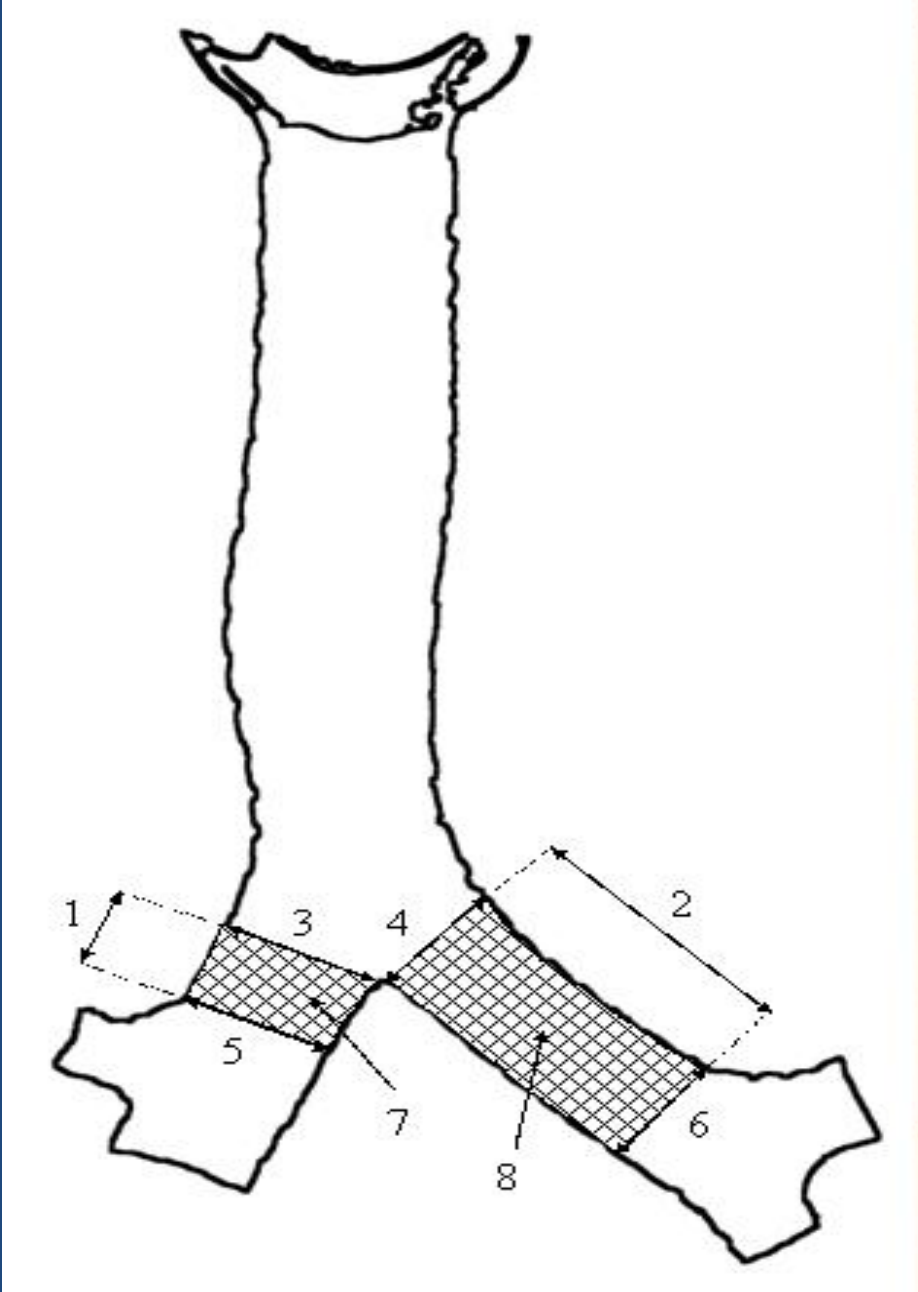
## Introduction:

Intensive progress in prenatal medicine results in performing airway management in the fetus affected by life-threatening congenital malformations. This study aimed to examine age-specific reference intervals and growth dynamics for length, proximal and distal external transverse diameters, and projection surface areas of the two main bronchi at varying gestational ages, including their relative growth in length and projection surface area.

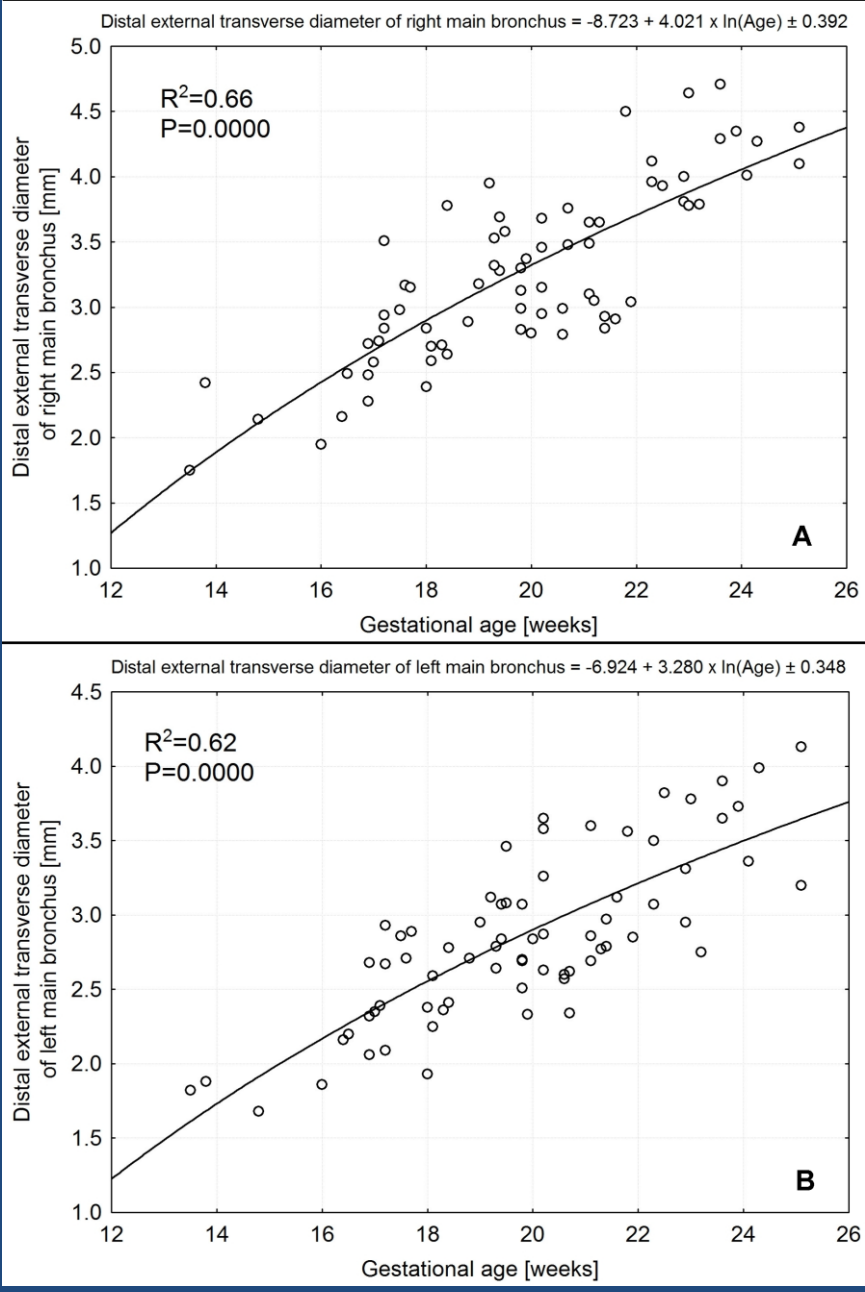
## Material and Methods:

Using anatomical dissection, digital image analysis and statistics, length, proximal and distal external transverse diameters, and projection surface areas of the right and left main bronchi were examined in 73 human fetuses (39 males, 34 females) aged 14–25 weeks, derived from spontaneous abortions and stillbirths.

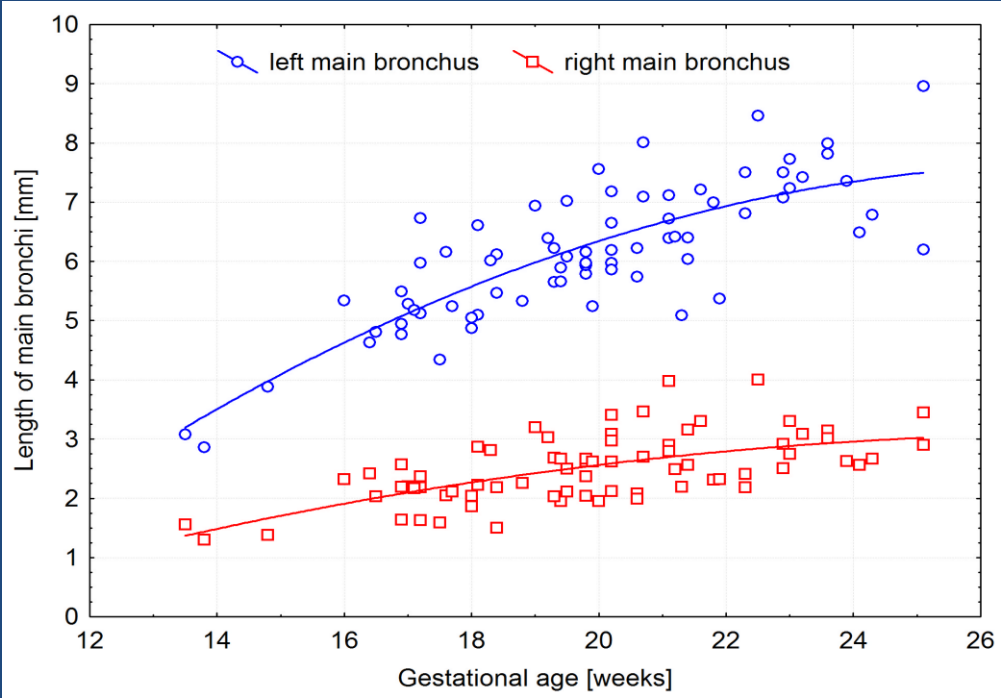
## Results:



Measurements of the main bronchi *in situ* in a male fetus aged 19 weeks: A–trachea, B–right main bronchus, C–left main bronchus, 1–length of right main bronchus, 2–length of left main bronchus, 3–proximal external diameter of right main bronchus, 4–proximal external diameter of left main bronchus, 5–distal external diameter of right main bronchus, 6–distal external diameter of left main bronchus, 7–projection surface area of right main bronchus, 8–projection surface area of left main bronchus.



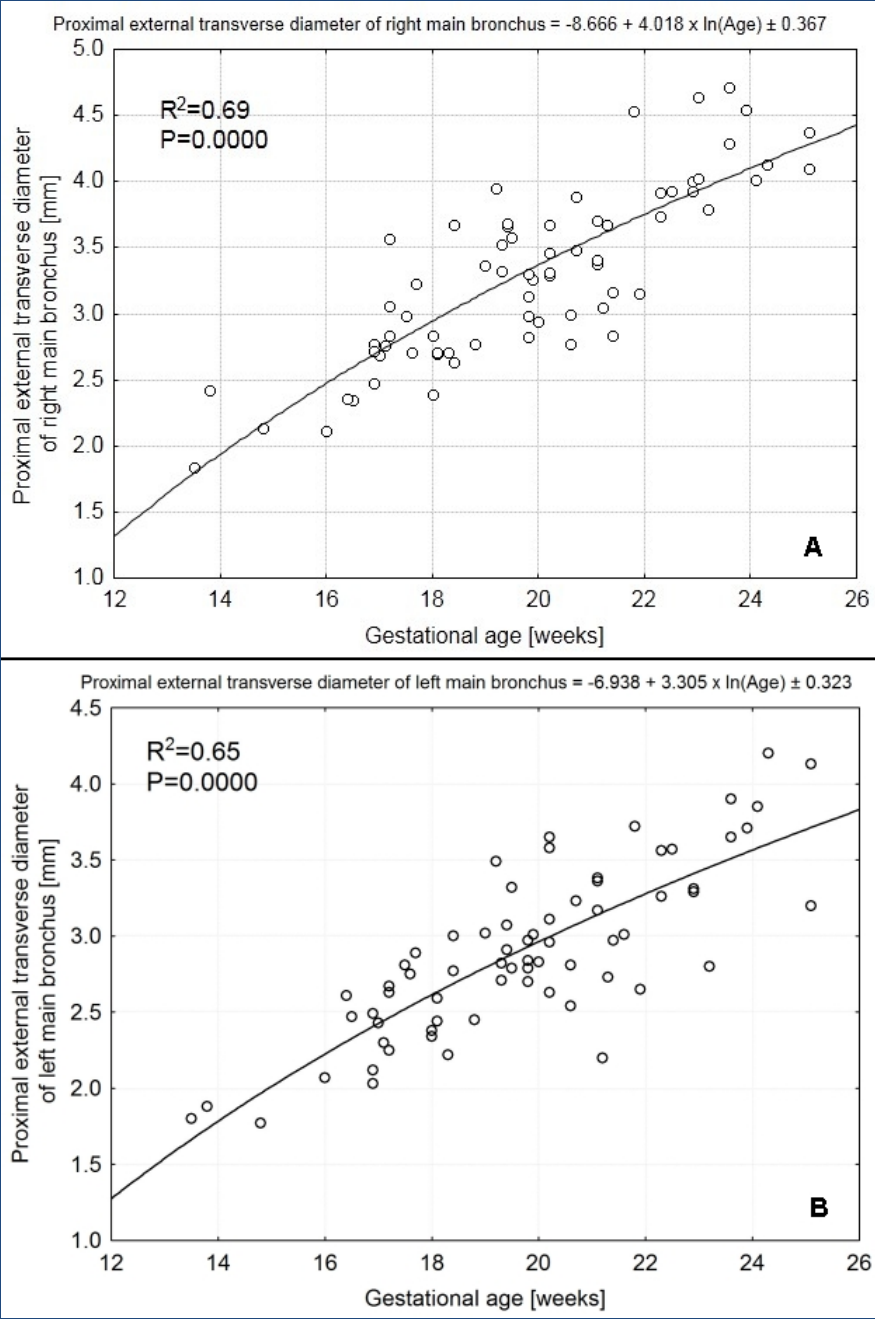
Growth dynamics of the distal external transverse diameters of the right (A) and left (B) main bronchi *versus* gestational age in human fetuses



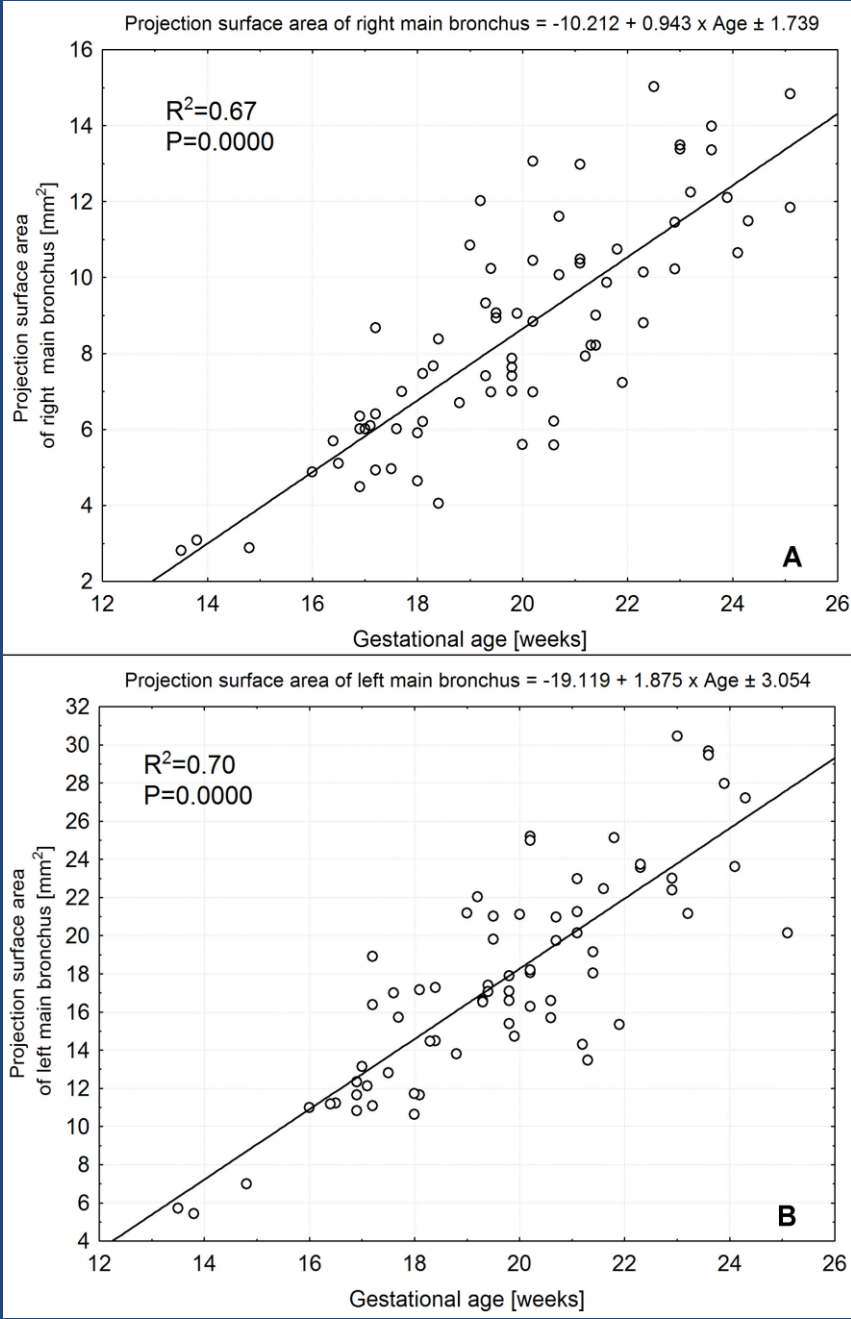
The lengths of the main bronchi in human fetuses

## Conclusions:

1. The main bronchi show no sex differences.
2. The right and left main bronchi grow logarithmically in length and external transverse diameter, and linearly in projection surface area.
3. The right and left main bronchi evolve proportionately, with the right-to-left bronchial ratios of  $0.41 \pm 0.07$  for length, and  $0.47 \pm 0.08$  for projection surface area.



Growth dynamics of the proximal external transverse diameters of the right (A) and left (B) main bronchi *versus* gestational age in human fetuses



Growth dynamics of the projection surface area of the right (A) and left (B) main bronchi *versus* gestational age in human fetuses