

Diaphragm muscle: Neonate vs adult

Several anatomic and histologic differences between the the adult and neonatal diaphragm contribute to a relative disadvantage the later has when it come to respiratory function:

Due to a relative reduction in percentage of type I muscle fibers (slow twitch) in the diaphragm, neonates are at an increased risk of respiratory fatigue.

The ribs of a neonate are more horizontal than in the adult. This reduces the effectiveness of intercostal muscle contraction and consequently neonatal inspiration is nearly entirely dependent on diaphragm contraction.

The neonatal diaphragm is more flattened and less dome-shaped than an adult's which reduces it's geometric effectiveness. Similarly, the diaphragm inserts at a less acute angle resulting in a smaller range of excursion possible.

Not strictly isolated to the diaphragm, but it should be noted that the increased compliance of the chest wall due to incomplete calcification also works against the neonate as they attempt to generate negative intrathoracic pressure through diaphragmatic contraction.

Further Reading: Dassios T, Vervenioti A, Dimitriou G. Respiratory muscle function in the newborn: a narrative review. *Pediatr Res.* 2021 Apr 19:1–9. doi: 10.1038/s41390-021-01529-z. Epub ahead of print. PMID: 33875805; PMCID: PMC8053897.