# Alterations in Lung Nitric Oxide Bioavailability and Oxidative Stress in Post-Partum Rats Exposed to Resource Deprivation (Poverty) During Weaning

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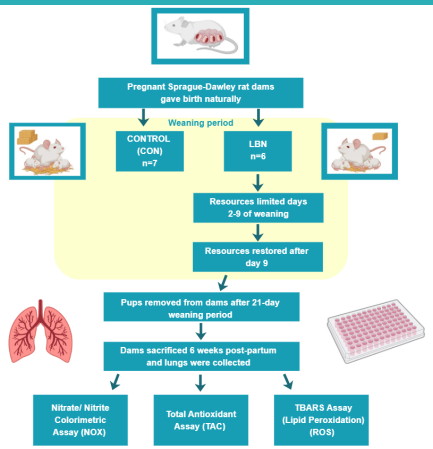
UNT Health FORT WORTH

## BACKGROUND

- Poverty, a multidimensional condition in which one cannot meet their basic needs, is a chronic stressor and resource deprivation state.
- Globally, poverty affects about 831 million people with women of childbearing age and children being the most vulnerable.
- Multiple studies have shown that children who are exposed to a resource deprivation state (poverty/ low socioeconomic income/ ACE) have an increased risk of developing respiratory diseases later in life.
- Alterations in lung nitric oxide (NO) bioavailability and oxidative stress are important factors that contribute to the development of respiratory diseases.
- Although multiple studies investigate how resource deprivation affects lung function and the increased risk of respiratory diseases in children, very few studies examine the correlation between these outcomes in mothers.
- To study these outcomes in mothers, especially during nursing, our lab uses the limited bedding and nesting (LBN) rodent model of chronic stress and resource deprivation.
- In the LBN model, there is an 80% reduction of bedding and nesting material for both the dams and pups during weaning.
- Previous studies from our lab have shown that dams exposed to the LBN model displayed elevated levels of stress, neuroinflammation, and depression (PMID 39884662).
- However, no studies have examined any alterations in lung NO bioavailability and oxidative stress in these dams.

**The objective is to examine the effects of chronic stress and resource deprivation on lung NO bioavailability and oxidative stress in LBN rat dams at 6 weeks postpartum.**

## METHODS

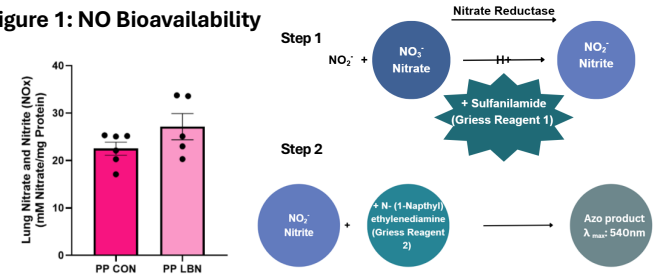



## HYPOTHESIS

**We hypothesized that the LBN rat dams exposed to chronic stress and resource deprivation during weaning will display a decrease in NO bioavailability and an increase in oxidative stress in the lungs.**

## RESULTS

### Figure 1: NO Bioavailability

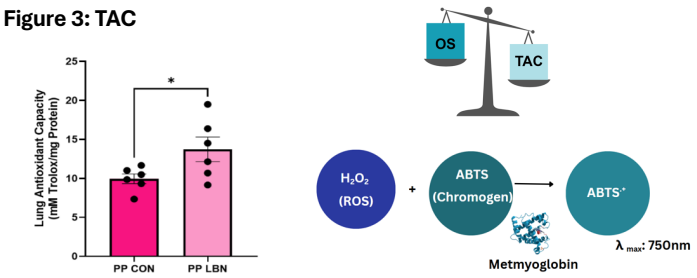



There was no change in NO bioavailability between LBN and CON dams (10.75±2.47 vs 4.78 ± 1.95 mM Nitrate/ mg of protein; ns).

### Figure 2: TBARS (Lipid Peroxidation/ Reactive Oxygen Species)


Lipid peroxidation was decreased by ~38% in LBN compared to CON dams (0.80 ± 0.05 vs 1.29 ± 0.11 mM MDA/ mg of protein, p< 0.05).

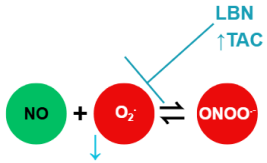
### Figure 3: TAC




TAC was increased by ~38% in LBN dams vs. CON dams (13.72 ± 1.43 vs. 9.94 ± 0.86 mM Trolox/ mg of protein).

## CONCLUSIONS

- Post-partum dams exposed to chronic stress and resource scarcity displayed no change in NO bioavailability and a decrease in oxidative stress in the lungs.
- Therefore, the post-partum dam's ability to maintain NO bioavailability may be due to an increase in antioxidant capacity to decrease oxidative stress in the lungs.




## CLINICAL SIGNIFICANCE

- Poverty is a major public health concern that disproportionately affects women and increases the risk of respiratory disease.
- Informs us of how chronic stress and resource deprivation can affect the health of the mother's lungs.
- Demonstrates how mothers 3-5 years postpartum, may have a unique ability to develop protective mechanisms against alterations in NO and oxidative stress in the lungs to decrease the risk of respiratory disease.
- Points to investigating the role of antioxidants as a therapeutic option to reduce oxidative stress in the lung.
- Enables physicians to consider the social determinants of health, such as socioeconomic status, when providing care to patients, particularly for women.
- Encourages policymakers and governmental agencies to invest in initiatives that reduce poverty.

## FUTURE DIRECTIONS

- Measure lung function in LBN dams.
- Examine other markers of oxidative stress.
- Investigate how TAC influences oxidative stress and NO bioavailability in the lungs.
- Determine how LBN dams were resistant to a decrease in NO bioavailability and an increase in oxidative stress.
- Examine other organ systems that are affected by chronic stress and resource deprivation in dams using the LBN model.
- Testing different animal models of chronic stress and resource deprivation to determine the effects of these conditions on maternal physiology.

## ACKNOWLEDGEMENTS

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