

# ERS 2023



## Review of the European Respiratory Society (ERS) International Congress 2023

<b>Location:</b>	Milan, Italy
<b>Date:</b>	9 <sup>th</sup> –13 <sup>th</sup> September 2023
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Milan, Italy, best known for its fashion week and football team, was home to the European Respiratory Society (ERS) International Congress 2023 between 9<sup>th</sup>–13<sup>th</sup> September 2023. This year's congress kicked off with a live performance of jazz, and with the Congress Chairs 2023, Marisa Bonsignore and Sergio Harari, welcoming the attendees to the hybrid congress. After 3 years without an opening ceremony, Bonsignore expressed her pleasure to be with the attendees at the beginning of the congress.

Harari continued by listing the wonderful work that Milan has done, and will do, to help the environment. The city is currently reforestation, with plans to plant more than 3 million trees by 2030. These efforts are all to keep air pollution down, which was one of the main themes of the congress, along with climate change and sustainable development. Bonsignore continued by stating that the congress will look at environmental issues related to respiratory problems, and she awarded Francesco Forastiere, Imperial College London, UK, the ERS Congress Chair Award, for his dedication in studying the effects of air pollution on the respiratory system.

ERS President, Carlos Robalo Cordeiro, was then welcomed to the stage, where he expressed his solidarity with the Moroccan people after being hit by a terrible earthquake.

### "Welcome back to an opening session of the ERS International Congress."

"Welcome back to an opening session of the ERS International Congress," Cordeiro said, before stating his pleasure at sharing the ERS's ongoing initiatives, as well as their new commitment to reducing their emissions, and being in line with the United Nation's (UN) Sustainable Development Goals. Cordeiro emphasised the congress themes, and how, along with the charity myclimate, the ERS have identified means to offset congress CO<sub>2</sub> emissions by 425,000 tonnes.

After the pandemic, the ERS have updated their strategy by anticipating the future, evaluating performance, identifying areas of improvement, and refining the vision and purpose of the ERS. Cordeiro encouraged the audience to attend the ERS Congress 2024 in Vienna, Austria, where updates will be presented.

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A special video message from Tedros Adhanom Ghebreyesus, Director-General of the World Health Organization (WHO), emphasised the importance of prevention by improving living conditions, reducing exposure to excessive air pollution, reducing tobacco use, and improving the climate crisis; treatment for those who need it most, including migrants and low-income countries; and filling knowledge gaps for respiratory disease. Ghebreyesus ended by thanking the ERS for their partnership and commitment for a healthier, safer, and fairer world.

This year's congress welcomed more than 20,000 people, in-person and online, who could attend a total of 11,272 sessions. Of these, 4,590 were abstracts, with 2,059 presentations and 4,067 e-Posters.

Along with Forastiere, a number of other respiratory specialists received awards, including Athol Wells, Imperial College London and Royal Brompton Hospital, both in London, UK, who received the ERS Presidential Award for his contribution to respiratory medicine in interstitial lung diseases and idiopathic pulmonary fibrosis. Those who achieved the ERS Mid-Career Gold Medal include Bianca Schaub, University Children's Hospital, Ludwig Maxmilian University (LMU) of Munich, Germany; Martijn Nawijn, University of Groningen Medical Center

(UMCG), the Netherlands; Imran Satia, McMaster University and Firestone Institute for Respiratory Health (FIRH), both in Hamilton, Canada; Danny Eckert, Flinders University, Adelaide, Australia; Chin-Chung Shu, National Taiwan University Hospital, Taiwan; and Merel Hellemons, Erasmus University Medical Center (MC), Rotterdam, the Netherlands. The ERS Educational Award was given to Felix Herth, Thoraxklinik, University of Heidelberg, Germany, while the ERS Sadoul Lecture Award went to Tobias Welte, Hannover Medical School, Germany. ERS Teaching Awards were presented to Marieke Duiverman, UMCG, the Netherlands; Najib Rahman, Nuffield Department of Medicine, University of Oxford, UK; and Nicole Beydon, University Hospital Armand Trousseau, Paris, France. Finally, ERS Lifetime Achievement Awards were bestowed to Heather Joy Zar, Red Cross Childrens Hospital, University of Cape Town, South Africa; Martijn A. Spruit, Maastricht University, the Netherlands; Joanna Pepke-Zaba, Royal Papworth Hospital, Cambridge, UK; and Stefano Gasparini, Università Politecnica delle Marche Medical School, Ancona, Italy.

Next year's congress will be held in Vienna, Austria, from 7<sup>th</sup>–11<sup>th</sup> September. Until then, enjoy our key insights from the ERS International Congress 2023. ●



## Air Pollution Linked to Lower Birthweight

PREGNANT females who are exposed to air pollution give birth to smaller babies, but living in a greener area may counteract these effects. This research was presented by Robin Mzati Sinsamala, University of Bergen, Norway, at the ERS International Congress 2023. Birthweight is strongly associated with lung health, as low birthweight increases risk of asthma and chronic obstructive pulmonary disease as children grow older.

The study is part of a wider research programme investigating the effects of air pollution and greenness on lung health in generations of Europeans over the long-term. The team analysed data from the RHINE study, including 4,286 children from five European countries. Greenness of the area people lived in during pregnancy was gauged through satellite images and density of vegetation, including forests, farmlands, and parks. They further collected data on five pollutants, and compared this information with birthweight. Factors that can affect birthweight, such as mother's age, smoking, or other health conditions, were taken into account.

Results showed that higher air pollution levels were associated with lower birthweight. This effect was reduced when taking greenness into account. Researchers further noted that mothers from greener areas had babies with a higher birthweight, compared with those living in less green areas. Sinsamala explained that this could be due to lower amounts of traffic, plants that clear the air of pollution, or higher amounts of physical activity in greener areas.

ERS Advocacy Council Chair Arzu Yorgancioğlu, who was not involved in the research, stated: "This study adds to a growing body of evidence on the damage that air pollution is having on our health, especially in vulnerable babies and young children. Women who are pregnant will want to protect their babies from potential harm. However, as individuals, it can be difficult to reduce our exposure to air pollution or make our neighbourhoods greener." They further stressed the importance of putting pressure on governments and policy-makers to lower air pollution levels. ●

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## Using Phlegm Colour to Predict Prognosis in Patients with Bronchiectasis

NEW research presented at the ERS International Congress 2023 suggests that the colour of phlegm amongst patients with the lung disease bronchiectasis has the potential to be used in order to predict future outcomes, as well as monitor symptoms of the disease.

One of the most prevalent chronic inflammatory airway diseases, bronchiectasis, has no known cure. The condition is caused by a widening of the bronchi, leading to a build-up of mucus, and making the lungs more susceptible to infection. The disease affects between 67 to 566 per 100,000 individuals of all ages in Europe and North America. One of the most common symptoms is a productive cough, with the majority of patients producing phlegm (also known as sputum), which can be classified into four increasingly severe categories: mucoid, mucopurulent, purulent, and severe purulent.

Presented at ERS by Megan Crichton, postdoctoral researcher at the University of Dundee, UK, this study involved 19,324 patients with bronchiectasis from 31 countries around the world. Of this group, 13,484 patients coughed up sputum regularly, the colour of which was monitored by Crichton and colleagues, with follow-ups for 5 years in order to track the

number of exacerbations they had, their severity, and the mortality rates.

Crichton reported that when patients developed chest infections, their sputum colour would darken as a result of the inflamed cells releasing the protein myeloperoxidase, meaning that sputum colour can be used to indicate inflammation. Additionally, Crichton reported an increased risk of exacerbations, hospitalisations, and death with more purulent sputum. It was found that for each one-point increase in sputum purulence, there was a 12% increase in the risk of death.

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Crichton and colleagues concluded that their research, conducted with a large sample size over a period of time, shows that sputum colour is able to reflect prognosis. Analysing sputum colour proves a non-invasive, easy-to-interpret method for monitoring disease progression, simplifying management of bronchiectasis for clinicians and patients alike. ●



## Healthy Diverse Guts Linked with Less Wheezing and Asthma

INFANTS with more mature communities of bacteria in their gut are less likely to develop allergy-related wheezing and asthma, according to research presented at the ERS International Congress in Milan, Italy. The microbiota under scrutiny, developing during the early years of life, are largely comprised of bacteria acquired from the mother when first born. With age and exposure to different sources, the diversity of this microbiota increases and matures.

Yuan Gao, Deakin University, Australia, who presented this study, stated: "We then hypothesised that advanced maturation of the infant gut microbiota in early life is associated with decreased risk of allergy-related wheeze in later childhood." She went on to explain: "A more mature infant gut microbiota at 1 year of age was associated with a lower chance of developing food allergies and asthma in childhood."

The current research was conducted using the Barwon Infant Study (BIS), running in Australia since 2010, including 1,074 babies who were recruited between 2010–2013. Following the infants, Gao and colleagues analysed the bacteria in faecal samples collected 1 month, 6 months, and 1 year after birth. Postnatal reviews were conducted at 1 year and 4 years, whereby parents were asked to report on whether their children had developed allergy-related wheeze or asthma in the last 12 months. Skin-prick tests were also conducted to see if children had allergic reactions to any of 10 foods or airborne substances, such as rye grass or dust. A randomly selected subgroup of 323 children were subject to DNA sequencing in order to identify and characterise gut microbiota, in the form of calculating 'microbiota-by-age z-score'

(MAZ), a mathematical estimate of the maturity of children's gut microbiota.

Gao highlighted: "We found that if babies had more mature gut microbiota when they were 1 year old, they were less likely to have an allergy-related wheeze at 1 and 4 years old," and, "in other words, the more mature the gut microbiota, the less likely were the children to have allergy-related wheeze." In explanation of the mechanism by which mature gut microbiota contribute to this, she said: "Given the complex origins and development of both gut microbiota and the infant immune system, it is likely that the protective effect of a healthy gut microbiota occurs as a result of communities of bacteria acting in multiple different ways, rather than via one particular mechanism."

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A limitation to the study includes the inability of the DNA methods used to characterise the gut microbiota in providing insights into the function of the bacteria. Researchers are planning to recruit 2,000 children in Australia and New Zealand in an upcoming clinical trial, ARROW, in order to take this work further. This will study if giving children a mixture of dead bacteria orally can protect them from wheezing illness or asthma by boosting healthy immune response to viral infections, the most common cause of childhood illness. ●





## Obstructive Sleep Apnoea Treatment Prevents Heart Disease Deaths

INDIVIDUALS with obstructive sleep apnoea (OSA) can reduce their cardiovascular disease mortality risk by using a continuous positive airway pressure (CPAP) machine during sleep, as indicated by research unveiled at the ERS International Congress 2023 in Milan, Italy.

CPAP machines are prescribed to individuals with OSA to improve their sleep quality. These devices function by delivering a continuous stream of air through a facial mask, preventing the airways from collapsing during sleep. Nonetheless, research investigating the impact of CPAP therapy on cardiovascular disease has yielded inconsistent findings.

Jordi de Batlle, Institut de Recerca Biomèdica de Lleida (IRBLleida), Spain, and colleagues, conducted a study involving 3,638 patients with OSA in Catalonia who ceased using CPAP in 2011. This group was compared with a parallel cohort of 3,638 patients with OSA who

persisted with CPAP treatment until at least 2015 or until their death.

When comparing the two groups, it was revealed that individuals who adhered to CPAP treatment experienced a 40% reduced risk of mortality from any cause, a 36% diminished risk of cardiovascular disease-related mortality, and an 18% lower likelihood of being hospitalised due to cardiovascular disease.

De Batlle noted that their findings imply that CPAP treatment can be highly beneficial for the majority of patients with OSA by preventing cardiovascular issues like heart disease and strokes. This is particularly advantageous given that CPAP treatment already provides substantial benefits for most patients with OSA by reducing daytime sleepiness, and enhancing their overall quality of life. Consequently, these results underscore the importance of encouraging individuals with OSA to continue using their CPAP machines. ●

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## Could Progenitor Cell Transplantation Cure Chronic Obstructive Pulmonary Disease?

AUTOLOGOUS P63+ lung progenitor cells show potential in repairing damaged lung tissue in patients with chronic obstructive pulmonary disease (COPD), according to the results of a Phase I trial funded by Regend Therapeutics Ltd, China, presented at the ERS International Congress 2023, in Milan, Italy.

Wei Zuo, School of Medicine, Tongji University, Shanghai, China, and Chief Scientist, Regend Therapeutics Ltd, China, and colleagues, collected P63+ lung progenitor cells from the airways of patients with COPD, cloned these in the laboratory, and then used bronchoscopy to transplant the cells back into the corresponding patient lungs.

The study included 20 patients, 17 of whom received the autologous P63+ lung progenitor transplant, with the remaining three patients comprising the control group. Zuo reported that 35% of the patients had severe COPD, and 53% had extremely severe COPD.

Patients were followed up for 24 weeks to assess treatment tolerance and efficacy. The authors reported that the treatment was well tolerated by all patients, and that after 12 weeks, median diffusing capacity of the lung increased from 30.0% to 39.7% in the treatment group.

By 24 weeks, median diffusing capacity of the lung had increased to 40.3%. Two patients with mild emphysema displayed repair of damaged lung tissue following treatment.

The researchers also measured the 6-minute walk distance test (6MWD) at baseline and at 24 weeks, and found that the median distance covered during the 6MWD increased from 410 m to 447 m. Furthermore, scores for the St George's Respiratory Questionnaire (SGRQ), used to assess quality of life, reduced by seven points in the treatment group, indicative of improved quality of life following treatment.

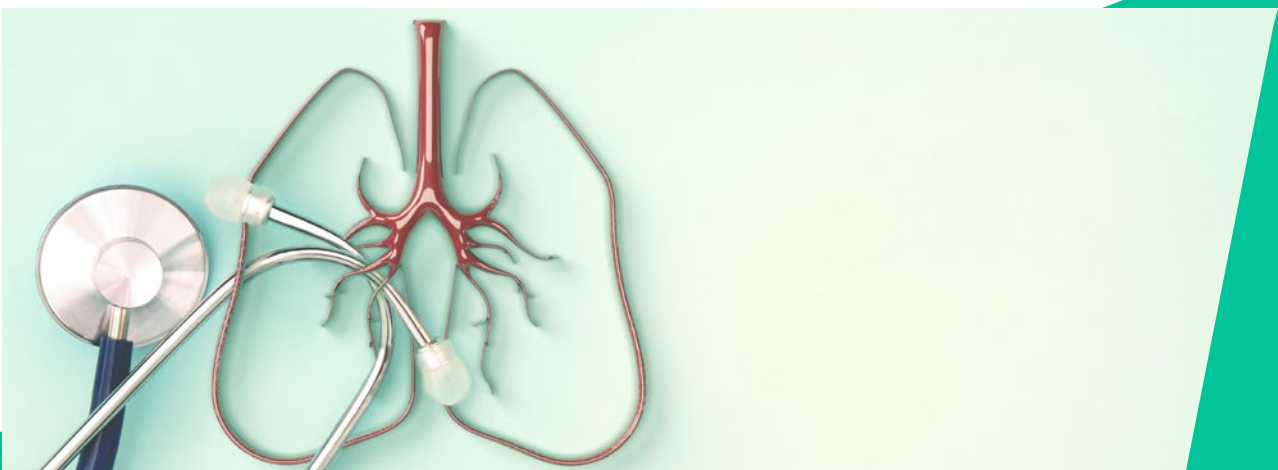
Zuo stated that P63+ progenitor cell transplantation "not only improved the lung function of patients with COPD, but also relieved their symptoms, such as shortness of breath, loss of exercise ability, and persistent coughing."

A noted limitation of the study is that transplanted progenitor cell uptake is uncontrolled. There is hope that further studies will provide clarity on this. Looking towards the future, the researchers are planning a Phase II trial to evaluate efficacy of the treatment in a larger cohort, which has been approved by China's National Medicinal Products Administration (NMPA). ●

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## Exposure to Air Pollution During Pregnancy Linked with Changes to Cell Processes in Newborns

ALTERATIONS in proteins have been detected in babies with mothers exposed to air pollution during pregnancy. Cell processes, such as autophagy, are affected by these changes, and a study investigated the different responses babies encountered based on their mothers' exposure, with results presented at the ERS International Congress 2023 in Milan, Italy.

Olga Gorlanova, University of Basel, Switzerland, led this research to build on a previous study analysing air pollution in pregnancy and how this affects lung function and the immune system in newborns. Healthy newborn babies had individual and different responses to their mothers' exposure to air pollution during pregnancy, which could mean some babies were more vulnerable than others.

In total, 11 proteins were measured in the cord blood of 449 healthy babies, specifically documenting the proteins involved in autophagy, ageing, and cell remodelling to see how prenatal exposure to air pollution affects these processes. The current study involved measuring the mothers' exposure to nitrogen dioxide (NO<sub>2</sub>), and tiny particles of particulate matter (PM10) measuring 10 microns or less in diameter. Vehicle emissions, tyre and brake wear, and smoke are among these pollutants. NO<sub>2</sub> and PM10 were both linked to changes in proteins involved in autophagy, with exposure to NO<sub>2</sub> linked with decreased activity of the proteins SIRT1 and IL-8, and increased levels of the Beclin-1 protein. Gorlanova described the findings: "Our results

indicate that NO<sub>2</sub>, a pollutant formed mainly from traffic emissions, is associated with increased levels of Beclin-1 protein, which is central to initiating autophagy. Exposure to higher NO<sub>2</sub> was also linked to decreased levels of SIRT1, which is a protein that plays a protective role in stress resistance, inflammation, and ageing. IL-8 is a protein active in certain inflammatory cells."

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**"Our findings suggest that healthy newborns have an individual response pattern to air pollution."**

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"Our work adds to the growing body of evidence that autophagy-related mechanisms may be involved in how human cells react to air pollution. The findings are consistent with evidence from tissue and animal research. Further exploration of these mechanisms may help to better understand the deleterious effects of pollution on infants," was how Gorlanova hinted at the usefulness of this study. Next steps in this field will involve examining whether babies with distinct protein response patterns to air pollution will suffer from more breathing problems during infancy and childhood, compared to those who do not show the same protein responses.

Gorlanova summarised this research: "Our findings suggest that healthy newborns have an individual response pattern to air pollution. We think that this may be an indication that some babies are more vulnerable to it than others." ●

## Smoking-Induced Leucocyte Telomere Shortening Accelerates Ageing

RESULTS from a retrospective study presented at the ERS International Congress 2023 in Milan, Italy, spotlighted an association between smoking and reduction in leucocyte telomere length.

Siyu Dai, School of Clinical Medicine, Hangzhou Normal University, China, and Department of Paediatrics, The Chinese University of Hong Kong, Hong Kong; and Feng Chen, The Chinese University, Hong Kong, analysed the genetic and health information of 472,174 UK Biobank participants to determine smoking status (current smoker, previous smoker, and never smoked); level of addiction to smoking cigarettes; pack year history; and leucocyte telomere length.

Mendelian randomisation across 113 single nucleotide polymorphisms related to smoking status (15 for current smokers, 20 for previous smokers, and 78 for never smokers) was applied to investigate if a causal link between smoking and leucocyte telomere shortening could be inferred.

The analysis found smoking status was significantly associated with shorter leucocyte telomere length. Despite a trend towards shorter leucocyte telomere length in ex-smokers, the association was not found to be statistically significant. Additionally, participants who had

never smoked did not show significantly shorter leucocyte telomere length.

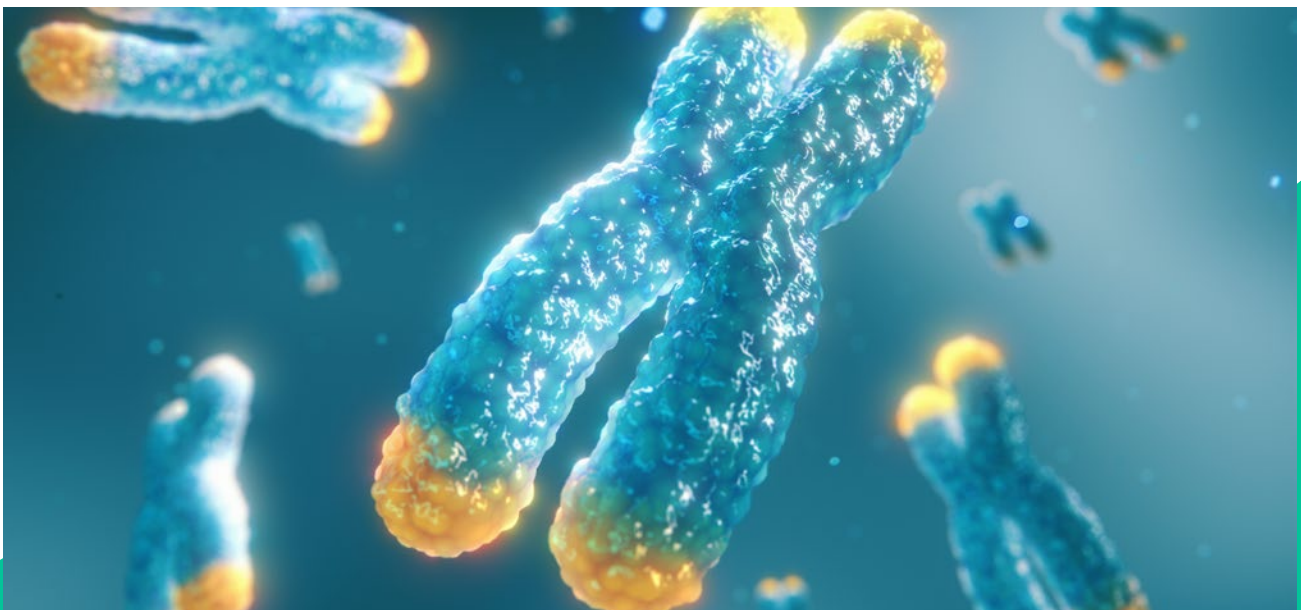
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**"Smoking status was significantly associated with shorter leucocyte telomere length."**

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The findings show that smoking may cause leucocyte telomere shortening, with a dose-response effect. Dai stated: "Our study shows that smoking status and cigarette quantity can result in the shortening of leucocyte telomere length, which is an indicator of tissue self-repair, regeneration, and ageing. In other words, smoking can accelerate the process of ageing, while quitting may considerably decrease the related risk." In addition to this, Dai advocated that smoking cessation support and treatment should be included into daily clinical practice to help create a "smoke-free environment for the next generation."

With this in mind, Dai and Chen hope to not only conduct further research to validate the findings from this study, but also investigate the effects of passive smoking on tissue self-repair, regeneration, and ageing. ●





## City Living and the Risk of Respiratory Infections in Babies and Young Children

RESULTS from a study presented at the ERS International Congress 2023 in Milan, Italy, suggest that young children growing up in towns and cities experience more respiratory infections than those growing up in the countryside. Further research presented at the congress suggests factors such as attending daycare, and living in a damp home or near dense traffic, increase the risk of chest infections in young children. Meanwhile, breastfeeding has been shown to reduce this risk.

The first study, presented by Nicklas Brustad, University of Copenhagen, Denmark, included 663 children and their mothers. Participants were investigated from pregnancy until the children were 3 years old. Children living in an urban area had an average of 17 respiratory infections before the age of 3 years, compared with an average of 15 for those living in rural areas. Furthermore, children living in urban areas had differences in their immune systems compared with those living in rural areas. Brustad said: "Our findings suggest that urban living is an independent risk factor for developing infections in early life when taking account of several related factors, such as exposure to air pollution and starting day care."

The second study, presented by Tom Ruffles from University Hospitals Sussex NHS Foundation Trust, Brighton, UK, included data from 1,344 mothers and their children living in Scotland and England. Questionnaires were completed when the children were 1 year and again when they were 2 years old. Breastfeeding for longer than 6 months helped protect babies and children from infections, while attending daycare increased the risk. Furthermore, children living in homes with visible damp were twice as likely to need treatment with an inhaler and twice as likely to require a steroid inhaler. Finally, living in an area of dense traffic increased the risk of chest infections. Ruffles said: "This research provides some important evidence about how we can help reduce chest infections in babies and toddlers. The benefits of breastfeeding are well-established, and we should continue to support mothers who want to breastfeed their babies."

Overall, these studies highlight the importance of understanding factors that can contribute to respiratory conditions in children, especially those related to where they live and are cared for. It is crucial to protect the developing lungs of young children. ●

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**"It is crucial to protect the developing lungs of young children."**

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## Dust Microbiota in Daycare Linked to Wheezing in Early Childhood

BACTERIA present in dust at daycares are associated with wheezing in young children, which is an early sign of asthma. This is according to data presented at the ERS International Congress 2023 by Annabelle Bédard, from the French National Institute of Health and Medical Research, Paris, France. Bédard stated: “We find mixtures of different bacteria and other microbes living everywhere: outside, inside our homes, on our skin, and even inside our bodies. These communities of bacteria, known as microbiota, can have beneficial or harmful effects on our health.” This research sheds light on why children’s lung health could be affected by daycare, and may help the search for ways to lower the risk of asthma.

The team collected samples of dust found on the floor of 103 daycare settings using an adapted vacuum cleaner. They then identified the bacteria found in the samples using 16S rRNA gene sequencing. Parents of 515 children attending these facilities were also asked whether the child showed respiratory symptoms, including wheezing. In total, 29% reported wheezing. Researchers identified four broad categories of microbiota: *Streptococcus*, *Neisseria*, *Haemophilus* and *Prevotella*; *Streptococcus* and *Lactococcus*; mixed with rare; and *Lactococcus*-dominant. The second profile was associated with a higher risk of wheezing; however, no association was found in the other categories.

The team concluded that there is an association between composition of dust microbiota in daycare and risk of wheezing in early childhood. The team’s next step will be to try to understand factors that influence the dust microbiota, in order to determine how to improve conditions, and prevent chronic respiratory diseases. They will also continue their research with the children to determine whether they develop asthma in later childhood. ●

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**“These communities of bacteria, known as microbiota, can have beneficial or harmful effects on our health.”**

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