



Congress Review

Review of the 29th European Respiratory Society (ERS) International Congress

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The President of the European Respiratory Society (ERS) expressed his great pride in the “high-quality scientific and educational experience” of this year’s Congress, held in sunny Madrid, in his Welcome to delegates. The event was certainly an endeavour to be proud of, hosting more than 20,000 delegates over five days and offering more than 420 scientific and educational sessions. Meet the Expert, Postgraduate Sessions, and much more was on offer to inspire delegates from across the field of respiratory. The central theme of the congress was prevention, and the coverage of this theme comprised three distinct branches: smoking cessation, air pollution, and vaccination. Delegates were treated to a scientific programme filled with exciting opportunities to learn, discuss, debate, and network; the key highlights of the event have been summarised in our Congress Review section.

Read our pick of some of the most pressing news updates announced at the Congress. This includes the news of a brand new treatment option for patients of rare genetic disease primary ciliary dyskinesia, the possible impact on offspring of pregnant women’s exposure to bisphenol A (BPA) during pregnancy, and an exciting new smart shirt that could help physicians monitor lung function in chronic obstructive pulmonary disease patients. The advances announced at the congress will enable respiratory specialists and trainee physicians alike to take huge strides forward in patient care, diagnostics, and much more.

In addition to our roundup of respiratory news stories, we present a hand-picked selection of abstract summaries written by the presenters themselves. The ERS congress saw a wealth of abstract presentations representing the very best in respiratory research; our team was spoilt for choice when selecting high-quality presentations to include in the Abstract Reviews. Topics include coal mine dust lung disease in Australian men, the REVEAL 2.0 Risk Score from Australia and New Zealand, the development of an mHealth asthma app,



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and sleep-disordered breathing in chronic kidney disease patients, amongst others. Keep an eye out for the authors, who are sure to be rising stars in the respiratory world!

Interviews with pre-eminent figures in the respiratory field add even more timely discussions to our Congress Review. Prof Barbara Hoffmann, Chair of the Environment and Health Committee (EHC), discusses the important work of this committee in shaping EU legislation and ERS Education Council Chair Prof Daiana Stolz enlightens us about the important collaborations happening between working groups, committees, and councils within ERS. Our interviews sections casts light on those more intricate topics within the field of respiratory, raising awareness of the work being done at all levels of the field to improve patient care and the infrastructure within which our colleagues and peers work, making them an invaluable addition to our Congress Review.



“The advances announced at the congress will enable respiratory specialists and trainee physicians alike to take huge strides forward in patient care, ”

Next year, the ERS congress will be held in Vienna, Austria, and the EMJ team eagerly awaits the opportunity to witness even more progress in respiratory research and patient care. Until then, read all about our highlights of this year’s congress.



Exposure to Different Pollutants and Areas in the UK Increases Risk of Infant Deaths



“We found that NO₂, PM10 and SO₂ are each linked in varying degrees to infant deaths from any cause, and to neonatal and post-neonatal deaths.”

CHALLENGES to reduce the risk of air pollution exposure in infants are presented to researchers who have shown that certain air pollutants are associated with increased risk of death in the most polluted areas of the UK. This is according to findings presented at this year’s ERS Congress in Barcelona, Spain and reported in a press release dated 27th September 2019.

Three pollutants, nitrogen dioxide (NO₂) and particulate matter (PM10), generated from traffic, and sulphur dioxide (SO₂), predominantly released from industrial activity, were found to be associated with increased risk of death in infants from highly polluted areas compared to those from areas with less pollution. The pollutants were shown to have this effect as separate components or in combination. One of the researchers, Dr Sarah Kotecha, Cardiff University School of Medicine, Cardiff, UK, commented on the findings: “We found that NO₂, PM10 and SO₂ are each linked in varying degrees to infant deaths from any cause, and to neonatal and post-

neonatal deaths. This is an important finding as the pollutants are produced and derived from different sources.”

Annual pollution exposure was calculated from data taken between 2001–2012 in England and Wales and used with data from 7,984,366 live births and deaths during these years to link death rates to the amount of pollution in each area of the country. The findings showed that there was an increased risk of up to 50% in death from any cause in infants from birth up to 1 year of age in the most polluted areas of the country. There was a 21% increased risk for SO₂, but not for NO₂ or PM10, in neonatal deaths, defined by death within the first 28 days of birth, which Dr Kotecha stated could be due to the individual mechanisms of the pollutants. The findings indicated that future research may include therapies depending on amounts of exposure to different types of pollutants posing a risk to the number of infant deaths.

Professional Drivers Experience Different Levels of Black Carbon Exposure at Work

EXPOSURE to black carbon is, on average, highest in taxi drivers working in central London compared to other professional drivers in the city, or to those at a busy roadside. This is according to findings presented at this year's EASD Congress in Barcelona, Spain and reported in a press release dated 29th September 2019. The findings are a result of a collaboration between researchers from London, UK universities, King's College London and Queen Mary University of London.

A total of 140 individuals who worked as professional drivers in central London were required to drive for a total of 96 hours whilst carrying black carbon monitors in their vehicles. They provided details about the type of vehicle they drove, the hours they worked, and whether they had either their air vents or windows open when they drove. The researchers aimed to investigate the effect different levels of pollution exposure on the health of professional drivers in central London. Mr Shanon Lim, PhD candidate at King's College London, presented the research and commented: "We believe there are around a million people working in jobs like these in the UK alone, so this is a widespread and under-appreciated issue."

The monitors, linked with GPS trackers, measured exposure levels per minute. The research showed that professional drivers were subject to 4.1 micrograms of black carbon per cubic metre of air ($\mu\text{g}/\text{m}^3$) when they worked in central London, this is approximately four times as much the exposure received at the drivers' homes, or experienced by professionals who work at an office desk indoors. The drivers also encountered spikes of black carbon exposure which lasted up to 30 minutes and often exceeded $100 \mu\text{g}/\text{m}^3$.

Emergency service drivers experienced the lowest levels of black carbon exposure, $2.8 \mu\text{g}/\text{m}^3$, the researchers speculated whether this may be because of emergency vehicles' ability to escape

congestion. Taxi drivers endured the highest levels of black carbon exposure at an average of $6.5 \mu\text{g}/\text{m}^3$. The researchers suggested that air pollution may be highest in areas that taxi drivers typically work in and can become trapped inside the vehicle. The authors advise that it is possible for drivers to protect themselves from the effects of pollution by driving with the windows closed, taking alternative routes, and using air filters.



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Truck Drivers at High Risk for Crash-Causing Sleep Apnoea

SLEEP-RELATED breathing problems, which can cause drivers to fall asleep while driving, are present in up to 50% of truck drivers, suggests a research study that was presented at ERS this year and reported in a press release dated 30th September.

In the study, 905 Italian truck drivers were interviewed to determine the prevalence of sleep-related breathing problems in the population, and the lifestyle factors that may increase the risk of such issues. Of the participants, 887 were men, average age was 46 (range: 19-78), and 77% were overweight (BMI ≥ 25). The structure of the study comprised a health survey that took place on 44 days between March and December in 2018. The interviews were conducted by volunteer expert patients, doctors, and nurses at truck dealerships, driver training days, and at a truck driver show. The questions in the health survey included:

- Do you sometimes stop breathing and have sleep apnoea at night?

- Do you snore?
- Do you wake up needing to urinate urgently?
- Are you dissatisfied with how you have slept?
- Do you frequently feel the desire or need to sleep during the day (except after lunch)?
- Do you take drugs for high blood pressure?

Strikingly, nearly 10% of drivers said that their partners noticed that they stopped breathing when they were sleeping sometimes. Furthermore, the answer 'yes' was given by 43% of participants to two of the survey questions, and therefore were at risk of obstructive sleep-apnoea.

Luca Roberti, President of Apnoici Italiani (the Italian Sleep Apnoea Patient Association), said: "This observational study has underlined the high prevalence of obstructive sleep apnoea among truck drivers, which is greater than the prevalence in the general population. This is due to a lifestyle that forces the drivers to sit for several hours a day, with little physical activity and a poor diet, leading to a greater risk of excessive daytime sleepiness and of dozing off unexpectedly while driving."

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Lung Disease can be Monitored with a 'Smart Shirt'

'SMART SHIRTS', in conjunction with mobile phone apps, can accurately measure lung function for patients with lung disease, according to the results of a study presented at this year's ERS Congress held in Madrid, Spain, and reported in a press release dated 30th September.

Chronic obstructive pulmonary disease is a chronic, progressive disease that requires long-term lung-function monitoring to assess disease progression. Traditional monitoring is normally completed in a clinical setting and is not practical for everyday activity, unlike the smart shirts that can be worn underneath normal clothing. As the wearer's chest expands and contracts, the smart shirt, named Hexoskin, measures the volume of inhaled and exhaled air by sensing the stretch of the fabric, in addition to heart rate and movement.

Denise Mannée, a technical physician, PhD candidate, at Radboud University Medical Centre, Nijmegen, the Netherlands, presented the results of the study. The breathing of the healthy volunteers (N=15) was monitored whilst doing activities such as lying down, sitting, standing, climbing stairs, and vacuuming. This was completed whilst the volunteers wore the smart

shirt alone, then repeated whilst also wearing traditional equipment to assess the accuracy of the smart shirt.

A marginal difference (0.2%) between the equipment whilst lying was observed, a slightly greater difference (3.2%) was observed in the more strenuous activities, such as vacuuming.

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"These results are important because they indicate that the smart shirt can be worn by patients while they go about their daily lives to accurately measure their lung function," Mrs Mannée explained. Thinking towards the future, the researchers now plan to investigate the use of the smart shirt for the monitoring of other respiratory disease such as asthma, cystic fibrosis, or post lung transplantation.

Susceptibility to Respiratory Infections in Babies Linked to Well-Connected Bacterial Networks

MICROBIAL communities, consisting of microscopic bacteria present in all humans that group together in various parts of the body such as the gut, lungs, nose, and mouth, have been shown to be linked to one another across the body. According to findings presented at this year's ERS congress in Madrid, Spain, and reported in a press release dated 1st October 2019, for the first time the extent of which these microbial communities (microbiota) are linked to each other and their relevance to respiratory infections susceptibility in babies has been shown.

Dr Melanie Clerc, Centre for Inflammation Research, University of Edinburgh, Edinburgh, UK, stated that infants with better connected and organised microbiota had fewer respiratory diseases compared to those with fragmented networks. For the study, samples from the nose, mouth, and gut were collected from 120 babies 1 week after birth and then at 2, 4, and 6 months for the large prospective Microbiome Utrecht Study in Utrecht, Netherlands. Furthermore, data on lifestyle and environmental factors affecting the babies, and the amount of respiratory diseases they developed in their first year of life were gathered.

The bacteria from the collected samples were analysed at multiple timepoints and using a

mathematical algorithm the researchers were able to create networks that elucidate the interactions between all of the microbes at each timepoint and over time. The study revealed that 1-week postpartum microbial networks had already been well-defined in babies who proceeded to experience 0–2 infections in their first year of life. Findings also uncovered that these networks were composed of four large clusters of bacteria, three clusters specific to either the nose, mouth, or gut; and a fourth, composed of species of mixed origin, that linked the other three groups.

Dr Clerc also noted that the children who developed more respiratory tract infections showed, small, less-well connected clusters from early on in life. She believes “our findings may lead to new insights into ways of using these cross-site microbial connections to prevent respiratory infections in childhood and to understand how susceptibility to disease is linked to the way these microbial communities mature.” The researchers plan to investigate the specific mechanism by which bacteria communicate across different sites, and how the communication networks are affected by medical intervention around the time of birth.



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Phenol Exposure's Impact on Respiratory Function

PREGNANT women subjected to higher levels of bisphenol A (BPA), a group of chemicals used in the manufacture of food containers, plastic bottles, toys, and some paper, have a higher risk of having children who wheeze and poorer lung function. According to research revealed on the 1st October 2019 during a press release at this year's ERS congress, these commonly used chemicals might affect the baby's development, and lung function in later stages of life.

Research has shown that phenols such as BPA can interfere with hormone signals in the body. The recent research by predoctoral Alicia Abellan, Barcelona Institute for Global Health (ISGlobal), examined pregnant women's exposure to different phenols and discovered that the majority of them had detectable levels of BPA in their urine. According to Ms Abellan "when babies are still in the womb, they are especially vulnerable to these substances because they have not yet established the ability to remove toxic substances, and their respiratory and immune systems are still developing."

In the study 2,685 pairs of mothers and their children already enrolled in one of eight large European research projects were examined. Urine samples were used to examine the mothers' exposure to BPA and other phenols during pregnancy. Children's lung functions were measured when they were aged 6-10 years, and questionnaires were used to determine whether children wheeze. Results revealed that 79% of the women had detectable quantities of BPA in their urine; furthermore, higher levels of BPA in women corresponded to a 13% likelihood of having children who wheeze. Additionally, doubling of BPA in a mother's urine sample was associated with an estimated 5 mL decrease in a child's lung capacity.



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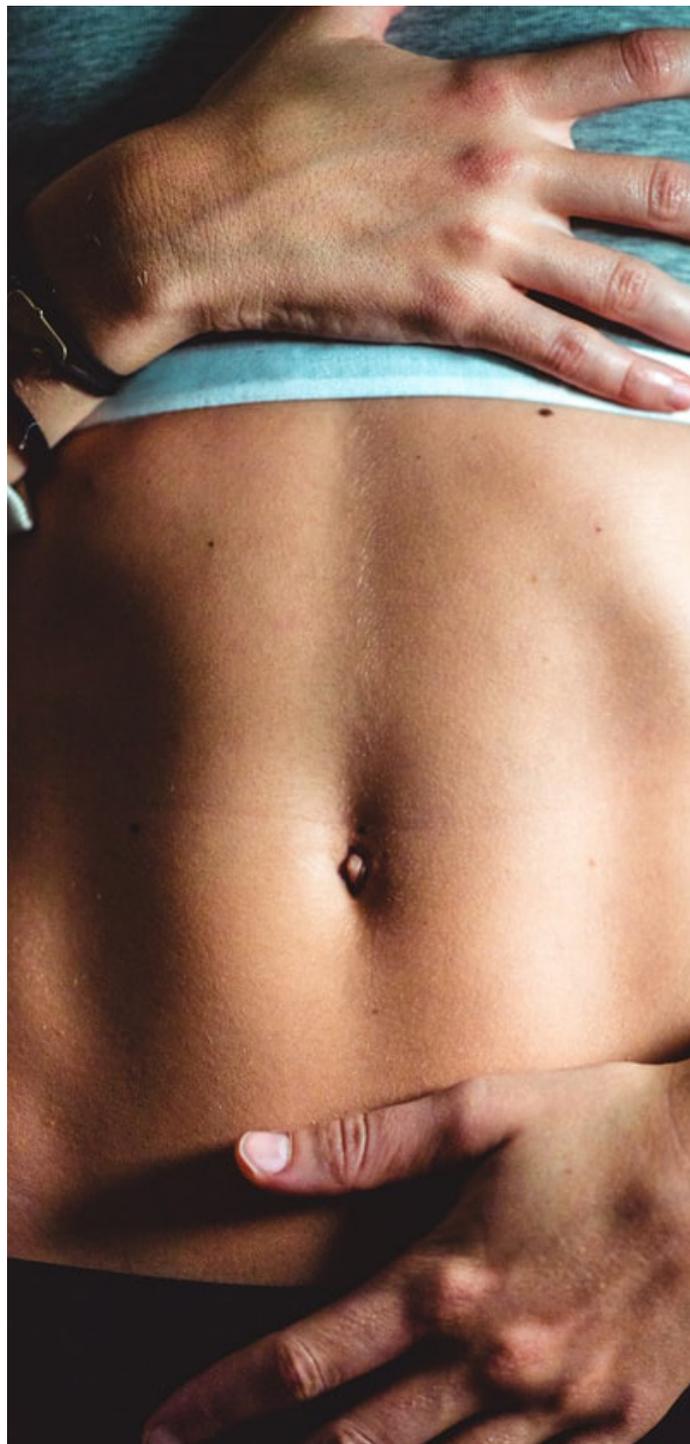
Moving forward, the study group plans to continue investigating the effects of phenol exposure and the link to respiratory effects. Ms Abellan believes that "policy makers and clinicians should be aware of the role that these commonly used chemicals might play in the very earliest stages of a baby's development and the impact that could have on our population's health at later stages of life, as we know that having lower lung function in early life makes people more prone to developing chronic lung diseases like chronic obstructive pulmonary disease."

Breathing Difficulty Risk Linked to Polycystic Ovary Syndrome Prevalence

POOR respiratory health, determined by lung function tests and defined as lower lung capacity, appears to exhibit a positive association with polycystic ovary syndrome (PCOS), revealing a potential link between these two seemingly distal conditions. This message was delivered as part of a press release on Wednesday 2nd October at the ERS Congress in Madrid, Spain.

Using lung function data contributed by the UK Biobank project consisting of 182,619 women's records, as well as previously published genetic data related to PCOS, the group of researchers from Imperial College London, London, UK, aimed to determine why such a high prevalence of chronic obstructive pulmonary disease can be seen in patients who are neither male or smokers, the most-associated predictors of disease manifestation. Mendelian randomisation was incorporated into a strategy involving the testing of lung function using a spirometer, a device used to quantitate the volume of air a person can exhale in one second and the total exhaled in a singular, forced breath. Genetic variance linked to PCOS was also included within the investigative model, which due to its origin in birth and persistence throughout one's life, could be causatively linked to breathing difficulty in adulthood.

PCOS was seen to account for an approximately 10% increased likelihood of reduced lung function, conferring an increased risk for comorbidities such as cardiovascular disease. Dr Diana van der Plaats, a fellow from the institute involved with the RESPIRE 3 study, noted that "this research highlights the fact that PCOS can affect different parts of a woman's body, not only her reproductive organs." The researchers concede that their work does not fully explain the mechanisms of this connection, however insulin levels and diabetes were proposed to be implicated; these



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factors are both symptomatic in PCOS patients. The researchers next plan to investigate the effects of hormonal regulation on lung function.

Prof Daiana Stolz, Chair of the ERS Education Council, concluded that "Doctors need to be aware that women with PCOS may be at a higher risk of having poor lung function, which might require follow-up and treatment."

MicroRNA Linked to Respiratory Failure or Sepsis in Pneumonia Patients

A TEAM of Spanish researchers from Consorci Hospital Universitari de Valencia and the University of Valencia have produced findings identifying specific genetic fragments as predictors of respiratory failure or sepsis in pneumonia patients. This could allow for doctors to screen for these markers in pneumonia patients upon hospital admission, allowing a more efficient and informed service of care. This exciting discovery was presented as part of a press release on the 2nd October 2019 as part of the ERS annual congress in Madrid, Spain.

In the study, clinical data and blood samples from 169 patients with community-acquired pneumonia was analysed using quantitative PCR techniques. In this manner, microRNA seen to be enriched or depleted in the disease background upon hospital admission could be determined, and their abundancy could be correlated to respiratory complication risk throughout the course of the disease.

Three microRNA (mir-182, mir-223, and mir-574) known prior to be implicated in lung and systemic

inflammatory processes were good predictors of sepsis or respiratory failure. Of the patient cohort, 64.5% developed complications, including respiratory failure (25.45) and sepsis (13.6%). Mir-223 effectively predicted sepsis onset (78% accuracy), whereas mir-574 was a good predictor of respiratory failure (77% accurate). Mir-182 was capable of providing prognostic warning for both conditions (sepsis: 83%; respiratory failure: 76%).

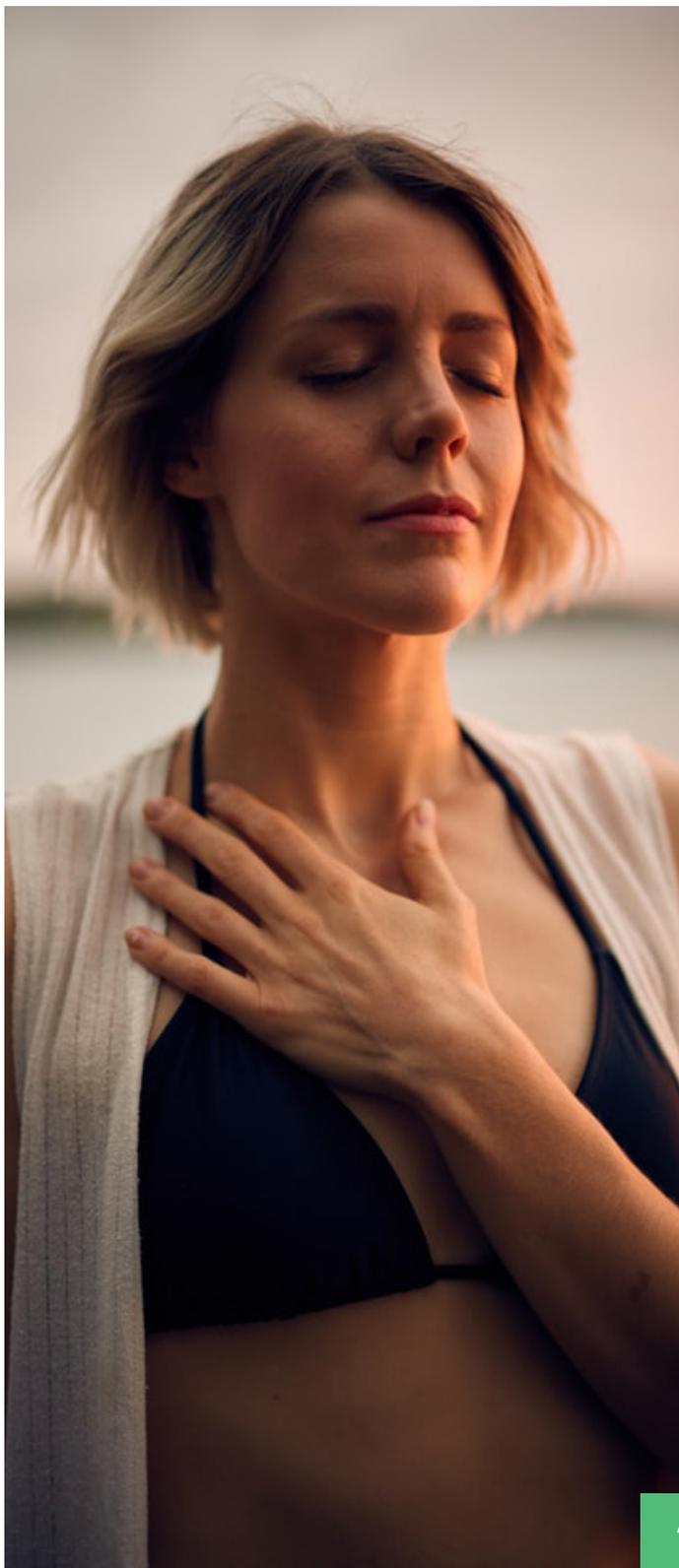
The researchers hope that establishing specific microRNA profiles in pneumonia patients may support the initiation of more intensive monitoring or support mechanisms. Importantly, such assessment is fast (1-3 hours) and very cost-effective, as well as being a routine enough procedure to administer at most hospitals.

Dr Francisco Sanz, associate professor at the University, concluded that “our study has improved our understanding of the changes and processes that occur in the body in response to pneumonia by identifying the microRNA that specifically determine complications.”

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Severe Asthma Patients Found to Take Harmful Amounts of Oral Steroids



Madrid, Spain, and reported in a press release dated 2nd October 2019. The study also found that the majority of participants could decrease the need for oral steroids with stronger adherence to other asthma medication.

Dr Katrien Eger, Amsterdam University Medical Centre, Amsterdam, The Netherlands, discussed the study: “Our findings show that many patients with severe asthma are taking harmfully high doses of oral steroids. Every prescription for oral steroids should alert doctors to assess adherence to inhaled therapies and inhalation techniques in these patients. Furthermore, now that there is an increasing number of biologic asthma drugs available that avoid the need for oral steroids, doctors should initiate biologic treatment in suitable patients to reduce exposure to harmful oral steroids.”

The research group identified Dutch patients taking ≥ 500 mg of inhaled corticosteroids a day, along with long-acting beta agonists, while having severe asthma, as defined by the Global Initiative for Asthma (GINA). Questionnaires on medical history were sent to 5,002 patients, 2,312 of whom responded. Oral steroid use and medication adherence was also collected. Adherence to medication was measured by prescriptions being collected $>80\%$ of the time.

“We found that 29% of asthma patients who were using high doses of inhaled steroids were also taking harmfully high doses of oral steroids of 420 mg a year or more,” explained Dr Eger. Some patients may be eligible for new biologic drugs to treat asthma, but it must be identified whether they could first attempt improving asthma medication adherence, as 78% of these patients were found to have poor adherence or incorrect technique for inhalation.

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HARMFUL doses of oral steroids could be taken by one third of patients who have severe asthma, as found in research presented at this year’s ERS Congress in

Good News for Primary Ciliary Dyskinesia Patients

EXCITING new results suggest that a 6-month course of low-dose antibiotic azithromycin could alleviate the symptoms of chronic lung condition primary ciliary dyskinesia (PCD), reports a ERS press release. The study is the first of its kind to find such positive results for this rare disease, which causes recurrent chest and ear infections in patients due to a build-up of mucus in the lungs.

Dr Helene Kobbernagel, Paediatric Pulmonary Service, Department of Paediatrics and Adolescent Medicine, Copenhagen University Hospital - Rigshospitalet, Copenhagen, Denmark presented the study, a 'gold-standard' randomised controlled clinical trial, at this year's ERS Congress, explaining: "We know that azithromycin is effective in treating a number of infections that occur in people with PCD, as well as having anti-inflammatory effects. It is also simple to administer and has mild side-effects." She added: "We wanted to see whether taking azithromycin over a period of time could also work to prevent infections and reduce symptoms."

To this aim, the team enrolled 90 PCD patients between the ages of 7 and 50 years from six hospitals across Europe. The group was split into two, the first group (n=49) was randomly assigned to azithromycin treatment for 6 months, the second (n=41) were given a placebo. All patients were assessed for lung function, hearing, the presence of infection-causing bacteria in their sputum, and quality of life.

During 6-month follow-up, the team noted a 50% reduction in episodes of symptoms in the azithromycin group (mean: 0.63) compared to the placebo group (mean: 1.37). The azithromycin group also had fewer infection-causing bacteria in their sputum samples, but were more likely to experience mild diarrhoea. Commenting on the results, Dr Kobbernagel said: "Our results show that azithromycin is safe for patients with PCD and that it could offer an effective maintenance therapy, reducing ill-health and helping children and adults get on with their daily lives."

In terms of future directions, the next step is to ascertain whether the antibiotic is safe for longer-term administration and whether it could help to prevent long-term damage to the lungs which PCD patients often experience as a result of recurrent infections. Although the researchers in this study did not record any significant differences in long-term lung function and hearing in this study, they cautioned that a longer study might be needed to assess this more accurately.

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