ESPE NEWS

BRINGING THE LATEST IN PAEDIATRIC ENDOCRINOLOGY TO YOU

ESPE
European Society for Paediatric Endocrinology
Improving care of children with endocrine diseases by promoting knowledge and research

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Endocrinology in a changing climate

Special issue
P5–8 >

ESPE 2024 in Liverpool – submit your abstracts by 20 May!

Welcome

Excitingly, the 2024 ESPE Annual Meeting in Liverpool, UK, is now on the horizon. The all-important deadline for submission of your abstracts is 20 May, while dates for travel grant applications (28 June) and early-bird registration (12 August) follow closely behind. Make a note of them all, and find out more about this fantastic event on page 9.

The impact on human health of changes to our environment and how we live is becoming ever clearer. In this issue, we have picked out just a few subjects of relevance to paediatric endocrinology.

On **page 5**, Helena Ribeiro, Sofia Lizarralde Oliver and Keila Valente de Santana take into consideration the impact of factors such as limited exposure to sunlight on children's vitamin D levels. The article highlights areas where research is needed, and discusses potential ways of addressing the issues.

Many parts of the world, particularly in the tropics, experience high ambient temperatures, often in circumstances where electric refrigeration is not an option. On **page 6**, Sanket Pendsey describes an ingenious method to store human insulin at a reduced temperature using simple equipment, so maintaining its potency. Larger studies may lead to more widespread use of this approach.

ESPE is calling for a ban of per- and polyfluoroalkyl substances (PFAS) at the EU level. These 'forever chemicals' are endocrine disruptors with a detrimental effect on children's health. On **page 7**, you can read a recent ESPE statement. Please share it far and wide to spread the word, promote education and call upon others to support ESPE's campaign.

Page 8 gives us a tropical perspective on many diseases of paediatric endocrinology, courtesy of Nishant Raizada. Conditions often present in a similar manner around the globe, but some differences may be observed in hot climates.

Elsewhere in this issue, you can discover opportunities to apply for support, such as the ESPE Clinical Fellowship and the ESPE Undergraduate Achievement Award (**page 3**). As always, you can also stay up tp date about ESPE events, dates and deadlines (**page 10**).

Happy reading! Please complete our **survey** and send us your ideas for future articles.

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Renato Arap/iStock

ESPE 2024

16–18 November 2024
Liverpool, UK

Lifelong endocrine care through collaboration, discovery and innovation

KEY DATES:

Submit your abstracts by **20 May**

Apply for travel grants by **28 June**

Early-bird registration **12 August**

Find out more on **page 9**

YOUR SOCIETY

Don't miss a €20 Amazon Voucher

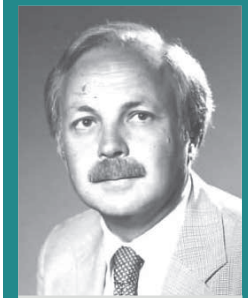
We want to know what you think about your newsletter. This is your last chance to complete our very short survey, with the opportunity to win a €20 Amazon voucher.

Please tell us what you think

View the survey

IN MEMORIAM

Pierre-Claude Sizonenko



Pierre-Claude Sizonenko

We are sad to report the death of Pierre-Claude Sizonenko, Honorary Professor at the Faculty of Medicine of the University of Geneva, Switzerland. He was very active in ESPE and other societies, organising the first joint meeting of the Lawson Wilkins Pediatric Endocrine Society and ESPE in Geneva in 1981. In 1995, ESPE awarded him the Andrea Prader Prize.

You can read his full obituary at **www.eurospe.org/about/announcements/obituary**

GRANTS

ESPE Undergraduate Achievement Award

This award is for scientific achievement in paediatric endocrinology, and is open to all undergraduates (medical and non-medical). Applicants must submit an abstract as first author to ESPE 2024. The six successful candidates will each receive free registration for the meeting and €750 towards their travel and accommodation costs. Given the increasing emphasis on specialisation early in career development, this award is designed to promote interest in our discipline among undergraduates.

Apply by **20 May 2024**

Find out more at **www.eurospe.org/undergraduate-achievement-award**

ESPE Clinical Fellowship

The ESPE Clinical Fellowship promotes the development of patient care, clinical management and clinical research in paediatric endocrinology. Fellowships run for either three or six months and are undertaken at European centres with an outstanding reputation in clinical paediatric endocrinology.

Submit your applications between **1 May–15 July 2024**

Details will be available at **www.eurospe.org/clinical-fellowship**

What the Clinical Fellowship meant for me

Carolina Varotto is based at the IRCCS Istituto Giannina Gaslini, Genova, Italy, and spent her Clinical Fellowship working with the team of Michel Polak and with Athanasia Stoupa at the Hôpital Necker–Enfants Malades in Paris, France. Here, she tells us what the Fellowship has meant for her career.

Carolina Varotto

"I've always been fascinated by paediatric endocrinology, since I've found it to sum up all the paediatric topics. So, it is no surprise that the ESPE Clinical Fellowship has been an incredible opportunity. For three months I was immersed in the clinical routine of the Necker Unit of Endocrinology. Thanks to the strong foundation provided by my internship at Istituto Giannina Gaslini, the experience meant I have encountered two similar, but slightly different, ways of approaching the intricate interplay between hormones and child development. I'm quite sure I'll use all the ideas I've come across, alongside the 'tricks of the trade'. What I do think is enriching is that a paediatric intern like me has had an educational opportunity abroad in the midst of my formation, which will be key in my long term clinical practice."

EVENTS

Apply now!

9th ASPED–ESPE Endocrine Academy

24–27 July 2024, Tunisia

Apply by **10 May 2024**

See **www.eurospe.org/asped-espe-endocrine-academy**

ESPE Summer School 2024

13–15 November 2024, near Liverpool, UK

Apply by **31 May 2024**

Find out more on page 9

ESPE Diabetes, Obesity & Metabolism School 2024

19–21 November 2024, Liverpool, UK

Apply by **7 June 2024**

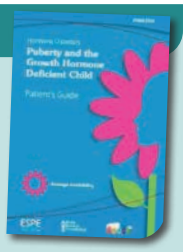
See **www.eurospe.org/diabetes-obesity-and-metabolism-school**

The highly successful **ESPE Winter School** took place on 24–28 February 2024 in Cairo, Egypt.

You can find an insight into the event by Kashan Arshad at **www.eurospe.org/education/espe-schools/winter**

RESOURCES

ESPE patient booklets



Remember that ESPE provides booklets for patients on a range of subjects, in English, Arabic, Dutch, French, Spanish and Ukrainian. We welcome offers to translate into other languages.

See **www.eurospe.org/publications/patient-booklets**

Bringing you recent highlights from the world of research

Fifteen years of iodine prophylaxis in Italy

Iodine deficiency disorders, including impaired thyroid function and goitre, are still prevalent worldwide, despite progress eradicating iodine deficiency using iodised salt. De Angelis *et al.* evaluated the Italian iodine prophylaxis programme, which was implemented in 2005. They undertook a nationwide survey between 2015 and 2019 to assess the programme's efficiency, effectiveness and possible adverse effects.

They found that 71.5% of adults (sample size 164 593) and 78% of school canteens (sample size 998) used iodised salt. Among 4233 schoolchildren aged 11–13 years, goitre was present in 2.2% and thyroid hypoechogenicity in 5.7% (an indirect indicator of thyroid autoimmunity). The median urinary iodine concentration (124µg/l) indicated iodine sufficiency. However, iodine insufficiency was suggested in the newborn population: 5.1% of neonatal thyrotrophin values from screening were >5.0mIU/l, higher than the 3.0% World Health Organization threshold.

Despite 15 years of iodine prophylaxis, there still is concern about iodine nutritional status during pregnancy.

Read the full article at De Angelis *et al.* 2024
Journal of Clinical Endocrinology & Metabolism
https://doi.org/10.1210/clinem/dgad593

How *INS* mutations impact β-cells in permanent neonatal diabetes

Permanent neonatal diabetes mellitus (PNDM) is a rare genetic disease that can be caused by dominant heterozygous mutations of the *INS* gene. Similar to type 1 diabetes mellitus, patients with PNDM require insulin therapy. It is well known that defective insulin processing and secretion are disease pathomechanisms, but how *INS* mutations lead to the observed continued decline of β-cell function after birth is not well understood.

To understand mechanisms driving β-cell failure, Zhang *et al.* examined two pathologic *INS* mutations, using differentiated, human, induced pluripotent stem cells (iPSCs) and embryonic stem cells. They used CRISPR/Cas9 to correct patient-derived iPSCs, so creating isogenic control cells with wildtype *INS*.

They found that defective proinsulin folding, decreased insulin formation and increased endoplasmic reticulum stress in human β-cells with specific *INS* mutations cause a loss of β-cell identity. This contributes to the functional failure of human β-cells observed in PNDM.

Read the full article at Zhang *et al.* 2024
Molecular Metabolism
https://doi.org/10.1016/j.molmet.2024.101879

Air pollution, socioeconomic status and type 2 diabetes

The association between exposure to air pollution and development of type 2 diabetes mellitus (T2DM) has recently been demonstrated in multiple countries. People with lower socioeconomic status (SES) are potentially more susceptible to these risks, due to lifestyle factors that increase chronic inflammation.

Sørensen *et al.* studied the entire Danish population from 2000 to 2017 to determine if the risk of T2DM from air pollution exposure varied depending upon SES. Models for air pollution and SES measures were applied to all addresses and the national patient register monitored all new diagnoses of T2DM.

Of 3 143 705 people aged 30–80 years who were included, 133 647 developed T2DM. This study confirmed earlier findings of a higher risk of T2DM with increasing exposure to pollution (hazard ratio 1.17 [95% CI 1.13–1.21] per 5µg/m^3 $PM_{2.5}$). Associations were stronger in those with co-morbidities and those with lower SES, confirming the authors' concerns.

Read the full article at Sørensen *et al.* 2023
Environmental Health Perspectives
https://doi.org/10.1289/EHP11347

Baricitinib preserves β-cells in type 1 diabetes mellitus

The BANDIT Study Group (Waibel *et al.*) has reported encouraging results with oral baricitinib (a janus kinase or JAK inhibitor) in preservation of β-cells among individuals (10–30 years of age) with new-onset type 1 diabetes mellitus.

In this double-blinded, randomised, controlled trial among 91 patients, 60 received baricitinib (4mg once daily) and 31 received placebo over 48 weeks. At the end of study, the mean mixed-meal-stimulated C-peptide level was 0.65nmol/l/min (interquartile range (IQR) 0.31–0.82) in the baricitinib group and 0.43nmol/l/min (IQR 0.13–0.63) in the placebo group (P=0.001). In addition, the insulin daily dose, glycated haemoglobin, glycaemic variability and glucose time in range favoured baricitinib therapy. There were no additional adverse events compared with placebo.

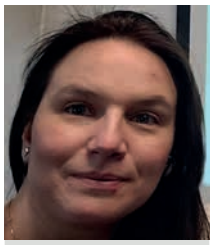
The reported effect size of C-peptide improvement (48% increase compared with placebo) with baricitinib is similar to drugs that were previously found to have favourable outcomes, such as teplizumab, golimumab and low dose anti-thymocyte globulin. This is encouraging, as baricitinib is a daily single dose tablet, whereas the previous drugs were injectable.

Read the full article at Waibel *et al.* 2023
New England Journal of Medicine
https://doi.org/10.1056/NEJMoa2306691

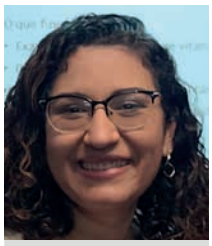
Vitamin D and children

Is playing outside now a luxury, in the context of climate change and new habits?

Helena Ribeiro



Sofia Lizarralde Oliver



Keila Valente de Santana

> *The impact of climate change on radiation levels and on the vitamin D status of populations has not been mentioned"*

Vitamin D is essential for human health and is directly related to climate. For most individuals, ultraviolet B (UVB) radiation from sunlight is its main source. Climatic and geographical elements provide different solar radiation intensities that can lead to different levels of vitamin D production.

Hypovitaminosis D is a worldwide issue, especially in developing countries at high latitudes and in countries where skin exposure to UVB radiation in sunlight is limited.[1] At higher latitudes, solar irradiation in the coldest months may be insufficient for vitamin D synthesis, leading to cases of rickets in children. To address this problem, many countries have adopted vitamin D supplementation, fortification of frequently consumed foods, or dietary recommendations to promote consumption of foods naturally rich in vitamin D. Hypovitaminosis D also results from lifestyles with long periods indoors, inadequate dietary intake, overweight, dark skin pigmentation, advanced age, sunscreen use and covered clothing style.

Reviewing the literature

There is a lack of literature providing scientific support for recommendations on the values and time of exposure to UVB radiation required for adequate vitamin D synthesis, that also takes into consideration age, skin pigmentation, different geographic locations and climate aspects, including local irradiation, without posing a risk for skin cancer.

A recent systematic literature review on the theme[2] indicated scarce studies focusing on children. Sahin *et al.* studied children in Turkey (36°N–42°N) aged 2 months to 18 years. Vitamin D status in children was lower during the late winter and early spring months, and decreased as children got older, marking the beginning of school age.[3] Beyitler *et al.* studied children living in Cyprus (35°N) and found similar results.[4]

Majeed & Moore connected vitamin D status with climate variables,[5] through the prevalence of rickets in the UK, using a historical series of children hospitalised in the country in 1963–2011, and finding a connection between the outcome and climate oscillations. Climate variations, in addition to variation of the seasons, interfere with vitamin D synthesis, and increase rates of hospitalisations due to rickets in the UK as a result of decreasing sunshine hours during the negative phase of AMO (Atlantic multidecadal oscillation).

Climate change and time outdoors

Recently, scientists have become concerned about the implications of climate change for the health sector. Nevertheless, the impact of climate change on radiation levels and on the vitamin D status of populations has not been mentioned. Studies have shown a high prevalence of vitamin D deficiency or insufficiency in locations with sufficient radiation throughout the year for its synthesis,

Ekaterina_Maroly/iStock

such as Australia, Brazil, Cyprus and Hawaii.[2] However, only a few publications recommend sunlight exposure, such as that by Beyitler *et al.*, who recommended that children should spend more time outdoors to benefit from vitamin D synthesis through sunlight.[4]

The prevalence of deficiency/insufficiency is lower in newborn children and increases progressively until adolescence.[3,4] This suggests that the habit of staying indoors for a long time develops from an early age, due to school and study activities, and expands with age. Such data support prescriptions, especially for lower income populations and in countries where vitamin supplementation represents an additional financial burden.

Research into the subject is important because of the growing hypovitaminosis D pandemic, which can result from a lifestyle that discourages external activities, or from the potential risk of climate change, characterised by temperature extremes, which would lead people to remain in artificially conditioned environments.

Children need experiences in nature to fully develop, and the 'nature deficit' is a problem in a society where children are increasingly restricted to indoor environments.[6] Nature-Based Solutions have been pioneered by the International Union for Conservation of Nature (**www.iucn.org/our-work/nature-based-solutions**) to combat the effects of climate change, and nutritional and health spheres should turn to these.

In terms of the contribution of everyday habits as limiting factors for sunlight exposure, it is essential to consider types of housing, school environments, urban design, the presence of green areas and external spaces for coexistence and leisure, safety and suitable routes for walking and/or riding bicycles, along with the time allowed for children to undertake outdoor activities, in order to favour vitamin D synthesis.

Helena Ribeiro, Sofia Lizarralde Oliver and Keila Valente de Santana

Departamento de Saúde Ambiental, Faculdade de Saúde Pública, Universidade de São Paulo, Brazil

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Storing insulin in hot climates

Sanket Pendsey explains a cost-effective solution for insulin storage at home without refrigeration.

Sanket Pendsey

> *"Where home refrigeration is a problem, a water-filled clay pot is an effective and cheap alternative method"*

Among all the developments since insulin's discovery, there has been little focus on its storage and thermostability. As insulin is temperature-sensitive, its potency may go down with rising ambient temperature. For most formulations of insulin, manufacturers and regulatory agencies recommend that it can be stored at room temperature (20–25°C) for up to 28 days and, thereafter, it needs to be discarded.

Few studies have addressed the issue of insulin's thermostability. In 1968, Storvick & Henry showed that animal-derived isophane insulin retained 95% potency when stored at 25°C for 12 months.[1] Likewise, Pingel & Volund in 1972 showed that isophane and soluble insulin formulations retained 95% or more of their potency at temperatures of up to 30°C when stored for up to 5 months.[2] In contrast, however, an Indian study showed loss of potency of human insulin by 28 days when stored at 32–37°C.[3]

So what should individuals do if they live in a tropical climate, where the ambient temperature is usually higher than recommended for insulin storage?

A real world issue – and a practical solution

Families without home refrigeration or a continuous supply of electricity may find it difficult to store insulin as per the guidelines, leading to anxiety about whether insulin is efficacious or not, and resultant poor glycaemic control.

Innovative methods may be used to cool the insulin. For instance, in India, the Dream Trust Clinic in Nagpur (**www.dreamtrust.org**) started to distribute clay pots filled with water to store insulin, which is placed in a watertight, sealed bag. The method works on the principle of evaporative cooling (Figure 1).

Validation of clay pot storage

To evaluate this method, a collaborative pilot study[4] was conceptualised by Graham Ogle from the Australian charity Life for a Child (**www.lifeforachild.org**), along with colleagues from the University of Gothenburg (Sweden), University of Florida (USA) and the Dream Trust Clinic. Nagpur in India was chosen, as it is one of the hottest cities in India, with summer temperatures ranging between 33 and 44°C.

In this study, six different types of human and analogue insulin were stored in the clay pots (Figure 2) and open

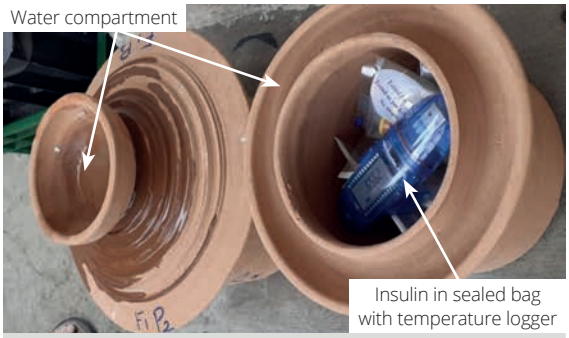

***Figure 2**. Clay pots for insulin storage, evaluated in the study*

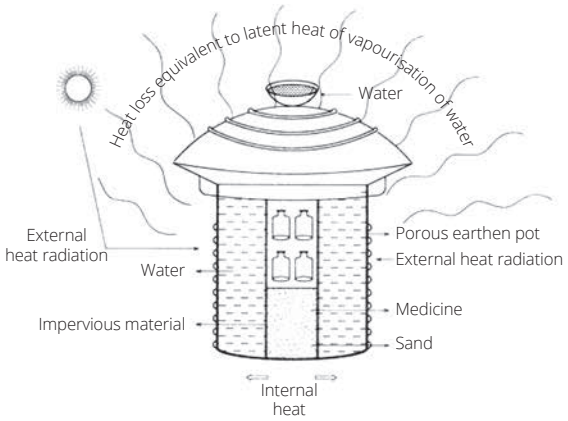

***Figure 1**. Evaporative cooling method in a clay pot.*

boxes in a shaded area inside the homes of six families in Nagpur whose children have type 1 diabetes. The insulin was then analysed at intervals of 1, 2 and 4 months. A control sample was stored in a refrigerator at the Dream Trust Clinic in Nagpur.

The potencies of different insulin samples were analysed by nuclear magnetic resonance spectroscopy at the University of Gothenburg and by high performance liquid chromatography at the University of Florida. Acceptable insulin concentrations were maintained for up to 2 months for all samples of all insulin preparations. At 4 months, all samples from three analogue insulin preparations and from three of four samples for each human insulin preparation also maintained a relative concentration of ≥95%.

Overall, clay pot temperatures were reduced by a mean difference of 0.4–5.7°C when compared with open box temperatures. Findings from our study concur with a recent similar study by Kaufman and colleagues who showed that insulin concentration was preserved for up to 12 weeks at cyclical laboratory temperatures.[5]

Conclusions

Where home refrigeration is a problem, a water-filled clay pot is an effective and cheap alternative method to store insulin. Further studies with larger sample sizes and additional analysis of insulin function and integrity are needed. If the findings are confirmed in larger studies, then regulatory authorities may well loosen the storage guidelines for insulin. Rather than discarding remaining insulin after 1 month of storage at room temperature, insulin could be stored for up to 2–4 months in clay pots. Health professionals would be reassured in advising the usage of such clay pots, the wastage and cost of insulin may come down, and family anxiety may also be reduced.

Sanket Pendsey
Consultant Diabetologist, Diabetes Clinic and Research Centre, Nagpur, India; Managing Trustee, Dream Trust

The insulin thermostability project was a collaborative effort, with contributions from Life for a Child, Australia (G Ogle, S James); University of Florida, Gainesville, FL, USA (TJ Garrett, MA Atkinson); University of Gothenburg, Sweden (AB Nord, D Malmodin, G Karlsson); Queen Silvia Children's Hospital, Sweden (G Forsander), Diabetes Research Education and Management Trust, Nagpur, India (SS Pendsey, SP Pendsey).

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Speaking out against PFAS

ESPE is calling for an EU ban on per- and polyfluoroalkyl substances (PFAS).

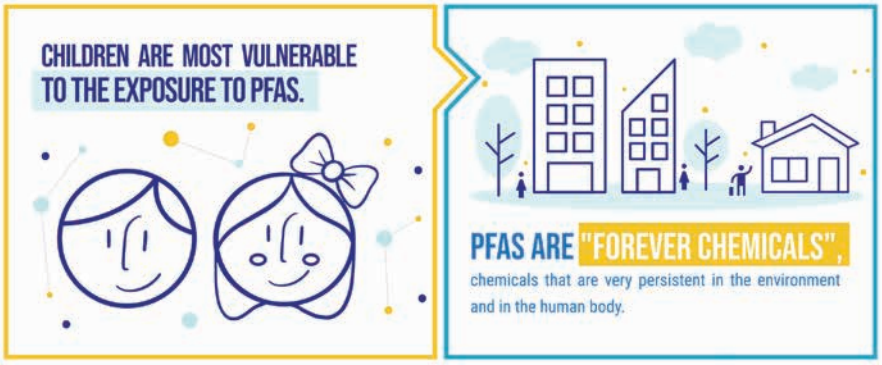
> *Within the next five years, all PFAS in the EU should be phased out entirely, to stop further human exposure and the continuous contamination of our environment"*

PFAS include thousands of synthetic endocrine-disrupting chemicals (EDCs). These persistent pollutants have detrimental effects on human health, especially in children. ESPE recently issued the following statement to persuade EU policymakers and others to address the use of these chemicals.

The detrimental impact of PFAS on children

Existing peer-reviewed studies provide ample evidence for the association between child exposure to EDCs and the onset of numerous illnesses, including endocrine cancer, obesity, disturbed timing of puberty, impaired fertility, neurodevelopment alterations and numerous rare diseases. Exposure is unavoidable, as these synthetic chemicals are present everywhere in our daily life. Children are particularly exposed through the placenta, breast milk, toys, plastic bottles and clothes, as well as the floors babies crawl on.

PFAS are a group of over 10 000 manmade chemicals used as oil and water repellents and coatings for common products, including cookware, carpets and textiles. These EDCs do not break down, or do so very slowly, over many years, when they are released into the environment and into our bodies, and they continue to accumulate over time.



PFAS are 'forever chemicals' – chemicals that are very persistent in the environment and in the human body. They are transgenerational, and can migrate via the placenta from mother to child during the prenatal period. Postnatally, PFAS will be taken up via breastmilk and, later in life, via inhalation of dust or by ingestion of PFAS from drinking water, soil, non-stick coating on pans, food packaging products and food, particularly from fish, fruit and eggs. New research also indicates that PFAS are dispersed through the air over long distances.

As is the case for all EDCs in our environment, children are most vulnerable to the exposure to PFAS. This is because of their breathing space closer to the floor, lower body weight, differences in water and food intake, developing organ systems and longer lifespans during which toxic effects might manifest. Infants especially are extremely vulnerable, as the first months of life are known to be a critical window for the programming of later adiposity and endocrine regulation, neurodevelopment and growth. Higher serum PFAS levels in infants have also been associated with a lower vaccination response. Prenatal exposure has, for example, been associated with the timing of puberty in girls. A recent study showed that nearly 60% of children's textiles labelled 'waterproof', 'stain-resistant' or 'environmentally friendly' contained toxic PFAS.

While decision makers, including those at the EU level, have become more aware of the risks that PFAS pose for population health, ESPE has great concerns that current policies and legislation do not accurately address the specific impact that PFAS and other endocrine disruptors have on children, even before they are born. For example, more should be done to avoid early exposure by focusing on the elimination of PFAS in all food, and other products including cookware, food-contact material, cosmetics, clothing, toys, food packaging and floors. ESPE considers the PFAS restriction proposal recently submitted to the European Chemicals Agency by authorities from Denmark, Germany, the Netherlands, Norway and Sweden as an important first step in the right direction.

The concept of 'essential use' is at the core of the debate on restriction procedures. As outlined in the restriction proposal, as well as in the EU Chemicals Strategy for Sustainability, PFAS should be limited to essential use only. Essential for ESPE means that PFAS should only be employed in those uses that are critical for the functioning of society and where no alternatives are available. Moreover, in principle, only those chemicals that have a relatively short half-life should be used, meaning that the chemical leaves the human body relatively quickly after exposure. Perfluoro-octanoic acid and perfluoro-octane sulfonate, for example, do not meet this criterion.

Within the next five years, all PFAS in the EU should be phased out entirely, to stop further human exposure and the continuous contamination of our environment.

In addition to better policies and more stringent regulations, more research is needed to investigate the immediate and long term effects of PFAS and other EDCs on the development of children from fetus to young adult, particularly the impact on the endocrine system. This is essential to better protect and, where possible, mitigate current and future adverse health effects with lifelong impact. Better tailored policy making, and an improved understanding of the risks posed by PFAS in children, are crucial to establish a safer environment for our children and society in general.

Help now by sharing the ESPE statement

This link takes you to the fully referenced version of the ESPE statement, for you to share.

Paediatric endocrinology: a tropical perspective

The spectrum of disease in the tropics may be similar to the rest of the world, but Nishant Raizada describes some unique aspects.

Nishant Raizada

> *In India, the prevalence of vitamin D deficiency in infants may be as high as 88%"*

Disorders of puberty

Secular trends in the onset of puberty, as seen in the Western world, are now beginning to become apparent in the tropics. Data from various tropical countries show a decline in age at thelarche and menarche; girls with higher body mass index appear to be more affected.[1]

Delayed puberty is often seen, with the most common causes being systemic illnesses and malnutrition. Constitutional delay in growth and puberty (CDGP) is another common cause. Distinguishing between CDGP and hypogonadotrophic hypogonadism is often difficult. A lack of previous height measurements compound this problem.

Precocious puberty appears to be less common, but it may be being underdiagnosed or under-reported. The usual causes of precocious puberty are seen in the tropics as well. However, undiagnosed congenital adrenal hyperplasia is the most common cause of peripheral precocity, hinting at the lack of neonatal screening. After the COVID-19 lockdown, there may have been a spike in cases of central precocious puberty, as reported in one study from India.

Short stature

Short stature is a common complaint in paediatric endocrine clinics. Malnutrition and systemic illnesses contribute to the bulk of the cases. Turner syndrome, Noonan syndrome, achondroplasia and idiopathic short stature are among the rarer causes reported in tropical regions.

Pituitary disease

The common pituitary disorders reported in tropical areas include craniopharyngiomas, growth hormone (GH) deficiency, pituitary adenomas (including prolactinomas) and Cushing's disease. Craniopharyngiomas are common, suprasellar tumours that often present with features of hypopituitarism. Incomplete surgical resection and the need for radiotherapy are frequent – ostensibly due to late detection.[2] GH deficiency (isolated or in combination with multiple pituitary hormone deficiencies) can be seen in paediatric endocrine clinics in the tropics.

Pituitary tumours are reported less often, with corticotrophinomas and somatotrophinomas predominating.[3]

macky_ch/iStock

Bone disorders

Vitamin D deficiency and nutritional rickets are rampant in tropical areas. Despite abundant sunlight, issues such as hot weather, dark skin, social factors and genetics underlie the high prevalence of this deficiency. In India, the prevalence of vitamin D deficiency in infants may be as high as 88%.[4] Countries close to the Equator may have lesser vitamin D deficiency.

The problem of vitamin D deficiency is compounded by low calcium intake, which is particularly common in patients from low socioeconomic strata. Advanced rickets with skeletal deformities can still be found in many tropical countries. Although treatment is simple, compliance with treatment remains a challenge in many places.

Other paediatric bone mineral disorders, such as renal tubular acidosis, primary hyperparathyroidism, X-linked hypophosphataemic rickets and idiopathic tumoural calcinosis, have all been reported in tropical countries.

Thyroid disorders

It is unfortunate that, despite extensive research, universal screening for congenital hypothyroidism is not present in most tropical countries. The prevalence of congenital hypothyroidism in India is estimated to be one in 1000–1500 births. A large number of children therefore spend their lives with the morbidity related to this condition.

Iodine deficiency disorders were the most common cause of thyroid disorders in the tropics, but several countries have launched iodine fortification programmes in the past few decades. A few underprivileged nations still face iodine deficiency disorders.[5]

Acquired hypothyroidism is now mostly autoimmune in the tropics, as is the case in the rest of the world. However, many cases remain undiagnosed or are diagnosed late for reasons of poverty, a dearth of trained doctors and limited access to laboratory facilities. Van Wyk–Grumbach syndrome (untreated hypothyroidism, short stature and isosexual precocious puberty) is often reported in tropical countries.

Presentation of paediatric hyperthyroidism and paediatric thyroid cancer appear to be similar to what is seen in the rest of the world.

Adrenal disease

The notable adrenal disorders are congenital adrenal hyperplasia (CAH), adrenal insufficiency, adrenal Cushing's syndrome and phaeochromocytoma–paraganglioma. Data from India suggest a prevalence of CAH of 1 in 576 births identified by newborn screening (NBS). However, as NBS is not being performed, >80% of cases are diagnosed when they present with adrenal crisis.[6] Even after diagnosis, the management is challenging, with poor follow-up and adrenal rest tumours being potential problems.

Differences of sex development (DSDs)

Children with DSDs often present at older ages, due to a lack of awareness and a shortage of endocrine facilities. Common causes of 46,XY DSD in the tropics are 5α-reductase deficiency, androgen insensitivity syndrome and gonadal dysgenesis. The spectrum of 46,XX DSD is dominated by CAH (21-hydroxylase deficiency), with ovo-testicular DSD and vaginal atresia being the other significant contributors.

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