

AKHBAR : THE STAR
MUKA SURAT : 4
RUANGAN : HEALTH

4 Health

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THE STAR m/s 4 Health 2/2/2025 (AHAD)

SEPSIS is an underestimated killer.

Nearly a quarter of patients treated for sepsis in hospital will die, but because so many different illnesses can predispose patients to experiencing it, it's overlooked as a direct cause of death.

Yet approximately 20% of deaths worldwide are caused by sepsis, and currently we have no treatments that tackle it directly.

Now researchers writing in *Frontiers in Science* explain how systems immunology can help us understand and treat sepsis – and how this could cut the death toll of future pandemics, no matter what disease causes them.

"We need to adopt a concerted approach to tackle sepsis," said Professor Robert Hancock of the University of British Columbia, Canada, the lead author of the article.

"Only a very small amount of funding is currently invested in sepsis research and product development – and yet sepsis is as prominent a cause of death as heart disease and cancer, and the major cause of death in pandemics."

Precision medicine for sepsis

One of the reasons it's so hard to understand and treat sepsis is that it is multifaceted.

Sepsis arises when the immune system fails to control an infection and malfunctions, causing multi-organ failure.

Many different infections can cause sepsis, and its symptoms and progression vary between patients and over time in the same patient.

Its early symptoms are similar to those of many other illnesses, which makes it difficult to diagnose quickly and initiate timely treatment, contributing to high mortality.

Systems immunology offers a potential solution to this diagnosis problem by using mathematical and computational modelling to study the immune system in the context of all the

Preventing future pandemic deaths

Sepsis is deadly because it varies greatly between different patients, and within individual patients over time, making it hard to diagnose and treat effectively.



From data published in 2020, there were 48.9 million cases and 11 million sepsis-related deaths worldwide, representing 20% of all global deaths. — dpa

body's other systems.

It does this by using different types of clustering analysis to identify patterns in large volumes of omics data, ranging from transcriptomic data (what genes show altered expression) to proteomic and metabolomic data – that tell us about the body's reaction to its physical circumstances, in this case sepsis, in incredibly fine-grained detail.

These patterns help us work out the patterns and basis for the immune dysregulation that

drives sepsis, come up with new hypotheses that we can research and use to develop new treatments, and identify diagnostic markers that we can use to catch sepsis early.

For instance, using these clustering analyses, scientists have identified changes to gene expression that act as early warnings for sepsis.

They've also been able to identify five different subtypes of sepsis which are caused by different kinds of immune dysregu-

lation and have different prognoses.

In future, we could build on these advances to diagnose different subtypes of sepsis earlier and treat them with the right drugs when we do.

However, systems immunology analysis is not yet in widespread use, because it is expensive and demands significant volumes of data – so we don't yet know how these diagnostics could translate into clinical results.

The researchers call urgently for targeted funding and greater data availability.

"In sepsis, we lack the depth of information required to enable more effective systems immunology and machine learning approaches," said Prof Hancock. "We hope to encourage the development of large, in-depth omics-oriented patient studies that will trigger a new generation of insights."

Future treatment

Successfully treating sepsis would be a multipurpose life-saver, preventing mortality regardless of the illness that triggered it.

Viral sepsis is a major cause of deaths triggered by severe Covid-19, while many deaths in historical pandemics like the 1919 influenza pandemic and the bubonic plague are thought to have resulted from sepsis.

If we can tackle sepsis, we might be able to protect ourselves against the worst consequences and the highest death tolls in future pandemics, no matter what kind of infection causes them.

Since immune dysregulation linked to sepsis can linger, causing symptoms similar to post-viral syndromes like long Covid-19, learning to treat this could also benefit some chronic illness patients.

But to make this happen, the researchers caution, more funding and larger studies will be needed.

"The omics methods that underlie systems immunology are relatively expensive on a per patient basis," said Prof Hancock.

"It will require a concerted drive from stakeholders to generate the data needed for further insights.

"We need to invest in larger omics studies of patients, develop new animal and organoid models that reflect sepsis heterogeneity, and invest in early diagnostics for sepsis and treatments that correct or supplement defective immunity in sepsis patients."

AKHBAR : THE STAR
MUKA SURAT : 2
RUANGAN : HEALTH SNIPPETS

THE STAR m/s 2 Health Snippets 2/2/2025 (AHAD)

MICRONUTRIENT deficiency, whereby levels of vitamins and minerals essential for healthy bodily function are far too low, is common in people with type 2 diabetes, finds a pooled data analysis of the available evidence, published in the open access journal *BMJ Nutrition Prevention & Health*.

A lack of vitamin D is the most common “missing” micronutrient overall, the findings indicate, with women at greater risk than men of these deficiencies, dubbed “hidden hunger”.

Genetic predisposition, various environmental factors, sedentary lifestyle, an unhealthy diet and obesity are risk factors for the disease, explain the researchers.

And previously published research suggests that micronutrients have a key role in the development of type 2 diabetes, by potentially affecting glucose metabolism and insulin signalling pathways.

In a bid to try and quantify the global prevalence of micronutrient deficiency in people with the condition, the researchers scoured research databases for relevant studies, with the aim of pooling the data.

Their analysis included 132 studies, involving 52,501 participants, and published in several languages between 1998 and 2023. With the exception of three studies, the rest were hospital-based.

Vitamin D deficiency common in type 2 diabetes

The pooled data analysis showed that the prevalence of micronutrient deficiency (vitamins, minerals and electrolytes) among people with type 2 diabetes varied around the world, possibly because of diverse dietary habits, lifestyle choices and cultural practices, suggest the researchers.

But, overall, the global prevalence was 45% – 40% in those with complications of their disease.

A very low level of vitamin D was the most common micronutrient deficiency, affecting 60.5% of those with type 2 diabetes.

But magnesium deficiency was also common, affecting 42%, while the prevalence of iron deficiency was 28%.

The global prevalence of B12 deficiency was 29%, and higher, still, among patients taking metformin.

Further stratification of the pooled data showed that prevalence was higher in women with the condition than in men at nearly 49%, and highest among patients in the Americas (54%).

Most of the included studies were cross sectional, making it difficult to establish causality, nor was it clear whether the micronutrient deficiency preceded poor glycaemic con-

trol or was a consequence of it, caution the researchers.

And as there are no valid population based studies looking at micronutrient deficiency, it’s impossible to draw comparisons between patients with type 2 diabetes and the general population, they add.

“This systematic review exemplifies the double burden of malnutrition in action, whereby nutritional deficiencies and diet-related non-communicable diseases, such as type 2 diabetes, co-exist,” comments Shane McAuliffe, visiting senior academic associate, NNEdPro Global Institute for Food, Nutrition and Health, which co-owns the journal.

“The treatment of type 2 diabetes often tends to focus on energy metabolism and macronutrients, but the identification of a higher prevalence of specific micronutrient deficiencies in those affected is a reminder that optimising overall nutrition should always be a priority.

“The findings should help to focus research and policy initiatives aimed at furthering our understanding of the causes and effects of these deficiencies and the potential for targeted and tailored interventions.”