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Hello and welcome to the Health Hits podcast.

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This time we are covering the mysterious but often deadly condition of sepsis.

Its not an infection as such, more the body's response to serious infection and last year it led to 44,000 deaths in the UK alone.

We'll look at how the immune system normally responds to infection and what goes wrong in sepsis. As well as looking at what the early signs are so we can get help quickly, and what healthcare providers can do to try and treat it.

I'm your host Tom Fisher, I'm a medical doctor in the UK, and in these podcasts we take a journey through modern medical problems as well as exploring their roots in the past and the possible future they have in store for us.

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So lets get started.

First off we should think of sepsis as being like an over reaction to infection across the whole body. Its often not the infective bacteria or virus that is doing most of the damage in sepsis, but rather the damage that our own immune system is doing to our body in this state.

If an infection is localized to one small area then the immune system works very well. It has evolved over millions of years to isolate infection and clear it, and it does it well, but it blindly follows certain chemical instructions that in certain circumstances can provoke the damaging sepsis response.

Lets look at one example of a localised infection or injury.

Imagine what happens when you get a scratch on your arm or leg. Initially there is a bit of bleeding, but this is quickly stopped by clotting factors and clotting cells called platelets coming together to form a clot that blocks holes in blood vessel walls.

The damaged cells release chemical markers or cytokines which provoke an inflammatory response.

You may notice that around the wound it's a little bit red or pink. This is due to these locally released chemicals encouraging local blood vessels to dilate and bring more blood to the surface of the skin. And in that blood, are nutrients and immune cells necessary for wound healing and killing off infection.

If you pick the scab off a wound, like we all did as kids, you may notice the area underneath has a clear or yellowish fluid. This is fluid, rich in those nutrients and immune cells, which has deliberately leaked out of the blood vessels due to the action of the inflammatory chemicals, the cytokines, on the blood vessel walls.

This is how the body responds to a local injury or infection, whether it is in the skin, the waterworks, the lung, the gut.

It normally goes on for a number of days and results in any infection clearing and any damaged tissue being repaired.

What can sometimes happen is that the infective bacteria can spread beyond the local site and get into the bloodstream. This is known as bacteraemia. You can imagine that this would again trigger release of inflammatory chemicals, but because the bacteria is no longer localised to one area, they are released throughout the whole body.

And this is where things start to go wrong, this is where sepsis starts.

The system wide or systemic release of cytokines may provoke high or low temperature. It may result in shakes or shivers known as rigor. You may also notice the heart rate and breathing rate go up.

These can be subtle signs and people sometimes chose to ignore them. But symptoms like this, in someone with a known source of infection should be taken very seriously.

As we covered, the cytokines can provoke blood clots to form and if they form within the blood vessels they can travel to the organs such as the lungs or the kidneys and start to block them up. Essentially forming a dam that prevents proper blood flow to these organs and causing them to fail.

When blood flow is blocked to the extremities, the arms and legs, it can lead to ischaemia or death of the downstream tissues. Often resulting in amputations.

When there is evidence of an organ starting to fail, it is known as severe sepsis.

Patients will often start to get drowsy or confused at this stage, they may have very cold hands or feet, they may produce less urine despite drinking due to the beginnings of kidney failure.

If the underlying infection is untreated then cytokines continue to be released into the bloodstream. They can have a further effect on blood vessel walls. Making them more porous and allowing fluid to leak out. This can result in fluid building up in tissue, commonly in the lungs or legs known as oedema.

In that earlier example of localised infection, blood vessels dilate and so bring more blood to the injured area, turning it reddish. In the sepsis response this can happen to every blood vessel in the body, resulting in a massive drop in blood pressure. We call this septic shock.

Listen to episode 2 on blood pressure at www.HealthHits.info to find out more.

Septic shock is the worst form of sepsis and often the blood pressure will not come up despite litres of intravenous fluids. The cytokine effect on the vessel walls often causes the fluid to just leak out, and the organs themselves are failing. Patients this ill will be on the Intensive Care Unit by this stage but between a quarter and a half will not survive, and those that do are likely to have life-changing damage.

The key thing about sepsis is being aware of its possibility. Anyone with an infection of any kind with changes of heart rate, breathing rate, temperature, shakes, drowsiness, cool peripheries, blue lips in infants, should all be seen quickly by a doctor.

There is excellent guidance for patients available on NHS Choices, and last year NICE, the National Institute for Health and Care Excellence started a campaign to raise awareness of sepsis amongst health professionals and introduced new guidelines.

What is good about these NG51 guidelines is that they include values for heart rates, blood pressures, temperatures that would be concerning for adults and children of different ages. Normal values for these readings are totally different for different ages and so they really help clinicians work out whether a child is well or at risk of sepsis.

Early treatment with antibiotics and fluids can save lives and so there has been a big push in the UK and around the world from people like the UK Sepsis Trust and World Sepsis Day to try and raise awareness for patients and doctors alike.

Although sepsis can affect anyone, the immature immune system of very young children makes them particularly vulnerable.

When I was working in paediatrics we admitted a toddler sent in by the GP due to fever and a fast breathing rate. To look at the child was fine, looking around the room, playing. He was up on the examination couch whilst we were working out how we were going to get a blood sample when he suddenly became pale, cold, and his skin became very mottled. He became floppy and less responsive. All over the course of about 30 seconds. I had never seen anything like it.

We got a line in and gave him fluids and IV antibiotics and he was fine. But if he wasn't there in the hospital, if his GP hadn't identified the early signs of sepsis, he may well have had serious or even fatal complications.

It highlights how quickly sepsis can develop and how important it is for doctors and the general public to be aware of what it is, and what to do if it's suspected.

If you would like to find out more about the materials I have mentioned in this episode, ask questions, or request topics for future episodes, come and find us at www.HealthHits.info or on Twitter or Facebook @HealthHitsPod.

Thank you so much for listening, and please join me for another, episode of Health Hits.