University of Basel

Allergies: When the Immune System Backfires

Video Transcript

A king eating strawberries

GLOUCESTER: My lord of Ely!
BISHOP OF ELY: My lord?
GLOUCESTER: When I was last in Holborn, I saw good strawberries in your garden there. I do beseech you, send for some of them.
BISHOP OF ELY: Marry and will, my lord, with all my heart.

[Andreas J. Bircher]: The dialogue you just heard is part of scene four, act three in Shakespeare's Richard the Third. The scene reveals appearances to be treacherous. In the end, the Duke of Gloucester soon to become King Richard the Third sends Hastings, who thought him a friend, to the block. This ties in wonderfully with what a Renaissance audience would have seen in strawberries. It was understood as a symbol that includes two contradicting aspects. On the one hand, the fruit suggested virtue and honesty, as it was believed to grow in paradise. At the same time, it also stood for temptation and sensuality. The scene we heard unfolds to show how certainties are lost and how apparent friends become foes. Having presumably eaten the strawberries, the duke returns ailing in many places.

GLOUCESTER: Then be your eyes the witness of this ill: See how I am bewitched? My arm like a blasted sapling wither'd up. And this is Edward's wife, that monstrous witch. Consorted with that harlot strumpet Shore and with her witchcraft thus have marked me.

[Andreas J. Bircher]: Sir Thomas More writes after Richard's death in his history of King Richard the Third that such an incident did indeed take place. One hour after having eaten the strawberries, Richard returned, exhibiting strange symptoms. He had a skin rash on his arm that he was chafing and he was chewing his lips. At that time and place, people might have suspected poison provoking such manifestations. The effects of spoiled food or poison that was administered deliberately and with criminal intent were well-known. However, the respective symptoms were also often attributed to witchcraft. Would Richard with his aches visit a modern doctor, he may possibly be diagnosed as suffering from a nettle rash or urticaria due to an allergy to strawberries.

Today, more than half a millennium after King Richard and Shakespeare, we grasp allergies as diseases with complex mechanisms. Our course focuses on this fascinating topic. You will explore the workings of our immune system in order to understand the processes involved in allergies. However, sometimes comprehension is deepened, if we do not only address what we understand today, but also investigate the steps that led to this understanding. Thus, we will also peak at medical history. Vaccination as a means to prevent infection was, for instance, studied in Europe towards the end of the 18th century only. The term allergy was first coined by Clemens von Pirquet in the early 20th century, when observing unexpected reactions from vaccines.

But let us go back to our royal patient. According to Thomas More's account, he suffers from severe itching, circumscribed redness, and swelling of the skin. Maybe his symptoms included swelling of his lips and of his oral cavity, which might make breathing difficult. The swelling of the skin are commonly called wheals or hives. They are similar to those provoked by a contact with nettle leaves. Our patient thus

experiences a nettle rash, or urticaria. Urticaria and the closely related angioedema, or Quincke's edoema are frequent conditions they affect up to 15% of the people at one time in the life. The condition is often short lived. However, it may recur, and in some rare cases, it may even become chronic. Urticaria may be provoked by an allergy to a bee sting, food, or to a drug. This is even more probable if a patient suffers an acute onset that is accompanied by symptoms of the lung, heart, or gut. On the other hand, other forms of urticaria may be triggered by common infections. Even physical stimuli, such as scratching, pressure, effort, or cold water, may elicit a non-allergic urticaria in some individuals. On a cellular level, virtually all forms of urticaria have a similar mechanism. Mast cells are activated. Mast cells are part of a very important first-line defence in our immune system. They are found as well in the skin, as in the mucosas of the gut, the nose, and lungs. Mast cells are activated by manifold stimuli. They then release messenger substances, such as histamine. This mediator provokes the symptoms, wheals, swelling, and sometimes even contribute to severe breathing problems, abdominal cramps, and the collapse of circulation, the so-called anaphylaxis. This may lead to shock and even death.

So, we may conclude that Richard the Third probably suffered from an urticaria provoked by an allergy to strawberries. Theoretically, at this point, the king could have consulted the Professor of Medicine, Wernher Woelfflin, at the University of Basel founded in 1460. At that time, his ailments might have been explained as a strange disbalance among the four body humours, blood, yellow bile, black bile, and mucus, a so-called idiosyncrasy.

Nowadays, we know much more about the immune system, its various elements and functions, and the manifold allergic diseases it can cause. We have powerful diagnostic tools and effective anti-allergic treatments. However, there are still secrets to be solved, and the causes and mechanisms of some allergies remain mysterious. I am looking forward to explore with you the fascinating field of allergology. We shall address the manifold allergic reactions to countless allergens that can occur in patients. So, let us start.