Study finds significant 'post-COVID' resurgence in invasive meningococcal disease

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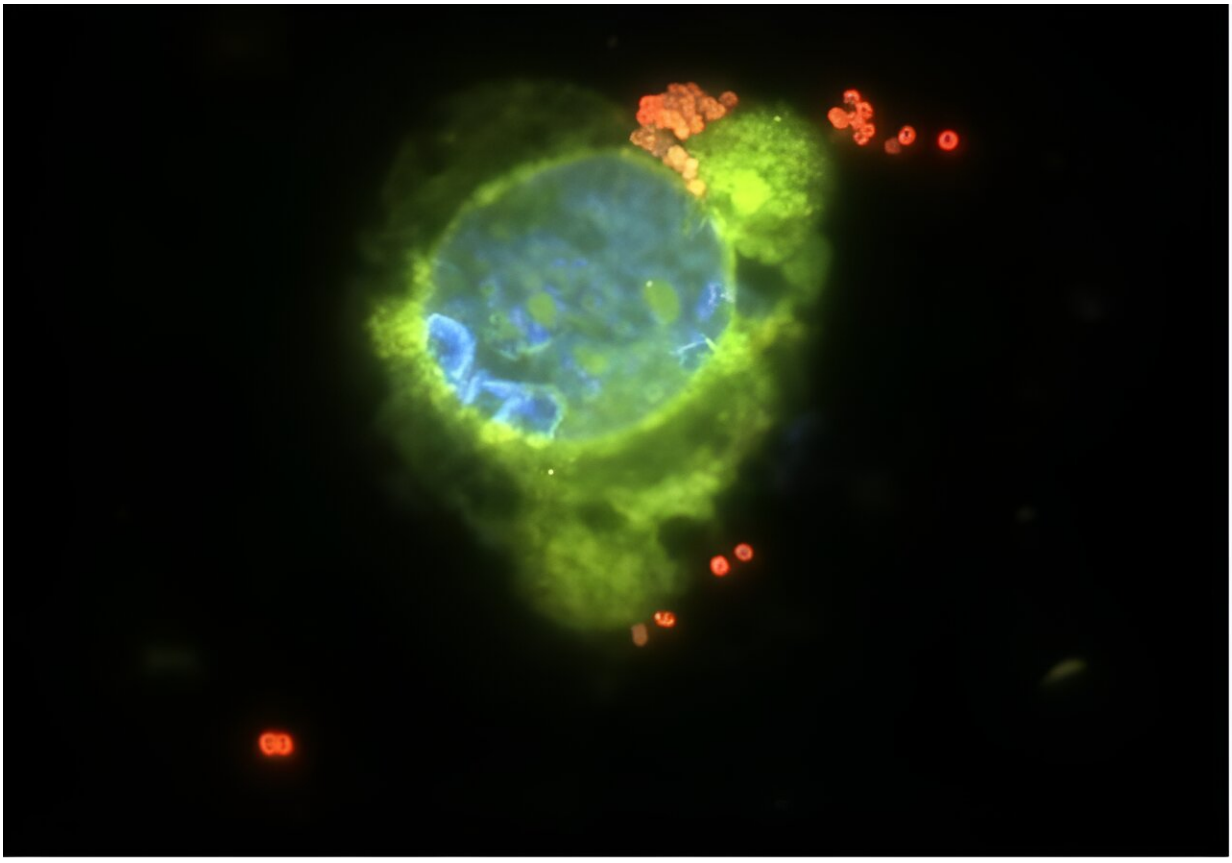

Neisseria meningitidis bacteria (in red) binding to the surface of an epithelial cell (nucleus in blue) infected with influenza virus (viral neuraminidase in green). Influenza infection facilitates diplococci binding to the cell surface. Fluorescence microscopy. Credit: Institut Pasteur/ Muhamed-Kheir Taha Invasive Bacterial Infections Unit

A team of scientists from the Institut Pasteur has used the database of the National Reference Center for Meningococci to trace the evolution of invasive meningococcal disease cases in France between 2015 and 2022, revealing an unprecedented resurgence in the disease after the easing of control measures imposed during the COVID-19 epidemic.

Recently reported cases have mainly been caused by meningococcal serogroups that were less frequent before the pandemic, and there has been a particular uptick in cases among people aged 16 to 24. The results, published in the *Journal of Infection and Public Health*, should help guide adaptation of the vaccine strategy for this fatal disease.

During the COVID-19 epidemic, health and hygiene measures like wearing masks and social distancing had a positive impact on respiratory infections. This was the case for invasive meningococcal disease (IMD), with the number of infections falling by more than 75% in 2020 and 2021. But what would happen at the end of the pandemic, when the protective measures were eased?

"During the COVID-19 pandemic, two theories emerged," explains Muhamed-Kheir Taha, co-lead author of the study, Head of the Invasive Bacterial Infections Unit and Director of the National Reference Center for Meningococci at the Institut Pasteur. "The first was that this positive effect would last and that meningococci would stop circulating over the long term. The second was that there would be a rapid resurgence in bacterial activity among a naive population that had not come into contact with the bacteria for a long time."

A team of scientists from the Institut Pasteur therefore decided to conduct a detailed study of the evolution of the disease between 2015 and 2022, and they confirmed the second hypothesis.

Using samples from the National Reference Center for Meningococci,

which has recorded all cases of IMD in France since 1980, the scientists were able to look back over the pandemic period. The first observation was clear.

"There was an unprecedented resurgence in invasive meningococcal disease in autumn 2022, and now, in autumn 2023, the number of cases is higher than in the pre-COVID-19 period," says Samy Taha, first author of the study and a scientist in the Institut Pasteur's Invasive Bacterial Infections Unit. Compared with a total of 298 cases recorded between January and September 2019, 421 cases have already been recorded between January and September 2023—a rise of 36%, even though the winter peak has not yet arrived.

The figure for the same period in 2021 was 53 cases. There are two main explanations for this: general immunity was weaker because strains were circulating less, but there was also a decrease in vaccination, with meningitis C vaccination falling by 20% during the first lockdown, for example. So the population has become naive when faced with bacteria that are constantly evolving—the bacterial genome is highly variable.

"Since the pandemic, there has been a particular resurgence in meningococcal serogroups W and Y compared with the other serogroups," continues Ala-Eddine Deghmane, co-lead author of the study and Deputy Director of the National Reference Center for Meningococci at the Institut Pasteur. "And although all age groups are concerned, we found that those most affected by this new wave of meningitis are young people aged 16 to 24."

In other words, the meningococcal bacterial strains responsible for IMD today are different from those that were circulating before the pandemic, and they target different age groups. "It is almost as if the COVID-19 epidemic has reset the entire system," says Samy Taha.

This resurgence in meningitis could gather momentum in the coming months with the effect of seasonal influenza. The influenza virus creates a favorable context for the development of meningococcal bacteria. All mass gatherings can be a risk factor for infection in general, and especially for IMD.

In France, only meningitis C vaccination is mandatory; vaccination for meningitis B is merely recommended in infants. But there are not yet any recommendations in the general population for serogroups Y and W. The scientists are therefore in contact with the French National Authority for Health to help adapt the future vaccine strategy.

"If the quadrivalent meningococcal vaccine for serogroups A, C, Y and W were to be recommended for adolescents, it would provide direct protection for them and also indirect protection for other categories of the population," explains Ala-Eddine Deghmane. Adolescents are the main healthy carriers of meningococci. "We must remember that without treatment, the mortality rate for bacterial meningitis is virtually 100%. Even with proper treatment, there is still a 10% mortality rate. So vaccine prevention is crucial," concludes Muhamed-Kheir Taha.

More information: Samy Taha et al, The rapid rebound of invasive meningococcal disease in France at the end of 2022, *Journal of Infection and Public Health* (2023). DOI: 10.1016/j.jiph.2023.10.001

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