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Intelligence

Artificial intelligence successfully predicts toxic algae in UK seafood

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By Responsible Seafood Advocate

Using molecular biology-based approach with artificial intelligence can predict a rise in toxic algae at least four weeks earlier than established methods

The National Oceanography Centre (NOC) has developed a new scientific approach to be used alongside artificial intelligence (AI) to test for toxic algae that can result in severe and fatal sickness in humans. The method can predict a rise in toxic algae at least four weeks earlier than the microscope method.

The study, which was published in ***Harmful Algae (https://www.sciencedirect.com/science/article/pii/S1568988323001233)***, highlights the benefits of using the new methods to predict harmful algal blooms in marine populations, designed to enable local authorities to mitigate the risks to both people and wildlife.

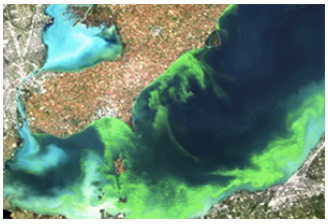
NOC scientists tested water over a six-month period from September 2021 until March 2022 in St Austell Bay in Cornwall, renowned for its production of oysters, mussels and clams and is a well-known hotspot for toxic marine algae. The plant periodically blooms near seafood production areas, which can lead to the potential contamination of seafood. If this is consumed, it can result in debilitating and sometimes fatal syndromes that attack the gut and nervous system.

Molecular biology-based approach with artificial intelligence can predict a rise in toxic algae weeks earlier than the microscope method. Photo courtesy of The National Oceanography Centre.

Working in collaboration with Cornwall Port Health Authority, the University of Glasgow, the University of Exeter and the Centre for Environment, Fisheries and Aquaculture Science (Cefas), scientists tested water for the DNA of a species called *Dinophysis accuminata* in three seafood production sites: Porthallow, Mevagissey and Ropehaven. *Dinophysis* produces a toxin called okadaic acid, which attacks the digestive system and can cause severe pain and sickness.

The standard method of identifying this toxin involves the observation of water samples under a microscope and using a very skilled “taxonomist” to identify the toxic cells and count them. This approach is time-consuming and expensive, so NOC adopted new methods: using molecular biology to identify and count genetic sequences in a fraction of the time and with far greater sensitivity and accuracy.

Can machine learning using climatic pattern data help predict harmful algal blooms earlier?



Study shows that a novel machine-learning approach using global climatic patterns can improve seasonal prediction of harmful algal blooms.

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“We’re embracing the move to genetic testing methods coupled with AI, as it’s an incredibly important scientific tool that can help UK businesses mitigate health risks in seafood production,” said Dr. Jonathan McQuillian, a molecular biologist at NOC. “This is the first example of this approach being used alongside the UK’s statutory algal surveillance program, and this breakthrough further pushes for the adoption of DNA testing in early warning systems.”

This new molecular biology-based approach has enabled NOC’s team to identify the same trend as the microscope-based method and was able to predict a rise in toxic algae at least four weeks earlier than the microscope method. The molecular testing was used to inform the validity of an AI-based model for predicting *Dinophysis* blooms, developed by the University of Glasgow and the University of Exeter.

“DNA testing is still relatively new technology with clear advantages over traditional microbiological testing methods, which should reassure the public that the stringency and standards of testing food and water supplies for harmful microbes are utilizing the very latest technology,” said McQuillian.

Further development of these methods, particularly their integration with ocean-deployed sensors or handheld testers, will revolutionize the way in which the UK monitors biohazards, not just in the marine sector, but also across healthcare, military, and industrial industries.

Read the full article here (https://www.sciencedirect.com/science/article/pii/S1568988323001233).

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