

Marion Koopmans—preparing for the next pandemic

Marion Koopmans wants the world to be ready for whenever the next pandemic strikes. She has helped launch the Pandemic & Disaster Preparedness Center (PDPC), a multi-centre collaboration initiated by Erasmus Medical Center, Rotterdam, the Netherlands, where she has, since 2013, been head of the Department of Viroscience. “The PDPC is focusing not only on infectious diseases but also how these intersect with the climate change that causes sea-level rises, extreme weather events, and complex ecological and societal effects, all to prepare for future disease outbreaks and health threats”, Koopmans told *The Lancet Infectious Diseases*.

The animal-loving Koopmans studied and trained to be a vet at Utrecht University, enjoying both the science and working out what was wrong with the animals. But she found veterinary practice at times frustrating because owners would only spend so much on a problem. She then focused on virology when a veterinary professor offered her work in a lab studying coronaviruses. Koopmans had no idea the relevance this would take on later in her career.

She later completed her PhD on the epidemiology of toroviruses, then studying them at the US Centers for Disease Control and Prevention (CDC) in Atlanta, GA, USA. At the US CDC, she researched viral gastroenteritis and gained experience in many other infections before returning to the Netherlands to accept a job as principal investigator in gastroenteritis in the National Public Health Institute (RIVM) in Bilthoven. She set up collaborative research programmes on enteric viruses to better understand foodborne disease outbreaks. She later led the public health laboratory response, her remit expanding to include surveillance programmes, diagnostics, and preparedness research.

The 9/11 New York attacks meant Koopman’s team was on guard for biological attacks—essentially another form of emerging disease preparedness. In 2003, she led the laboratory response to one of the largest avian influenza virus (H7N7) outbreaks that also involved humans. This, her first One Health investigation, involved over 240 farms and a continually evolving virus occasionally spilling over to humans. She also led on preparing diagnostics for the original severe acute respiratory syndrome-associated coronavirus outbreak, also in 2003.

Koopmans was also part of international efforts to research MERS-CoV, which emerged in 2012. A Spanish colleague gave her team access to a flock of Spanish camels, and to their shock, most of these animals had antibodies against MERS-CoV. They then worked with the Qatari Government to identify camels as a reservoir for MERS-CoV. When Ebola virus disease hit west Africa in 2014, Koopmans coordinated the deployment and operation of three mobile labs to support local non-governmental organisations. And when

SARS-CoV-2 arrived, her team reacted quickly, collaborating on developing some of the first PCR and serology assays for SARS-CoV-2. They also discovered that this new coronavirus was causing havoc in the mink farm populations of the Netherlands, all of which were eventually culled due to the risk of mutations and mink-to-human transmission. The recent discovery that SARS-CoV-2 is circulating in deer in the USA leaves Koopmans concerned: “This is a warning sign this virus is not done yet”.

She also formed part of the WHO delegation to China investigating the origins of the pandemic, dealing with huge global expectations while confronting realities on the ground. “We can’t just go in demanding data or announcing an inspection on a scientific mission”, she explains. “Also, it takes time to build bridges with our Chinese colleagues, who were really quite happy to debate all the studies we had asked them to do. However, as we were being continuously monitored, it was hard to make these personal connections. I really considered this as the first step in a process. Unfortunately, the next step did not happen.”

A recent preprint analysis, co-authored by Koopmans, names the Wuhan Market that sold live animals as the most likely source of the outbreak of SARS-CoV-2. “I believe this market is the most likely source based on current evidence. But I don’t think we can ever be 100% sure where the virus came from.” On China being accused of causing the pandemic, Koopmans says: “Pandemics can start anywhere. China does not like to be accused of things—who does? Although the way they have handled questions has, at times, been unhelpful, once politics enter the room and discussions enter a ‘defensive mode’, it is difficult to go back and learn what really happened. The WHO team did discuss all reasonable possibilities for the source of the pandemic, but much of the media attention focussed on what we considered the least likely option: a lab leak”.

Koopmans is currently working on prediction of where outbreaks are likely to occur, working with the Versatile Emerging Infectious disease Observatory (VEO) Consortium which she leads. “Many cases of emergent diseases start with a big event in the animal world. We want to use data on rapid changes that affect ecosystems to predict areas at risk of outbreaks of vector-borne or other diseases.”

“Marion is simply an outstanding leader, a brilliant scientist, generous mentor, supporter, and always there for you, whoever you are, whatever your role”, says Jeremy Farrar, director of the Wellcome Trust, London, UK. “She is driven by public service, a total commitment to diversity, social justice and inclusion, and, above all, honesty in everything she does and whoever she works with. She is the go-to person in One-Health virology for insight, advice, and wisdom.”

Tony Kirby



For more on the **VEO Consortium** see <https://www.veo-europe.eu>

For more on the **One Health Consortium** see <https://www.onehealthpact.org>

For more on **preprint on the origin of the SARS-CoV-2 outbreak** see <https://zenodo.org/record/6299116#.YjoFHS1Q1N0>