



Alemka Markotić—from hantavirus to COVID-19



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Having survived the harrowing war aggression on her two homelands, Croatia and Bosnia and Herzegovina—sometimes by the narrowest of margins as shells missed her location by small distances—Alemka Markotić, like many who lived through those times, feels lucky to be alive and has in her CV under “Other skills and competencies” ‘Survival in wartime’.

Today she is an expert in fields that include zoonotic infections with hantaviruses as favourites, urinary tract infections, clinical immunology, and most recently COVID-19. She is director of the University Hospital for Infectious Diseases (UHID), Zagreb, and a full professor at the Medical Faculty, University of Rijeka and Medical Faculty of the Catholic University Zagreb, Croatia. She is also president of the Croatian Academy of Medical Sciences.

She was born in Zagreb but spent her childhood in a small town in central Bosnia and Herzegovina. Markotić had a happy childhood and despite the former Yugoslavia’s resource limitations, she tells *The Lancet Infectious Diseases* that “I’ve always felt I had good teachers and a good education”. Her interest in science research would begin as early as primary school, and in high school she presented her first research projects and papers, reviewed by university professors, and won several research awards. At Medical school at the University of Sarajevo, Bosnia and Herzegovina, microbiology professor Danica Hlača would invite Markotić to join her team, in which she completed various data analyses on some respiratory viruses and hantaviruses and then obtained an assistant position at the Microbiology Department after she completed her medical training.

When a severe hantavirus outbreak occurred in Bosnia and Herzegovina in 1989, Markotić was sent to Belgrade to complete her training and she was then fortunate to meet visiting scientists from the US Army Medical Research Institute for Infectious Diseases (USAMRIID), including James LeDuc, who would then ask her university to collaborate on studying hantavirus treatment with ribavirin—the US interest dated back several decades to hantavirus outbreaks during the 1950s Korean War. Markotić explains that “as hantavirus disease is spread by small rodents, where humans and food are together outside, as in a war, there is a risk of outbreak”. The collaboration saw Markotić work in the first laboratory capable of hantavirus detection using ELISA testing at the Medical School in Sarajevo. Although war sadly stopped this work, Markotić used the time to teach medical students and also worked as a medical coordinator in refugee camps, even managing to get a small study on the presence of chronic diseases in these camps published in *The Lancet*.

Her hantavirus skills were called on again during a 1995 outbreak when she worked at the Institute of Immunology, Zagreb. She worked days, nights and weekends with support of academician Dragan Dekaris to diagnoses cases in soldiers,

and in the cases with bad kidney damage recommended they be transferred to dialysis-providing medical centres. She also continued to work closely with her USAMRIID collaborators and spent one year in Connie Schmaljohn’s lab at USAMRIID in Frederick, Maryland. Her work showed for the first time that hantaviruses can cause cytopathic effects and apoptosis in HEK293 cells, new insights in the role of cytokines and chemokines, and monocyte differentiation in the hantavirus immunopathogenesis.

Markotić returned to Zagreb after a year to continue her research and care for her recently widowed mother. Once there, she completed another long-held ambition: to establish the first biosafety level 3 laboratory in Croatia, based at the University Hospital for Infectious Diseases in Zagreb. She explains: “To do any top-level infectious disease research we needed a BSL3 lab to do it. I convinced the many partners in the project that Croatia’s location, endemic diseases, and role as a tourist hub were the reasons we needed this lab”. Markotić was subsequently appointed, in 2010, head of the research department at that hospital. Markotić also established the Croatian Society for Biosafety and Biosecurity (2014), which helped prepare the nation for future pandemics such as COVID-19.

“The first years of COVID have been the most challenging of my life”, she explains. Essentially, she never stopped, constantly treating patients, advising colleagues, going on conference calls with officials right up to the Prime Minister. Her COVID-19 work has seen her join the EU Commission COVID Platform with various roles, including an expert commission reviewing COVID-19 therapeutics and SARS-CoV-2 variants with the support of the European Medicines Agency and the European Centers for Diseases Control and Prevention.

She also, overnight, became one of Croatia’s most famous faces, with regular no-nonsense addresses to the nation. One particularly fiery transmission took place when Markotić discovered some southern Croatian coffee shops were secretly opening during lockdown. She told the nation: “If a COVID party is what you want, that is what you will have!”. Despite these pressures, she understands that “being able to communicate effectively is one of the most vital skills a scientist can have, and it needs to be included in all of our training”. And she feels strongly that more direct action must be taken against the antivaccine movements, lamenting the people who lost their lives to COVID-19 unvaccinated.

Despite her dedicated and successful career, Markotić says that she still has many dreams in her profession. One of them is to successfully complete the extensive ongoing reconstruction of the 130-year-old University Hospital for Infectious Diseases, into a modern facility, ready for new challenges in infectious diseases.

Tony Kirby