Big Hitter in Pulmonology: Professor Christoph Lange

Christoph Lange: physician, teacher, and tuberculosis researcher at heart

The journey of a clinician-scientist is often imagined as a direct ascent, carefully plotted by mentors along predetermined milestones. Yet the career of Professor Christoph Lange - today one of the most influential voices in tuberculosis research and respiratory medicine - unfolded not through a preconceived plan, but through curiosity, resilience and openness to unexpected turns. His story exemplifies how embracing uncertainty and seizing opportunity can lead to transformative contributions to global health.

"The last thing on my mind"

Born in 1962 as the youngest of three siblings, Lange was raised in a household where medicine was not just a profession but part of daily life. His mother was a paediatrician; his father, a pulmonologist and tuberculosis officer at a local public health office. Yet for much of his youth and early studies, Lange showed little interest in following his father's example. "Tuberculosis was the last thing on my mind," he often remarks.

Instead, one of his most formative experiences came during a high school exchange year in Des Moines, Iowa (USA) - a chapter that planted the seeds of his enduring global perspective. This time abroad nurtured his independence and sparked the curiosity that would later fuel his career.

Halophytes

After high school, Lange embarked on a degree in biology, immersing himself in botany, biochemistry and plant physiology. His early academic work focused on the ecophysiology of halophytes - plants thriving in saline environments such as salt marshes. His scientific interests centred on ecosystems, not epidemics.

An unexpected opportunity to study human medicine at the University of Witten-Herdecke - a small, highly prestigious German university known for its progressive education model - shifted his trajectory. Balancing medical studies with work as a biology teacher for fellow students, Lange honed his passion for teaching, an early sign of the mentorship that would later define his leadership style.

His medical education was marked by global curiosity. He undertook clinical electives at McMaster University in Canada, the National Institute for Neurology at Queen Square in London, the University of Otago in Dunedin, New Zealand, and three separate rotations at the University of Cape Town in South Africa. Initially drawn toward neurology, Lange realised that while neurology offered intellectual challenges, infectious diseases offered the power to cure. This revelation steered him toward a field where he could make tangible differences in patients' lives.

Early clinical career and unanticipated setbacks

With medical qualifications from Germany, licensing examinations from the US (initially a kind of sporting challenge among fellow Witten-Herdecke students that later proved crucial), and South Africa, Lange began his clinical career in paediatrics at the University of Cape Town under Professor Greg Hussey. He recalls this first clinical appointment with great fondness. Like his colleagues, he often worked to exhaustion, rewarded by a steep learning curve and the impression to make a real difference.

What a difference to his job when he returned to Germany for family reasons, the next year. He could not believe where he had landed. His plan to pursue pediatrics was derailed by the absence of open positions back home. Forced to adapt, he continued his residency training at two community hospitals in Preetz and Rendsburg - settings far from the academic centers and spirit he had initially envisioned and experienced during his time abroad.

This unexpected turn proved formative, providing crucial hands-on experience in patient care and reinforcing the compassion and bedside acumen that would later become central to his clinical philosophy.

Despite all odds

By his late thirties, Lange had not yet published academically, apart from his PhD thesis on the pharmacological properties of lichens - a topic combining medicine, botany, chemistry and history. Against the advice of his medical chief, who saw little merit in clinical training in infectious diseases (then not a recognised discipline in Germany), Lange applied through the US National Residency Matching Program and secured a fellowship at the infectious diseases training programme at Case Western Reserve University in Cleveland, Ohio.

He moved with his wife-now an independent occupational health physician, to Cleveland when their first son was less than two months old. Under the mentorship of Professor Michael Lederman, a leading authority in HIV research, Lange found the environment and guidance that ignited his research career. In just one year, he laid the foundation for six first-author publications, including a vaccine trial demonstrating that immune reconstitution in HIV depends critically on the nadir CD4 count prior to antiretroviral therapy initiation. Lederman became not only a mentor but a lifelong friend, profoundly shaping Lange's scientific identity.

Getting stuck upon return

After two years in the US, the family returned to Germany as Lange qualified as a board-certified internist and infectious diseases

specialist. Shortly thereafter, their second son was born. While family life settled smoothly near the shores of the Baltic Sea, Lange encountered a familiar structural barrier: infectious diseases was still not recognised as a subspecialty in Germany, despite his growing research portfolio.

Determined to remain on a research-oriented clinical path, he pursued board certifications in pulmonology and later in allergology, intensive care and sleep medicine. In 2002, his habilitation thesis on immune reconstitution in HIV infection earned Germany's most prestigious award for HIV research. Paradoxically, however, opportunities to continue this line of research and care for people living with HIV remained limited, forcing yet another adaptation.

Chance meets the prepared mind

Lange's pulmonology training took place at the Research Center Borstel, home to Germany's National Reference Center for Mycobacteria. Despite Borstel's reputation, clinical tuberculosis research was notably absent. Recognising this gap and drawing on his HIV research experience, Lange built a clinical tuberculosis research programme from the ground up.

In 2006, inspired by initiatives such as EUROSIDA and the ACTG, he founded the Tuberculosis Network European Trialsgroup (TBNET; www.tbnet.eu). As founding chairman, he guided TBNET into becoming Europe's largest collaborative tuberculosis research NGO, responsible for nearly 100 peer-reviewed publications in journals including The New England Journal of Medicine, The Lancet journals, and the American Journal of Respiratory and Critical Care Medicine. Today, Lange serves on the TBNET steering committee as Education Officer, spearheading the TBNET Academy, which equips young investigators across Europe and beyond. In recognition of this work, he received the "Society Needs Science" award from the Stifterverband for Science in Germany in 2014.

A broad portfolio

Lange's research rapidly expanded into drug-resistant tuberculosis, clinical immunology, biomarker discovery, and non-tuberculous mycobacterial (NTM) pulmonary diseases. Since 2015, he has led the Clinical Tuberculosis Research Unit at the German Center for Infection Research (DZIF).

With a prototype of an interferon-gamma release assay (IGRA) Elispot, Lange was among the first to show the impact of IGRAs in tuberculosis contact tracing. He also developed a method to detect paucibacillary tuberculosis by Elispot immunodiagnosis from broncho-alveolar lavage (BAL)-derived cells, achieving the highest diagnostic accuracy for pulmonary tuberculosis when combined with PCR. Findings from the TBNET pan-European cohort on MDR- and XDR-TB informed WHO revisions of treatment success and failure definitions.

His group has been instrumental in describing emerging Mycobacterium tuberculosis drug resistance in Europe and in developing strategies and guidelines for drug-resistant TB management including applications of M. tuberculosis drug resistance to tailor individual treatment regimens. In collaboration with Dr Andrew DiNardo's team at Baylor College of Medicine, Lange's group co-identified tuberculosis "endotypes" - distinct immune response patterns with potential for guiding host-directed therapies. Within his team, Dr. Maja Reimann developed several cutting-edge transcriptomic biomarker models like TB22 for personalized treatment duration, TB27 for early prediction of culture conversion, and TB1 to predict linezolid-associated neuropathy before clinical onset. These innovations reflect Lange's broad interest and portfolio and commitment to advancing precision medicine approaches in tuberculosis care, bridging laboratory science with clinical impact.

As a leading clinician-scientist in mycobacterial diseases, Lange currently co-chairs the ATS/ERS/ESCMID/IDSA international guidelines for pulmonary diseases caused by common and less common NTMs.

Forced to shift gears one more time

The Medical Clinic at the Research Center Borstel was not financially sustainable and despite the COVID19 epidemic no-one was willing to provide the necessary financial support for this small 81-bed hospital with a specialization in respiratory medicine. Lange, who was the Chief of Medicine since 2017 was unable to secure sustainability of the hospital with a special focus on tuberculosis research and care. With its size and very personal atmosphere the hospital appeared to belong into another time. By the end of 2021 the hospital was closed and the last tuberculosis patient was transferred to Berlin. The passionate physician Lange, was set back to a small outpatient clinic position but still had his strong research team and laboratory. At this time the European Commission launched a call for a public-private partnership to develop novel anti-tuberculosis drugs. Drawing on his European network, Lange joined a team of four scientist to submit a proposal. His group was fortunate and the successful outcome placed Lange in a shared clinical leadership position (with Professors Guy Thwaites and Nick Paton) of the UNITE4TB consortium, a €180 million EU-IMI-funded Phase II clinical trial platform spanning four continents, a commitment that he could not have addressed as Chief of a hospital. Today, Lange has arrived at the cutting edge of tuberculosis drug development. This ambitious project redefines clinical trial design through adaptive protocols, biomarker integration, and real-time data sharing. UNITE4TB exemplifies Lange's vision for accelerating treatment breakthroughs while embracing patient-centered, precision strategies.

The joy of working in a global network of enthusiasts

Despite being a late comer, Lange has a successful career with one of the highest publication records of a clinician scientists globally, in the field of tuberculosis. His interests extend far beyond scientific publications. As a mentor, he is known for his generous support of young clinicians and researchers, nurturing careers with the same care and attentiveness that mark his patient interactions. His commitment to education through platforms such as the TBNET Academy and his many guest professorships - including at the University of Namibia, Karolinska Institute, University of Umeå, State University of Medicine and Pharmacy in Moldova, University of Amsterdam, Baylor College of Medicine, and mre recently, the University Hospital Hamburg-Eppendorf (UKE) - demonstrates his passion for fostering global research capacity.

As a leader within professional societies, Lange has served as the Head of the Infectious Diseases Assembly of the European Respiratory Society (ERS) and as a member of the ESCMID steering committee on mycobacteria. His roles in crafting international clinical guidelines for TB, mycobacterial infections, and lung diseases through organisations such as ERS, ESCMID, IDSA, and The Union, have shaped standards of care worldwide.

In 2018, he became Medical Director of the Research Center Borstel, where he continues to oversee one of Europe's premier centers for translational respiratory research. In 2023, he was elected Director and is serving his second term as Secretary General of the International Union Against Tuberculosis and Lung Disease (The Union), reinforcing his leadership on the global stage.

Following the invasion of Ukraine by the Russian Federation, Lange leads a group of supporters for hospitals, students and researchers at Ukranian Universities. He organises lecture series on Respiratory Medicine and Infectious Diseases with international colleagues, raises funds, secures medical equipment and organises shipments to the Borstel partner hospital in Kharkiv in the East of Ukraine.

Professor Christoph Lange's career stands as a vivid testament to the power of adaptability, curiosity, resilience and humanity. From a student of halophytes to an architect of global tuberculosis research networks, Lange has consistently embraced the unexpected, turning challenges into opportunities.

As antimicrobial resistance continues to threaten global health, and as tuberculosis remains one of the world's deadliest infectious diseases, Lange's work remains central to the global effort toward elimination. His leadership through UNITE4TB, TBNET, DZIF, and The Union and collaborations with the European Centers of Disease Control and Prevention (ECDC) and the World Health Organization (WHO) tuberculosis team ensures that research, policy, and clinical care continue to evolve together - driven by evidence, precision, and a deep commitment to patient-centered solutions.

He doesn´t see the tuberculosis epidemic ending any time soon and aims to contribute to decrease the burden of tuberculosis globally and to improve the lives of those affected by this disease. He is well aware that this will not be achieved only through better diagnostics or medicines, but by foremost by improving social determinants of this disease, especially peace and prosperity.

In an era that demands both scientific excellence and global solidarity, Christoph Lange continues to makes a difference with meaningful and lasting impact.

Keertan Dheda, MB ChB, FCP (SA), FCCP, PhD, FRCP
Division of Pulmonology, Department of Medicine, Faculty of Health Sciences, University of Cape Town and Groote Schuur Hospital, Cape Town, South Africa
keertan.dheda@uct.ac.za