



Kim Kahnau, M.Sc.



MVZ Labor Münster
Hafenweg GmbH, Germany

Expert Insights

Efficient detection of infectious disease outbreaks in a hospital setting using rapid Fourier-Transform Infrared (FTIR) spectroscopy

GP

About Kim Kahnau

After completing a Bachelor's degree at Saxion Hogeschool in Enschede, Netherlands, and a Master's degree at the University of Osnabrück in Germany, Kim Kahnau joined the MVZ Labor Münster as a microbiologist in 2007. Protecting human health is her main goal:



"I always wanted to pursue a career in which I could help other people, but I couldn't really imagine myself as a doctor or a nurse. A job in a laboratory, where I could be hands-on and help diagnose infections was the right path for me. The introduction of the IR Biotyper in the lab allowed me to take part in a project characterizing infectious outbreaks in a hospital setting in real time. This formed the basis of my PhD thesis."

About the MVZ Labor Münster

The MVZ Labor Münster, part of the market-leading Limbach Group, has provided high-end medical diagnostics since 1973. In her role there, Kim Kahnau initiates and supervises the diagnostic process for a wide range of samples in challenging clinical settings, including investigating blood cultures and detecting microbial contamination of prosthetic devices. She says:



"Our team in Münster specializes in microbiology, hygiene and infection prevention, and our senior clinical microbiologists regularly make clinical rounds alongside the hospital physicians who use our analytical services."

Kim Kahnau is a Senior Medical Microbiologist at MVZ Labor Münster Hafenweg GmbH in Germany. This major medical laboratory supplies much of the Westphalian hospital system with diagnostic services and relies on the Bruker IR Biotyper® to accelerate outbreak detection and identify novel pathogens.

In Europe, an increase in bacterial diseases such as tuberculosis poses a public health threat, with a 10 % increase in pediatric cases in 2023 compared with 2022. Experts attribute this surge in infections to treatment errors and interruptions in healthcare services during the COVID-19 pandemic and a recent outbreak of *Salmonella* is causing particular concern. Between January 2023 and January 2025, 509 cases of salmonellosis were reported in nine European Economic Area (EEA) countries, including strains rarely encountered in Europe up to now.

It is clear therefore that there is a need for better disease surveillance. The MVZ Labor Münster has implemented an IR Biotyper which offers a fast and easy-to-use method for efficient and accurate confirmation of suspected microbial outbreaks, supporting informed decision-making and helping to contain bacterial spread.

Kim Kahnau explains: *"We found existing systems and workflows too slow to keep up with increased demand, with the result that our response to our customers could be delayed and the results limited. The IR Biotyper has transformed our work."*

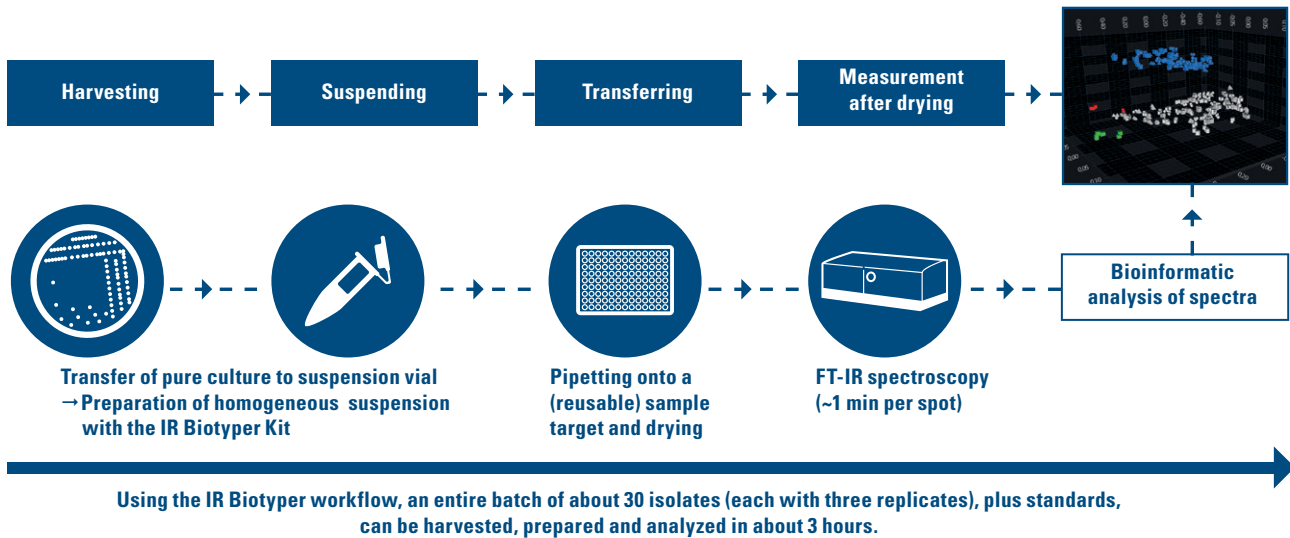
Fast and easy microbial analysis with FTIR spectroscopy

Having previously relied upon outside laboratories and reference centers for outbreak analyses, Kim Kahnau and her colleagues in Münster were looking for an in-house method to provide fast and reliable results – and deliver cost-savings too. The team attended a Bruker user meeting in 2019 where they saw the capabilities and power of the IR Biotyper first-hand:

"When we were introduced to the IR Biotyper, we were immediately impressed by the speed of analysis, and how user-friendly it was."

As a result, the MVZ Labor Münster team trialed the IR Biotyper in 2020, evaluating its performance by analyzing known samples and comparing results with those obtained via sequencing or pulsed-field gel electrophoresis.

Figure 1
FTIR workflow to monitor and confirm suspected disease outbreaks.



Encouraged by near identical results, the laboratory used the IR Biotyper to create a standardized protocol for analysis. Various agar plates and incubation times were tested and a culture on Columbia blood agar incubated for 24 hours was found suitable for all pathogens requiring analysis.

Kim Kahnau and her colleagues have used the IR Biotyper since 2021 to monitor and confirm suspected disease outbreaks in the hospital setting. She explains:

“We made the decision to purchase an IR Biotyper so that we could analyze outbreaks quickly. We wanted a standardized method that would provide physicians with the best information as fast as possible. Before we had the IR Biotyper, we had to forward all pathogen typing requests to other laboratories, which always takes longer and is more expensive for the client.”

Precision and speed are crucial in the hospital setting. Kim Kahnau comments:

“Since its introduction, the IR Biotyper has performed reliably and accurately. It creates a “biochemical fingerprint” of the pathogens, allowing us to confirm or rule out suspected outbreaks quickly and precisely. Rapid detection allows targeted hygiene measures to be initiated much faster than before.”

Kim Kahnau explains that the IR Biotyper has enabled MVZ Labor Münster to meet growing demand for outbreak analyses:

“We’re seeing an increase in the number and types of requests for analysis. For example, I was recently asked to determine if a group of patients had the same strain of pathogen, indicating transmission within the group.”

The MVZ Labor Münster team performed IR cluster analysis on resistant *Klebsiella pneumoniae* isolates from eight patients to determine whether transmission had occurred. Kim Kahnau describes the investigation:

“The isolates and a control strain were measured at least three times a day over three days. The resulting dendrogram analysis (see Figure 2) revealed five clusters, with four isolates (see cluster 1) and two isolates (see cluster 2) clustering together. Clusters 4 and 5 consisted of only one isolate each, therefore ruling out transmission.”

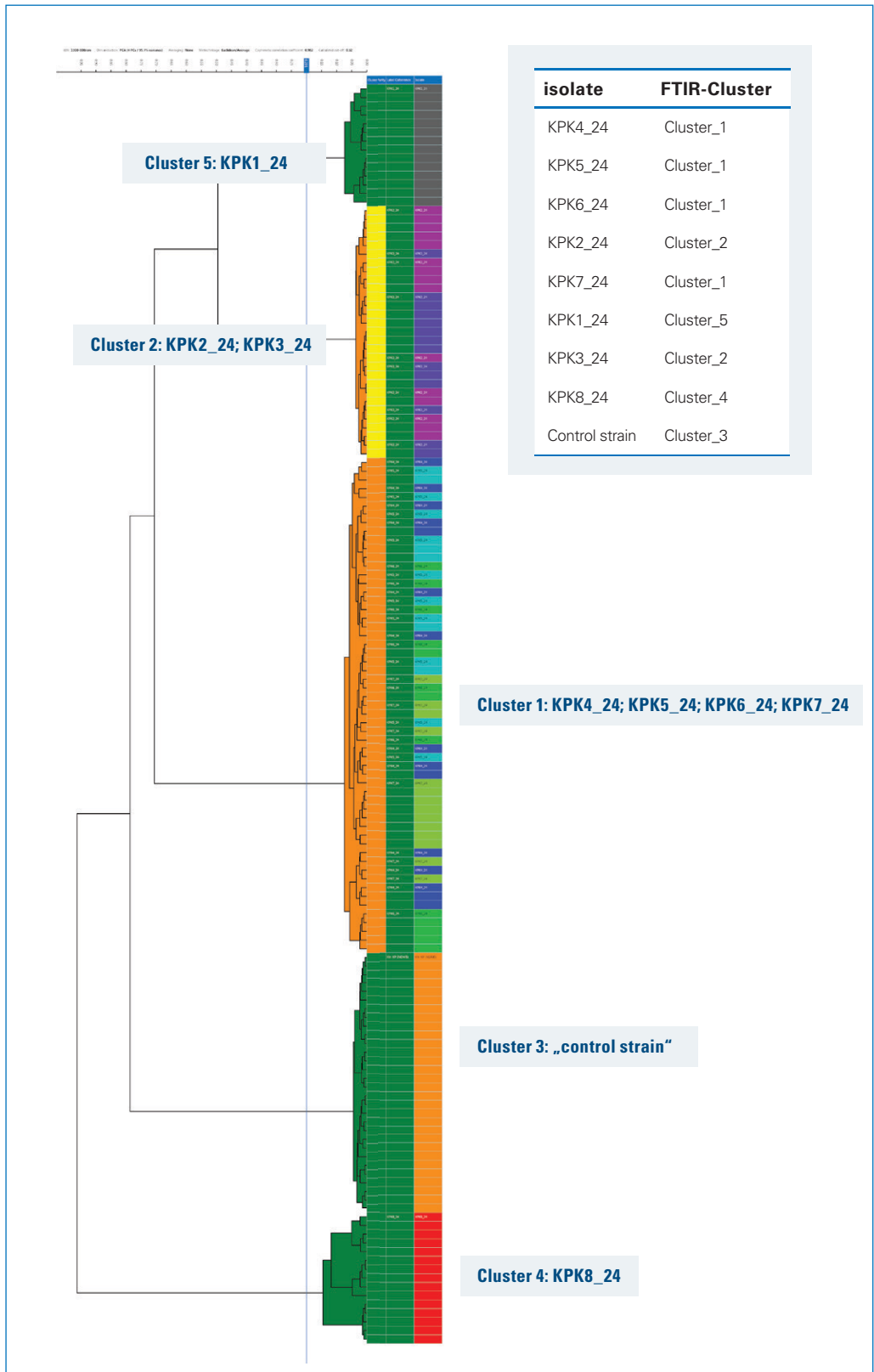


Figure 2
 Dendrogram with five clusters of eight strains (cluster 3 contains the "control strain") created using a Bruker IR Biotyper EUCLIDEAN & UPGMA (software version 4.0); cut-off value 0,201. The three columns show the cluster purity (green: in this cluster only one isolate appears, yellow: in this cluster two isolates appear, orange: in this cluster more than two isolates appear); label coherence (green: the isolate appears only in one cluster, yellow: the isolate is distributed over two clusters, orange: the isolate is distributed over more than two clusters) and the last column is the tested isolate.

Supporting breakthrough discovery

Kim Kahnau is currently completing her doctoral thesis exploring FTIR spectroscopy as both a rapid method for the early detection of pathogen transmission and as a tool for cluster analysis to identify relationships between isolates and outbreaks. Comparing cluster analysis of anonymized samples using the IR Biotyper with next-generation sequencing (NGS) on isolates suspected of transmission showed consistent results for gram-negative pathogens.

A highlight of her research was the discovery of two novel species of the genus *Stenotrophomonas*. Isolates analyzed with the IR Biotyper showed infrared clusters that after sequencing indicated previously unknown species. She comments:

“Through combined use of FTIR and NGS, we uncovered two novel species – an exciting and significant outcome of this doctoral thesis. These are microbes that were previously unknown. This breakthrough discovery contributes to expanding knowledge about infectious diseases, supporting improved hygiene management, epidemiological surveillance and outbreak control strategies.”

Working with Bruker

The team at MVZ Labor Münster relies on Bruker for continued support. During installation of the IR Biotyper, they received comprehensive training, including a demonstration of sample preparation, measurement examples, and a walkthrough of the device operation and associated software. Kim Kahnau says:

“Training on the IR Biotyper was a great collaboration and helped maximize operational efficiency. Whenever I have questions, I always feel very well taken care of by Bruker.”

A faster routine response

While detailed surveillance and data collection systems exist, infections are often identified too slowly to prevent disease outbreaks. Kim Kahnau explains:

“One of the biggest challenges in epidemiology is not the data collection itself – but the consistency with which we react to the knowledge gained. Despite detailed surveillance systems and clear indications of problematic developments, such as an increase in multi-resistant pathogens or rising resistance rates, practical responses are either lacking or come too late.”

She identifies broader use of the IR Biotyper as a potential solution. It can be used to compare isolates in the event of outbreaks and classify microorganism strains with high specificity. Results can then be visualized in the form of cluster analyses (dendrograms) or 3D scatter plots and offering same-day results from colony material facilitates faster response times.

“I’d like to see the IR Biotyper used more widely for outbreak investigations,” adds Kim Kahnau, *“as it provides initial answers rapidly that hygiene professionals can use to take effective action.”*

Looking ahead

In the future, Kim Kahnau hopes the IR Biotyper will be used more widely for outbreak investigations in the routine lab:

“At the moment, the system is most often used as a research tool in university hospitals, but I believe its future lies in more routine application. It delivers quick and accurate responses, critical in potential outbreak environments where a rapid clinical response can save patient lives, improve patient care and deliver significant economic benefits.”

References

- 1 Childhood tuberculosis cases rise by 10%: A disturbing wake-up call for Europe. European Centre for Disease Prevention and Control. March 24, 2025. Accessed July 14, 2025. <https://www.ecdc.europa.eu/en/news-events/childhood-tuberculosis-cases-rise-10-disturbing-wake-call-europe>
- 2 Widespread salmonella outbreak in the European Union/European Economic Area linked to sprouted seeds. European Centre for Disease Prevention and Control. March 6, 2025. Accessed May 27, 2025. <https://www.ecdc.europa.eu/en/news-events/widespread-salmonella-outbreak-european-union/european-economic-area-linked-sprouted#:~:text=Public%20health%20and%20food%20safety,in%20nine%20EU%2FFEA%20countries>

Not for use in clinical diagnostic procedures.
Please contact your local representative for availability in your country.

IR Biotyper® is a registered trademark of the Bruker group of companies.

Online information
bruker.com/microbiology



Bruker Daltonics GmbH and Co. KG

Bremen · Germany
Phone +49 (0) 421-2205-0

info.md@bruker.com

Bruker Scientific LLC

Billerica, MA · USA
Phone +1 (978) 663-3660

