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Label-free, non-destructive visualization of intracellular bacteria using *Coxiella burnetii* as an example

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Obligate intracellular bacteria invade host cells and are able to avoid the host's immune response. Furthermore, they are less accessible to antibiotics, which can lead to difficult-to-treat and to chronic infections. The life-cycle of intracellular pathogens is often complex and can include different morphoforms. Furthermore, intracellular infections are difficult to study in a non-invasive and non-destructive manner and often require sample-manipulative techniques.
Here, we present a label-free and non-destructive method to localize, visualize and quantify intracellular bacteria in 3D within intact host cells in a cell culture model. In our proof-of-principle study [1], we use the zoonotic obligate intracellular pathogen *Coxiella burnetii* that causes infections in ruminant livestock and humans.
Spectral information of the intracellular pathogen extracted from 3D Raman image stacks is in excellent agreement with Raman spectra recorded from the isolated pathogen, making the isolation step unnecessary for the characterization of the intracellular pathogen's developmental state. No external labelling is required as biochemical fingerprints are captured in the Raman spectra. The spectral information allows gaining quantitative insight into the infection cycle, which agree with insights from transmission electron microscopy (TEM) images. Furthermore, it is possible to follow infection-induced changes in lipid composition in and around the *Coxiella*-containing vacuole.

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Longitudinal study on prevalence, genotype distribution and associated risk factors of oropharyngeal human papilloma virus (HPV) infection after transplantation (DZIF-Transplant Cohort)

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Introduction: Immunocompromised individuals such as transplant recipients are at increased risk for persistent viral infections, including human papillomavirus (HPV). Oral HPV infection is associated with head and neck cancers; however little data are available on the epidemiology and risk factors for oral HPV infections at the time and after transplantation (Tx).
Methods: To investigate the prevalence of oropharyngeal HPV infections, viral genotypes and associated risk factors we analysed buccal swabs of liver (LTX), kidney (RTX), kidney-pancreas (RPTX) or hematopoietic stem cell (HSCT) transplant recipients collected at defined time points after Tx (0, 6, 12 months) at the DZIF Tx cohort Tuebingen site. Swab quality was controlled by real-time PCR for a cellular gene (PGK-1). For HPV screening we used line probe assays (InnoLiPa) specific for 32 high- and low-risk HPV types; unclear cases were additionally genotyped by Sanger