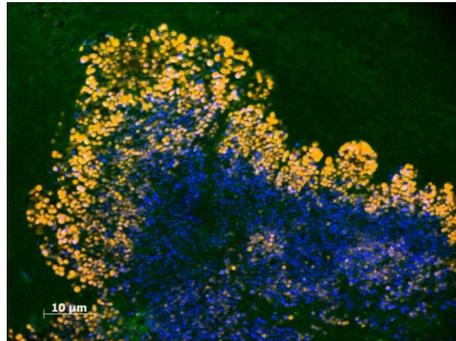


iSOLID - Integrated Solution for Infection Detection

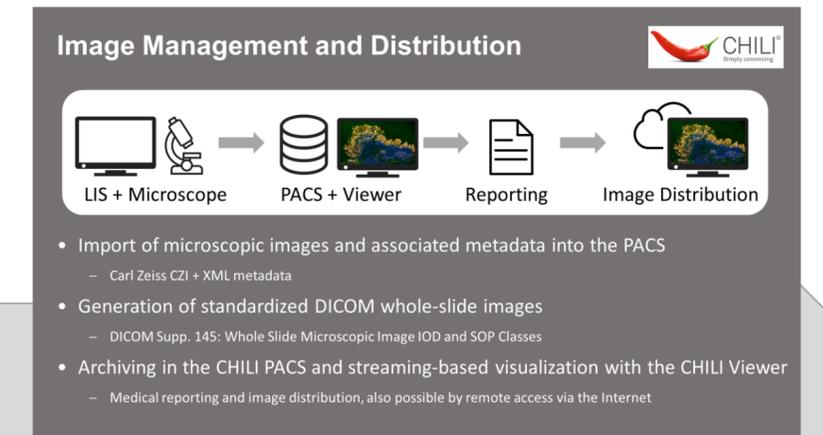
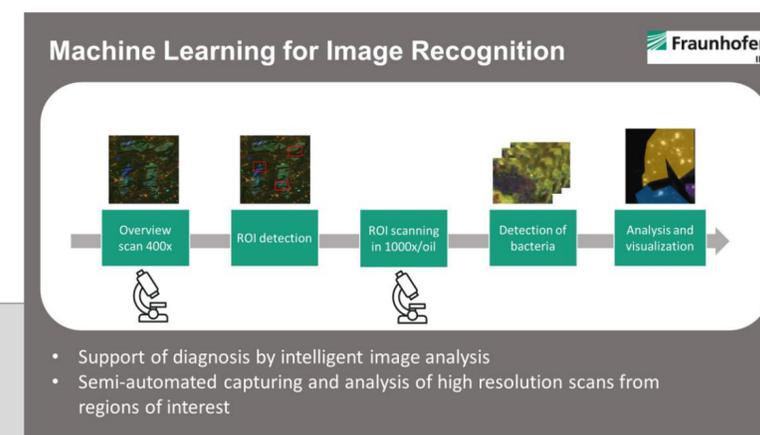
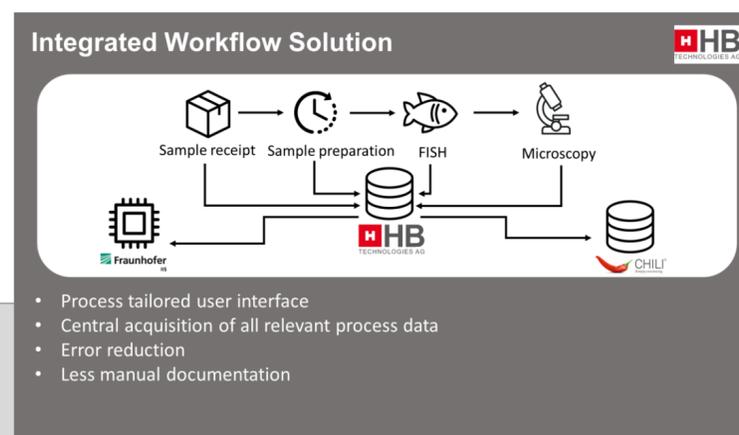
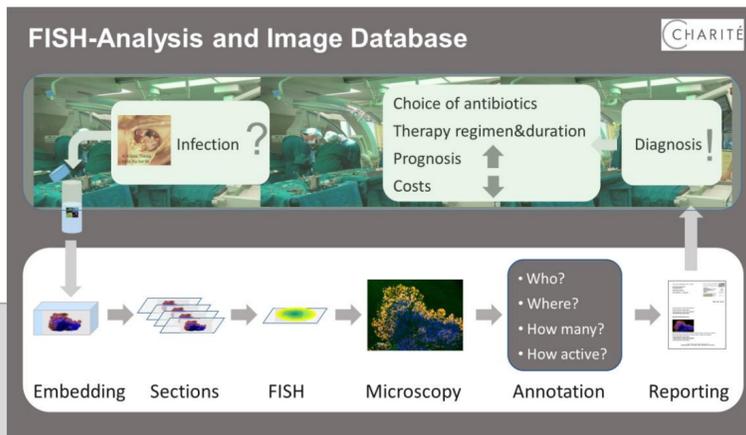
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Conclusions: iSOLID renders FISH for clinical samples a cutting-edge diagnostic tool. FISH in combination with automated image analysis and artificial intelligence on a routine diagnostic level opens up new infection detection opportunities such as staging of biofilm-associated infections with species, amount and activity of the microorganisms.

FISH of a human endocarditis heart valve. Detection of streptococci with the specific FISH probe (orange) in combination with the nucleic acid stain DAPI (blue). The biofilm features ribosome-rich, FISH-positive zones (orange) and metabolically inactive zones (blue). © Biofilmzentrum, Charité – Universitätsmedizin Berlin



Background:

Fluorescence *in situ* hybridization (FISH) is a molecular technique, which allows identification and visualization of microorganisms within tissues, providing information on formation, number and activity. FISH is increasingly used for research in biofilm-associated or implant infections. The diagnostic use of FISH in daily routine is currently restricted to specialized laboratories because it involves expertise, many hands-on steps, time-consuming microscopy, and laborious annotation and documentation of FISH images. These obstacles we aim to overcome with iSOLID.

Materials/methods:

With iSOLID we develop a platform solution for routine-level high-throughput FISH by combining a sample tracking software with automated image analysis for detection of bacteria in histological sections and an intelligent image handling system PACS (Picture Archiving and Communication System).

Results:

We developed a user interface for sample tracking and documentation of all data relevant for processing patient material for FISH. Semi-automated digital image analysis using machine learning and deep learning algorithms can detect bacteria in heart valve sections. The respective regions of interest are presented to the investigator, who evaluates and settles the diagnosis. Images are annotated and stored in a FISH-PACS, which allows fast recovery and reporting of the results. The separate components of the entire FISH platform are currently combined for testing under routine diagnostics conditions. iSOLID is an integrated FISH-based infection detection system with automated image analysis, archiving and workflow platform.