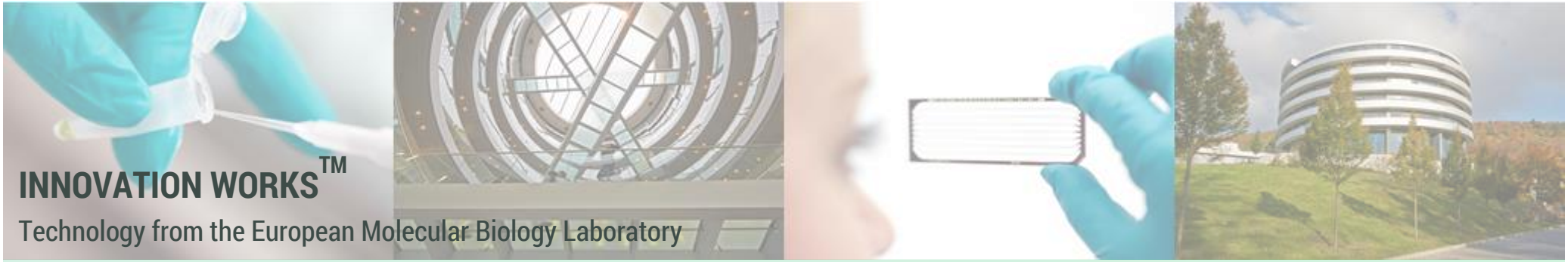

INNOVATION WORKS™

Technology from the European Molecular Biology Laboratory

Rapid detection of multi-resistance in bacteria by HPLC/MS

EMBLEM Ref. HDU-27

Challenge

- spread of microbial resistance is becoming a world-wide health problem
- classical antibiotics susceptibility testing (AST) can take days to weeks until results are obtained
- clear need for faster methods to detect antibiotic resistance

Commercial Opportunity

- we are seeking a licensee who develops and/or integrates our technology into a certified product for the clinical biology market

Technology

- the approach directly tests for the presence of extended spectrum β-lactamase (ESBL) hydrolysis using HPLC and mass spectrometry
- the assay provides actionable results from e.g. blood culture, agar or isolates within as little as 90 minutes
- bacterial growth is not required for the assay, thus also treatment success in patients pre-treated with antibiotics can be monitored

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Key Inventors

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Intellectual Property

EP130001224.8, filed 12.03.2013
PCT/EP2014/000071, filed 14.01.2014

EMBLEM TECHNOLOGY TRANSFER

Rapid detection of multi-resistance in bacteria by HPLC/MS

EMBLEM Ref. HDU-27

Early and targeted antimicrobial therapy decreases cost, improves patient outcome and prevents the spread of microbial resistance, which is becoming a world-wide health problem. Fast, actionable results are often critical – e.g. for sepsis patients mortality rates increase by 7% per hour without adequate treatment.

Classical antibiotics susceptibility testing (AST) consists of culturing bacteria in the presence of various antibiotics and determining growth. This procedure can take days to weeks until a result is obtained and faster methods are highly needed. PCR-based or MALDI-TOF MS instruments are capable of determining the identity of a limited number of bacteria within 4-36 hrs (or more) based on DNA/protein, but provide only limited guidance as to antibiotic susceptibility or multi-resistance. Our approach directly tests for the presence of extended spectrum β-lactamase (ESBL) hydrolysis using HPLC and mass spectrometry and is based on our newly discovered principle of inverse temperature dependence of ESBL activity. The assay provides actionable results from e.g. blood culture, agar, isolates within only 90 minutes, a significant increase in sensitivity with simultaneous substantial decrease of in-laboratory turnaround time. for the assay thus

Bacterial growth is not required for the assay thus also patients pre-treated with antibiotics can be analysed and treatment success can be monitored.

The laboratory at the University Clinic is well versed in clinical chemistry and is constantly improving on existing methodology. For example, we have previously successfully introduced the use of HPLC/ESI-MS technology to identify ampicillin resistant bacteria. In this assay, multi-resistant bacteria could also be identified because they gave intermediate results. Based on this finding we developed a novel assay, which makes use of our discovery that ESBL activity correlates inversely with temperature. While the active center of β-lactamases that hydrolyse ampicillin exclusively is highly specific and highly efficient over a wide range of temperatures, ESBLs also bind considerably larger molecules (e.g. cephalosporin), leading to a decreased specificity for ampicillin for each is measured by HPLC/ESI-MS. Because of the inverse correlation there is less residual ampicillin at lower temperature and at higher temperature there is more residual ampicillin.

References

Grundt et al. 2012, J Clin Microbiol
doi: 10.1128/JCM.00047-12