Scientists identify significant increase in new MRSA strains in non hospital environment

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Microbiologists from the Dental School in Trinity College Dublin in collaboration with the National MRSA Reference Laboratory at St. James's Hospital Dublin and Alere Technologies in Germany have identified significant increases in the prevalence, genetic diversity and antimicrobial resistance of PVL-positive MRSA circulating in Ireland in the ten years between 2002-2011. These findings have just been published in the March 2014 issue of a leading, peer reviewed international journal, The *Journal of Clinical Microbiology*.

PVL-positive MRSA strains are more likely to be found among individuals in the community rather than in a hospital setting which is where MRSA is usually associated. The Panton-Valentine leukocidin (PVL) toxin can enhance the ability of S. aureus (the bacteria Staphylococcus aureus) to cause disease through the destruction of white blood cells and damage to skin and soft tissues.

Among MRSA samples submitted to the Irish National MRSA Reference Laboratory between 2002 and 2011, the authors identified a 44-fold increase in the prevalence of PVL-positive MRSA and a six-fold increase in the number of PVL-positive MRSA samples resistant to multiple antibiotics.

Unlike MRSA strains that traditionally cause invasive infections among older and vulnerable patients in hospitals, many of whom may have underlying infections, these PVL-positive MRSA strains were predominantly identified among younger individuals in the community

and were mostly associated with skin and soft tissue infections, although serious and life threatening bloodstream infections and necrotising pneumonia were also identified.

Commenting on the significance of the findings, Professor David Coleman, Professor and Chair of Oral and Applied Microbiology, School of Dental Science, Trinity said: "The increased burden of PVL-positive and multi-antibiotic resistant PVL-positive MRSA in Ireland over the last decade is a worrying development and enhanced surveillance in both hospitals and communities is vital to ensure that these strains do not spread and become more established. Rapid and informative high-throughput molecular typing using DNA microarrays and ultimately whole-genome sequencing will be essential in preventing the spread of these strains".

Using high-throughput DNA microarray profiling and molecular typing, the authors, Professor David Coleman, Dr Anna Shore and Sarah Tecklenborg of the Dental School Microbiology Unit in Trinity, identified an unprecedented level of genetic diversity among PVL-positive MRSA and PVL-positive methicillin-susceptible S. aureus (MSSA) in Ireland. In fact, sixteen distinct clones of PVL-positive MRSA and five additional PVL-positive MSSA clones were identified. This diverse range of PVL-positive MRSA strains circulating appears to have increased in recent years and international travel is likely to have been a significant contributory factor. Clusters of PVL-positive MRSA were also identified within families and among patients in hospitals, highlighting the serious challenge that these MRSA strains present for infection prevention and control and for the treatment of infections caused by these organisms both in hospitals and in communities.

Dr Brian O'Connell, Director of the National MRSA Reference Laboratory (NMRSARL) remarked: "NMRSARL has been providing a service for the detection of PVL-positive S. aureus for over 10 years and

has been instrumental in delineating the emergence of these strains in Ireland. This paper details the diversity of the strains that are circulating and highlights the importance of continued surveillance, co-ordinated by a national reference laboratory, as some of these strains may cause prolonged and protracted outbreaks in the future".

More information: "Panton-Valentine Leukocidin-Positive Staphylococcus aureus in Ireland from 2002 to 2011: 21 Clones, Frequent Importation of Clones, Temporal Shifts of Predominant Methicillin-Resistant S. aureus Clones, and Increasing Multiresistance." *J. Clin. Microbiol*. March 2014 52:3 859-870; published ahead of print 26 December 2013, DOI: 10.1128/JCM.02799-13

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