

Comparison of the ability of adhesion and invasion of *Staphylococcus aureus* isolated from milk of cows with subclinical mastitis and milk from a human milk bank in BMEC, HEp-2 and HeLa cells

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Abstract:

Bovine mastitis is defined as an inflammation of mammary glands of cows, mainly caused by bacteria. This disease is a major concern of the dairy industry throughout the world, causing severe economic losses. Several micro-organisms may cause mastitis, however, *Staphylococcus aureus* is the main pathogen involved in these cases, due to their virulence factors. In humans, *S. aureus* is the etiologic agent of mastitis in women also infants, affecting 20-30% of the mothers. Despite the many advantages of breast milk, it has no physical protection against secondary contaminants coming from the environment, utensils, donors and practitioners of Human Milk Bank. *S. aureus* can invade bovine mammary epithelial cells, which starts with the adhesion to the surface of these cells - the first step towards the establishment of mastitis - leaving the bacterium free from host defense mechanisms and the action of antibiotics and with a nutrient source guaranteed. This study compared the adhesion and invasion of *S. aureus* isolated from cow's milk with subclinical mastitis and breast milk from a milk bank in different cell types [HEp-2, HeLa and Bovine Mammary Epithelial Cell (BMEC)]. The BMEC was obtained from a fragment of bovine mammary tissue. The isolated human milk showed better adhesion to HeLa cells ($p = 0.043$), while isolates from bovine milk adhered better to HEp-2 cells and BMEC ($p = 0.01$). In invasion testing, isolates from human milk and bovine invaded the three cell types indistinctly in percentage from 1 to 62.5% invasion for *S. aureus* of human origin and 0.7 to 100% for isolates from bovine origin. It was concluded that the adhesion test for human isolates can be used and HeLa cells isolated from bovine origin, can be used HEp-2 and BMEC cells. For testing invasion any cell type may be utilized for *S. aureus* from both origins. The results allow the use of pre-established cell lines, avoiding the laborious process of obtaining a primary cell line.

Keywords: BMEC, HEp-2, HeLa, *Staphylococcus aureus*, adhesion, invasion

Fomentation agency: FAPESP (process number 01359-2)