Growth and cell-division in extensive (XDR) and extremely drug resistant (XXDR) tuberculosis strains: transmission and atomic force observation.

ABSTRACT

The ultra-structure of Mycobacterium tuberculosis (MTB) was examined by transmission electronic (TEM)) and atomic force microscopy (AFM). The study was performed to describe the morphology of susceptible, multidrug-resistant (MDR), extensively drug-resistant (XDR) and extremely drug-resistant tuberculosis isolates (XXDR-TB) during their exponential growth phase. Four types of cell division were observed and described. While three of them (symmetrical, asymmetrical and branching type) occurred in all isolates studied, the fourth one (adapted type) was seen only in XDR and XXDR-TB bacilli. In the fourth type of cell division, a rod shaped mother cell produced a small round shape bacillus (0.3-0.5 μm). These round cells were different from buds or polar division, but similar to terminal endospores without showing the typing heat resistance. Based on the present observation, we suggest that XDR-and XXDR-TB bacilli accommodate changes helping them to overcome the hostile environment. Viewed under AFM, the other frequently detected shapes in MTB isolates were oval, V, Y and multi-branching filaments. These shape variation confirmed pleomorphic phenomena in MTB populations and the specific features of pan-resistant strains

Keyword: Atomic force microscopy; Cell division; Extremely drug resistant tuberculosis.