STRUCTURE AND ORGANIZATION OF THE TUBULIN HOMOLOG FTS-Z IN *BACILLUS SUBTILIS* REVEALED BY SUPER-RESOLUTION OPTICAL IMAGING

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FtsZ is a member of the tubulin family of cytoskeletal proteins and like eukaryote tubulins is essential for cell division. In diffraction-limited imaging FtsZ appears as a ring around the division site in dividing cells, and as a spiral in a certain proportion of non-dividing cells [1].We have studied the organization of immuno-labelled FtsZ at resolutions beyond the Rayleigh diffraction limit using STED (Leica TCS5-STED) and structured illumination (Delta-Vision OMX) microscopes.

Super-resolution images reveal that the spiral structures seen in conventional imaging are not the uniform structures they appear at low resolution but loose aggregates with dense regions separated by loose wispy microfilaments. This agrees well with results from electron tomography [2], and gives strong support to the proposal [3] that the primary determinant of the spiral arrangement of FtsZ is a lipid spiral within the cell membrane.

STED images also show a different structure with a regular periodicity at ~150nm, which is probably a tight single helix. We propose that this is the conformation FtsZ takes up when it is not linked to the much larger (550nm pitch) membrane lipid spiral. This may be the first completely novel structure to be discovered by super-resolution optical microscopy.

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