Revealing Nanoscale Changes in Aging Red Blood Cells

Correlative Optical-AFM Characterization with Park NX12

The Challenge

"Understanding how oxidative aging effects red blood cells required us to examine structural and mechanical changes at the level of individual cells. We needed a platform that could correlate optical observations with nanoscale morphology and mechanical properties on the same cell areas."

Consiglio Nazionale delle Ricerche

— Giovanni Longo,
Institute of Structure of Matter

Your Challenge, **Our Solution**

Park NX12



This case study is based on CNR research on oxidative aging in red blood cells and related peer-reviewed research published in Molecular Sciences & Methods and Protocols.

Park SYSTEMS

Park NX12
Customer Success Story

Consiglio Nazionale
delle Ricerche





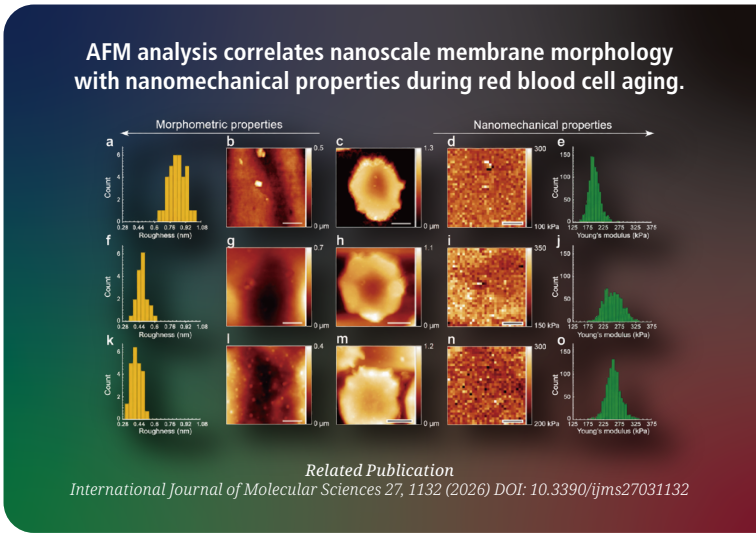
The Solution

Correlative Optical-AFM Imaging
Integrates with an inverted optical microscope to locate individual erythrocytes and perform AFM imaging of the same area

Controlled Low-Force Imaging
Acquires AFM morphology under non-contact or soft -contact conditions with tip–sample interaction below 2 nN

Nanoscale Morphological Analysis
Characterizes cell morphology and membrane roughness across different stages of erythrocyte aging

Nanomechanical Characterization
Maps Young's modulus on the same cell areas to correlate local mechanical and morphological properties



The Results

Distinct Aging Patterns
Revealed different aging responses in normal and favism red blood cells

Aging-Related Morphological Changes
Identified increased morphological alterations and vesicle formation in aging favism erythrocytes

Membrane and Mechanical Changes
Characterized changes in membrane roughness and nanomechanical properties during oxidative aging

Correlated Cellular Alterations
Linked nanoscale structural changes with fluorescence observations of hemoglobin-related alterations

"Park NX12 allowed us to examine the same red blood cells identified by optical microscopy at the nanoscale, providing detailed morphological information on their progressive structural changes during oxidative aging."

— Marco Girasole, Institute of Structure of Matter

