

Protein Distribution in Rod Cells

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Objective

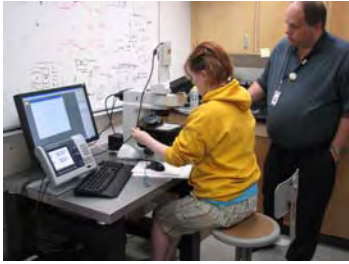
- using mid-IR light to compare protein concentrations at various locations along the length of retinal rod cells
- rod cells form a layer at the back of the retina and are the tissue responsive to light

Methods and Procedures

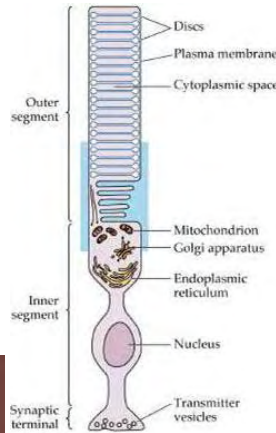
- rod cells were harvested from a light-starved African toad (*Bufo marinus*) immediately after exposure to light
- a fluorescent microscope was used to locate an ideal rod cell
- the same cell was located using the IR microscope with visible light
- FTIR spectra were recorded on Beamline 01B1-1 (MidIR Spectromicroscopy) at the Canadian Light Source using a Bruker IFS66v/S interferometer coupled to a Hyperion 2000 IR microscope.
- spectra were taken at 7 micron steps from outer to inner segments

Conclusion

- progression along the rod cell produced noticeable differences in protein concentrations and/or conformations
- the cilium region appears to have some differences in protein composition



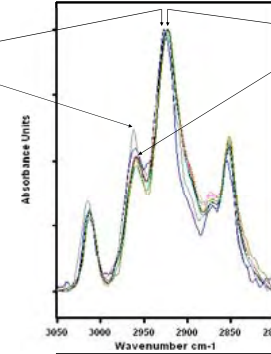
The rhodopsin protein



A Rod Cell – Quaroni et al. 1993

FTIR spectra in the C-H stretching spectral region recorded at different positions along a rod cell from the retina of *Bufo marinus*. The spectra were normalized to the band at 2920 cm⁻¹. The bands show some small differences going from the outer segment to the inner segment of the cell. The difference indicates a variation in the order of phospholipid acyl chains of the inner segment characterized by a greater abundance of beta-sheet containing proteins.

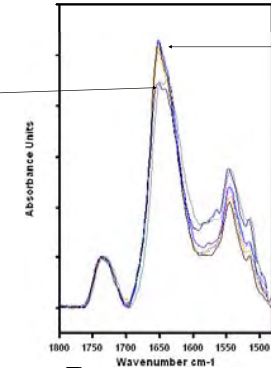
Rod Inner Segment Spectra



Rod Outer Segment Spectra

FTIR spectra in the carbonyl spectral region recorded at different positions along a rod cell from the retina of *Bufo marinus*. The spectra were normalized to the carbonyl band at 1740 cm⁻¹. The amide I band, at 1650 cm⁻¹, shows a clear difference in structure going from the outer segment to the inner segment of the cell. The difference reveals a variation in protein composition of the inner segment characterized by a greater abundance of beta-sheet containing proteins.

Rod Inner Segment Spectra



Rod Outer Segment Spectra

