



# **Involvement of elevated membrane cholesterol on G- protein regulated water and gas transport in biological membranes**

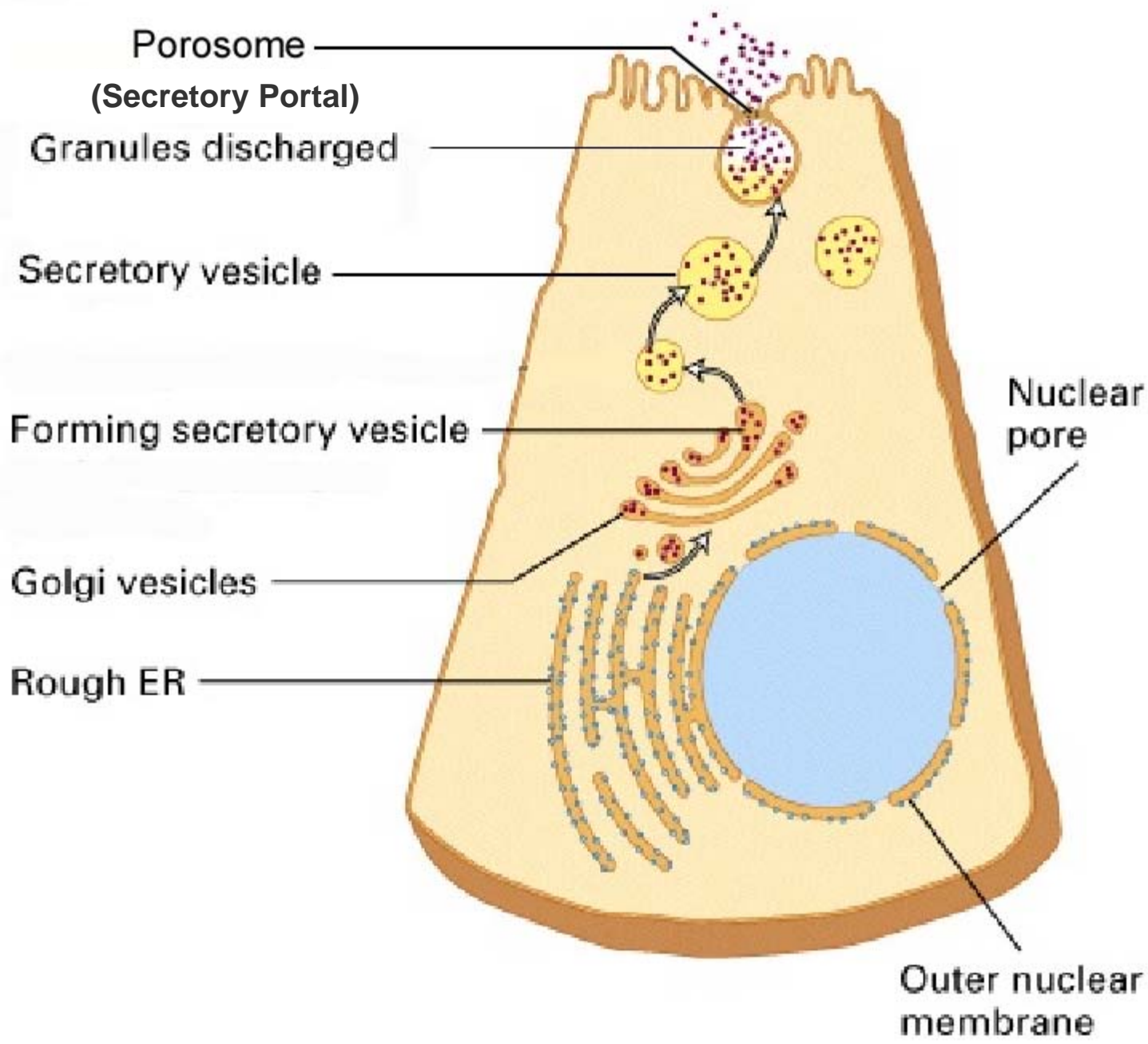
**Gas Channels Workshop, Case Western Reserve University, OH; Sept. 5-7, 2012**

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Wayne State University School of Medicine  
Dept. of Chemical Engineering & Material Science  
School of Engineering  
Wayne State University  
Detroit, MI 48201**

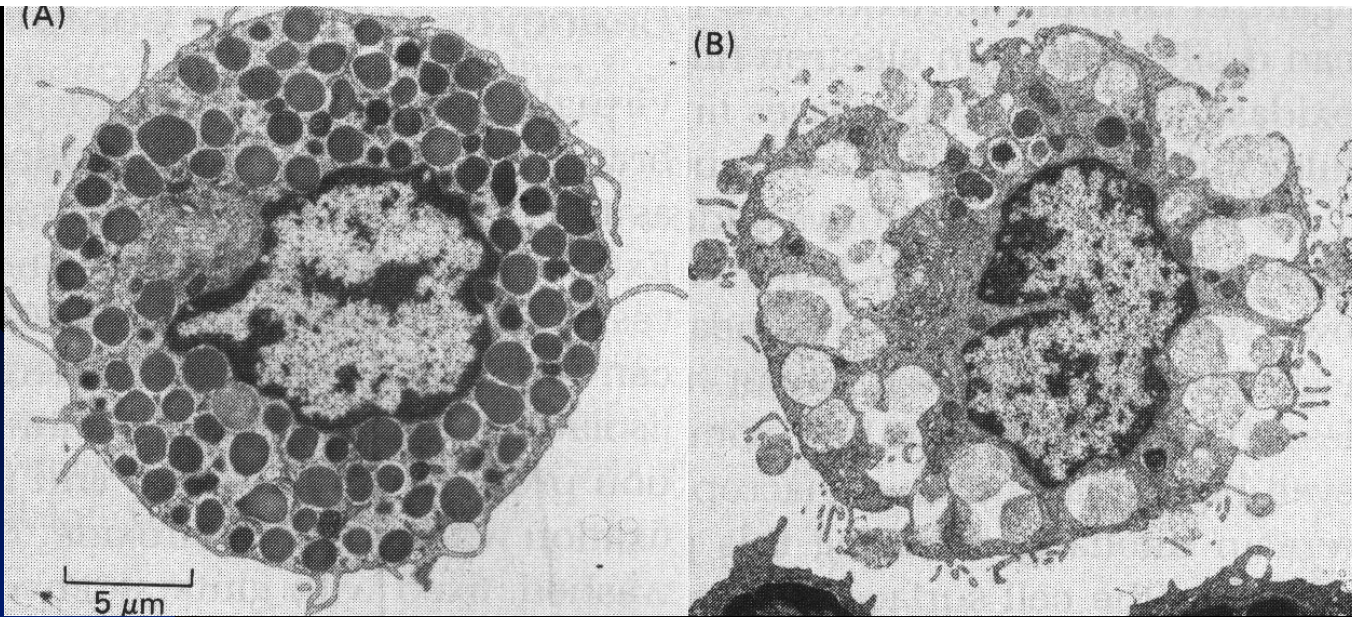


*Jena Research Group*

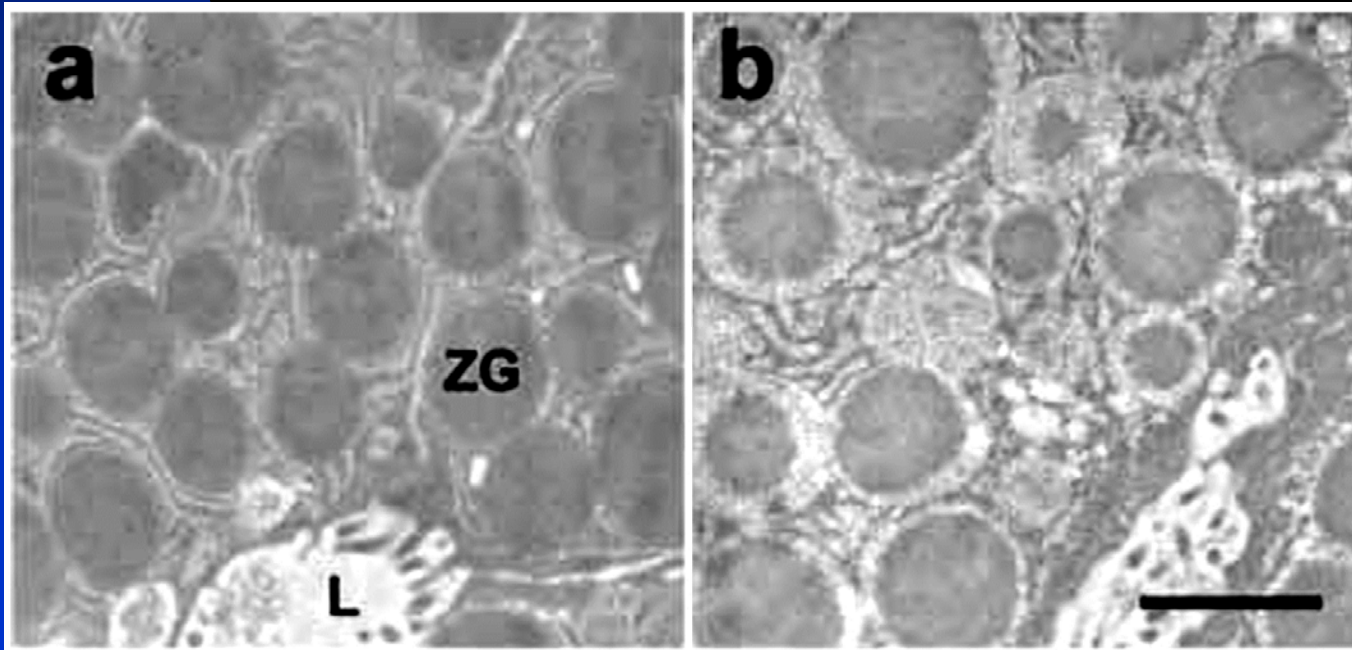






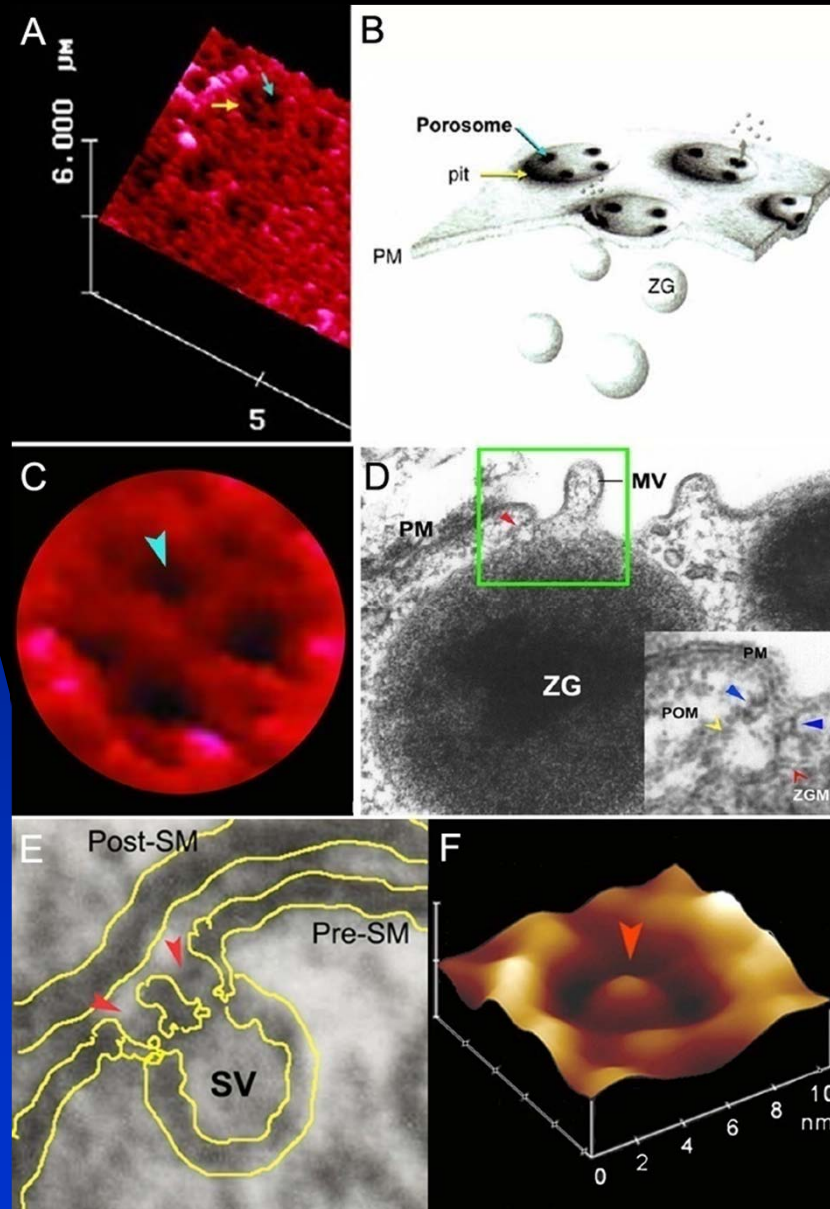


Rat Peritoneal Mast Cell- Lawson D. et al. 1975 *J. Exp. Med.* 142:391-402

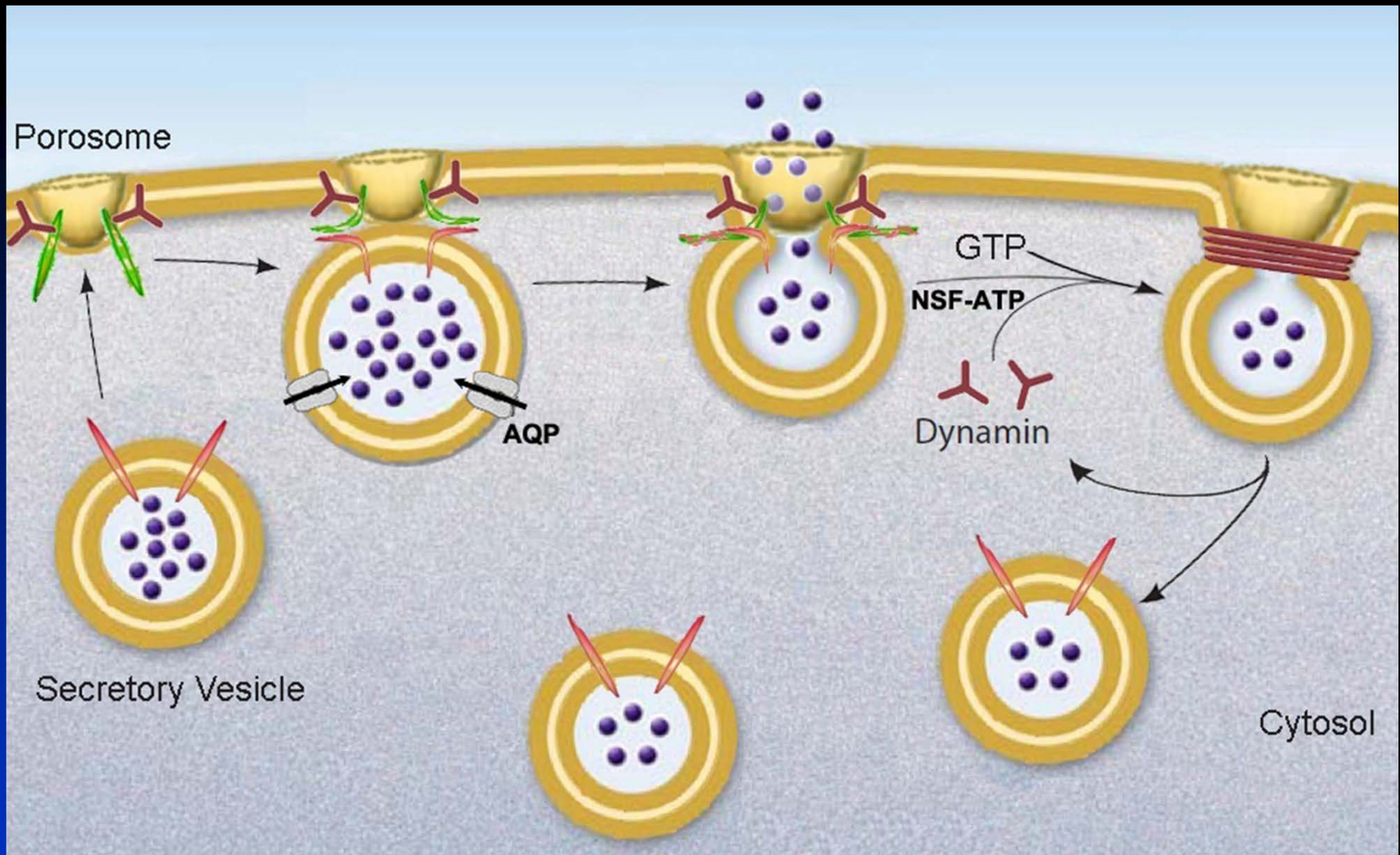


Rat Pancreatic Acinar Cells- Cho SJ et al. 2002 *Cell Biol. Int.* 26:29-33

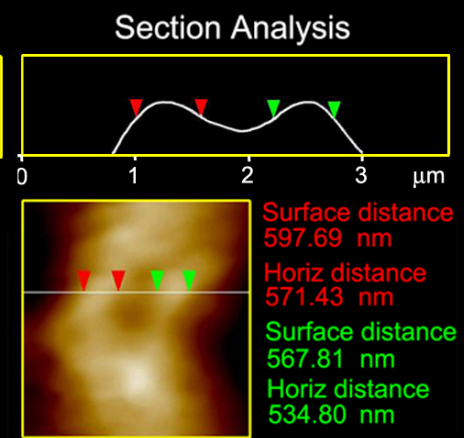
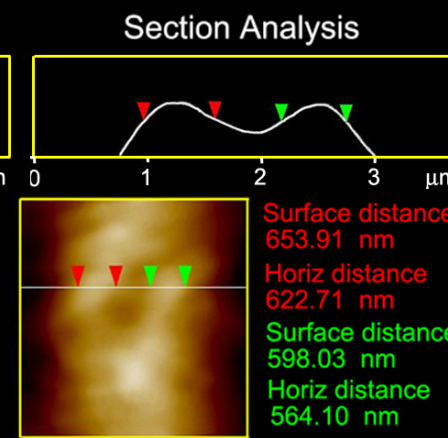
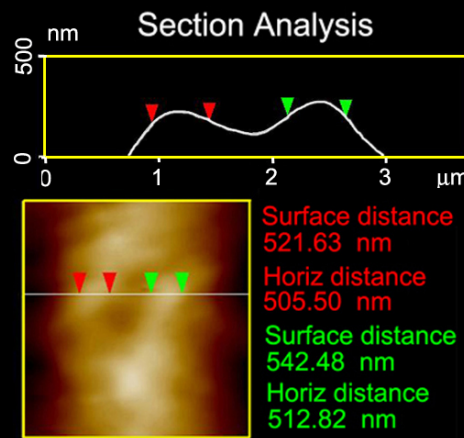
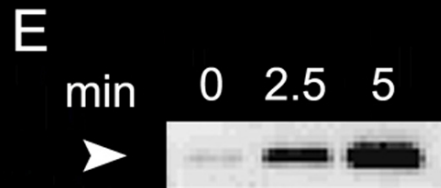
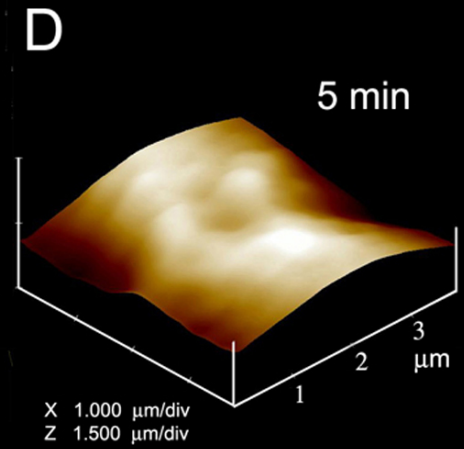
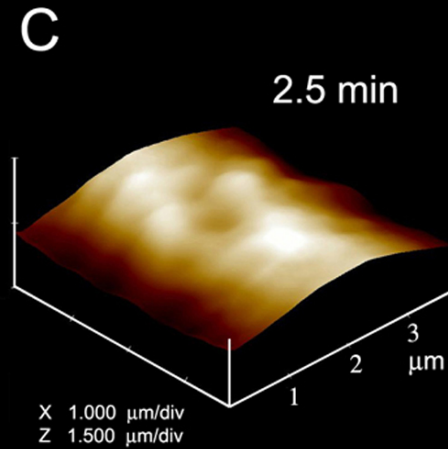
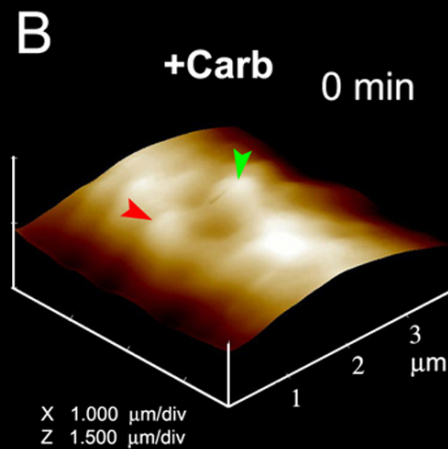
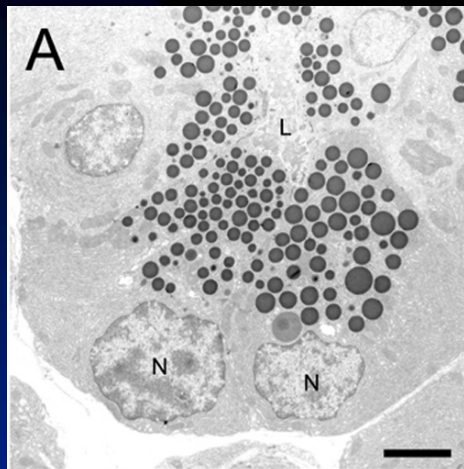
# Porosome: The Universal Secretory Portal in Cells



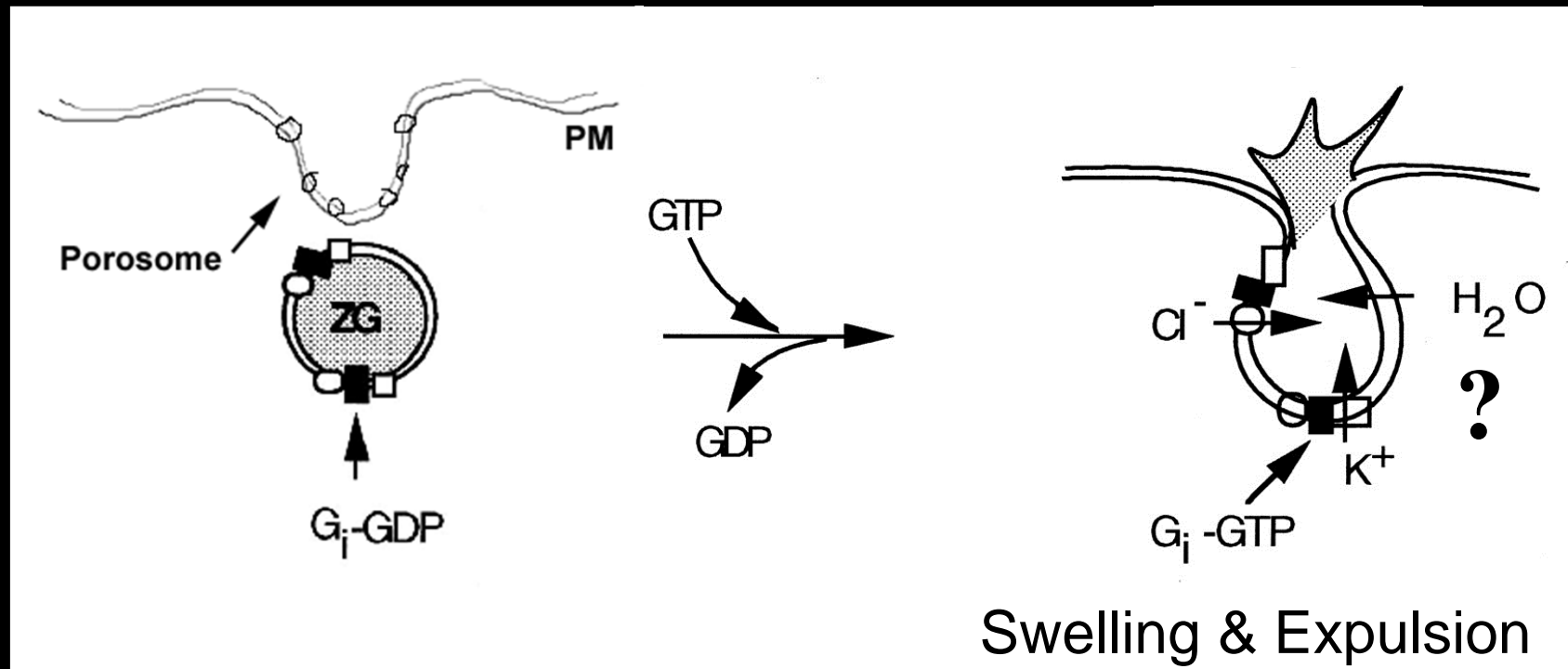




*Lee et. al. 2012 J. Proteomics 75:3952-62*



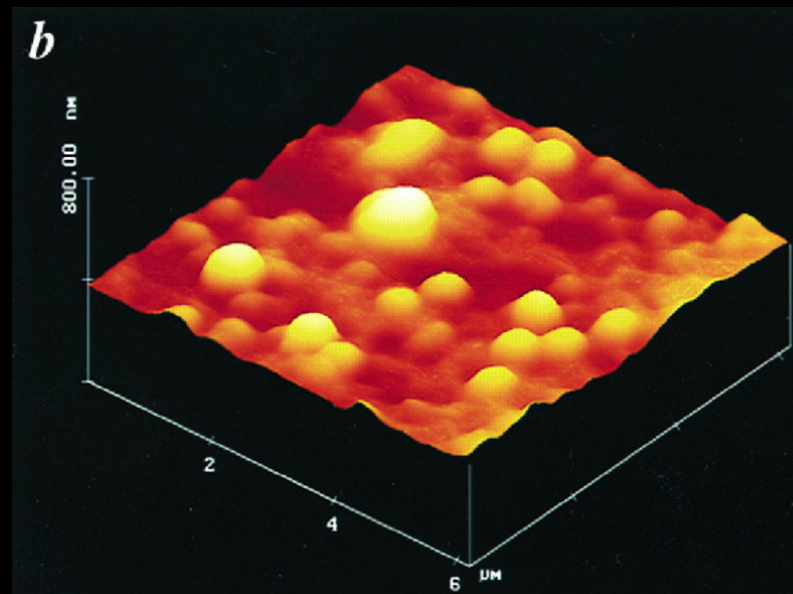
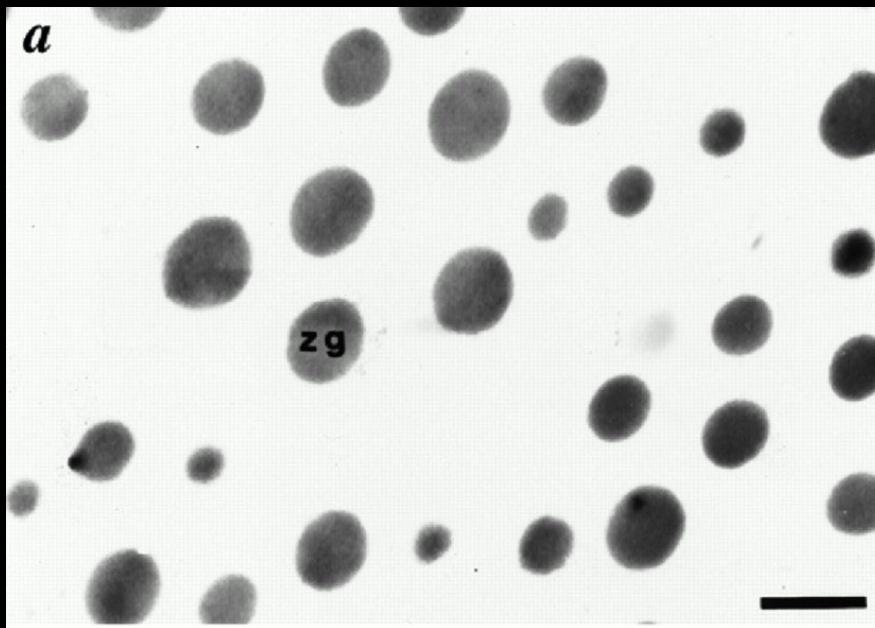
# Hypothetical model



*Jena et. al. 1997 Proc. Natl. Acad. Sci. USA 94:13317-22*

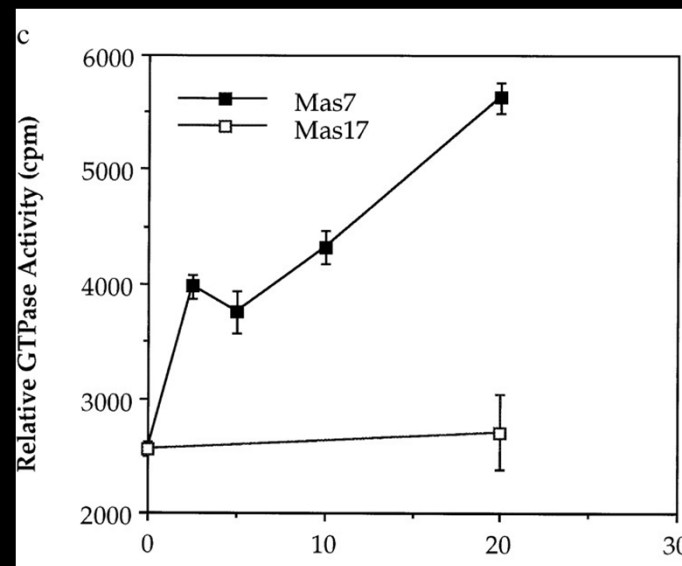
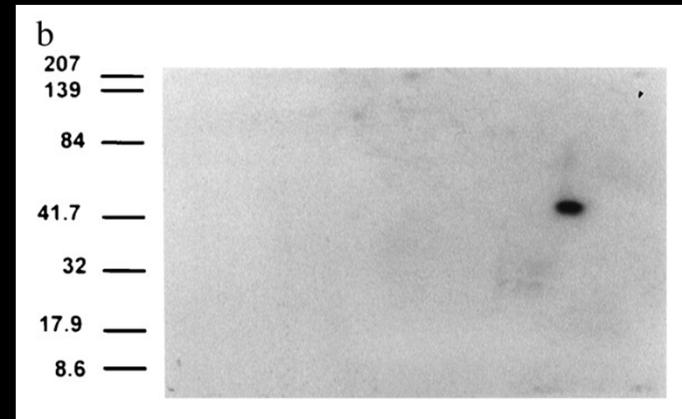
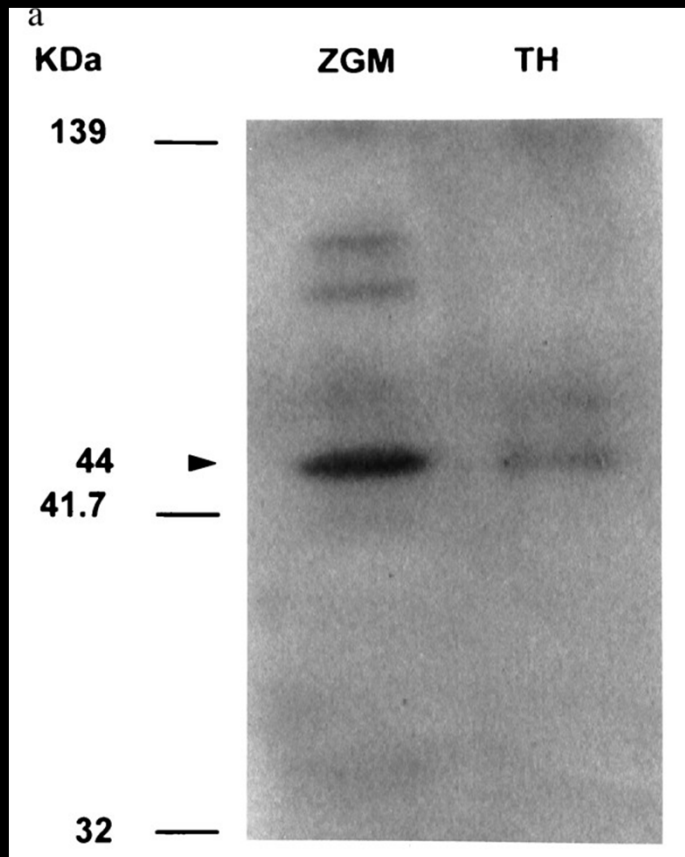


# EM & AFM micrographs of Zymogen Granules



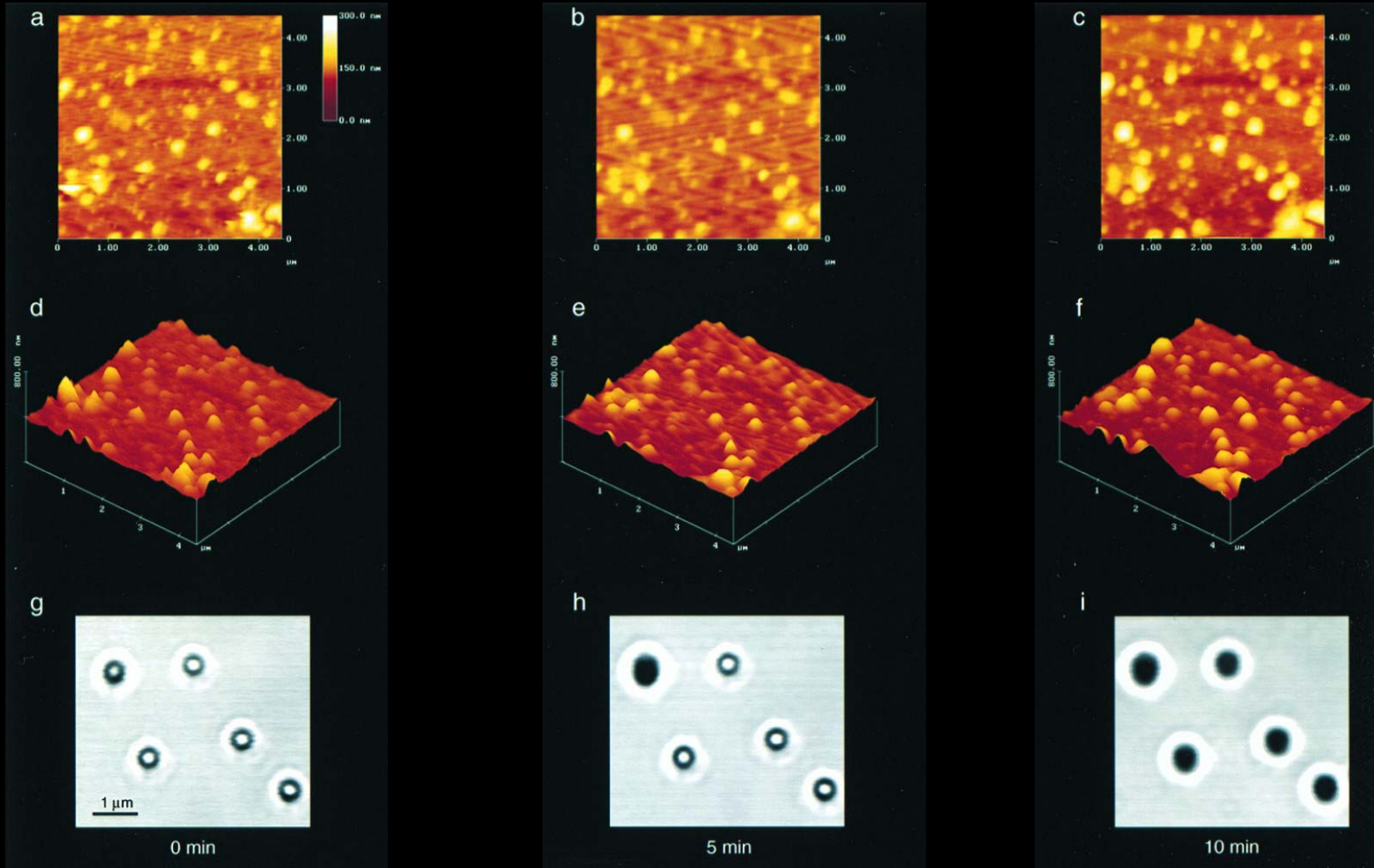
*Jena et. al. 1997 Proc. Natl. Acad. Sci. USA 94:13317-22*

# Association of $G_{\alpha i3}$ with ZGM



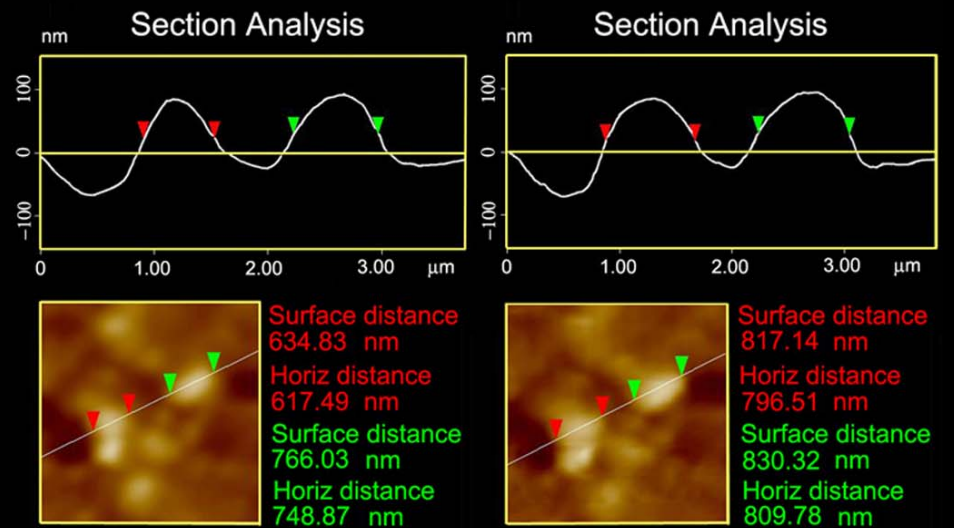
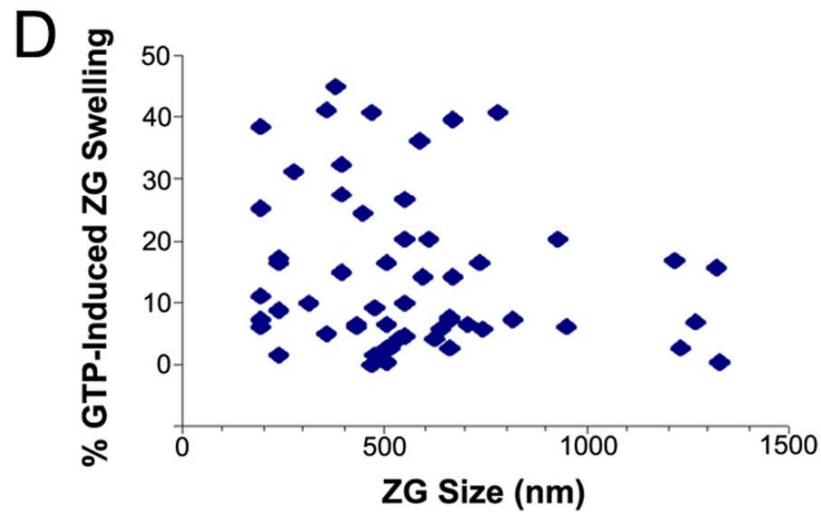
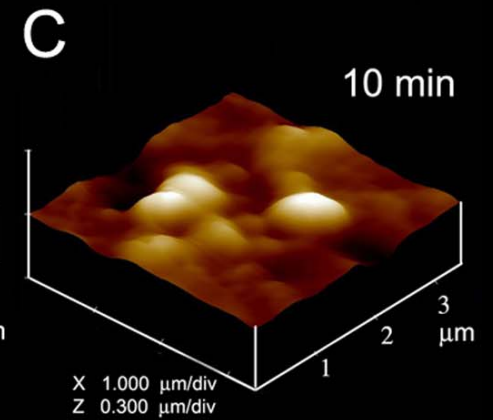
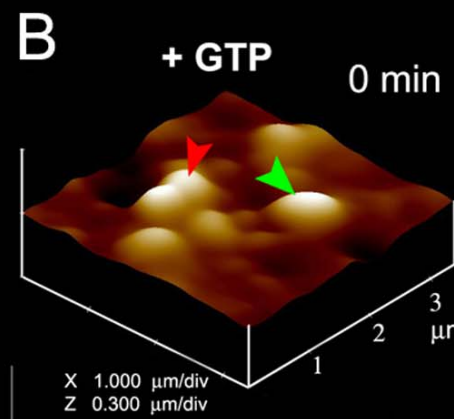
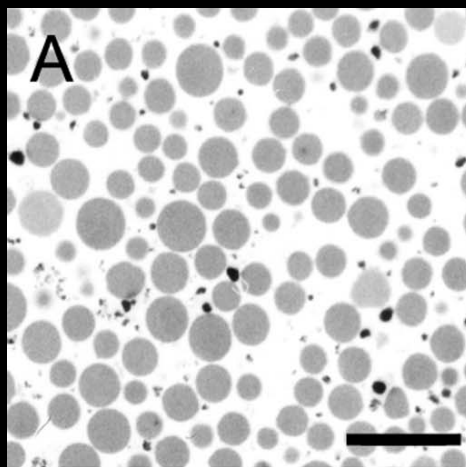
*Jena et. al. 1997 Proc. Natl. Acad. Sci. USA 94:13317-22*

# Vesicle Size Increase After Exposure to GTP

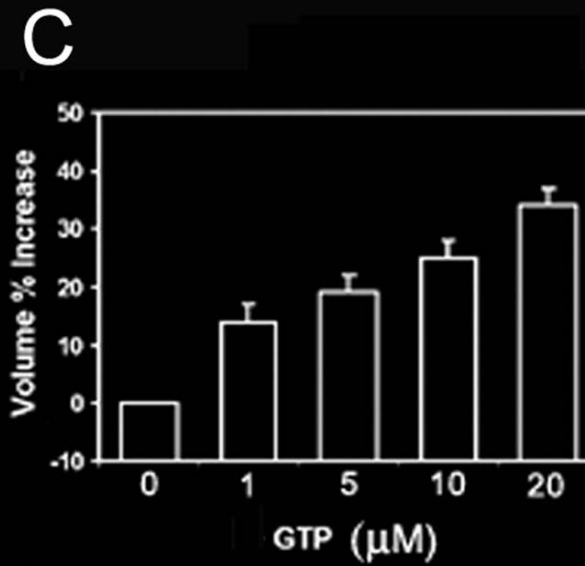
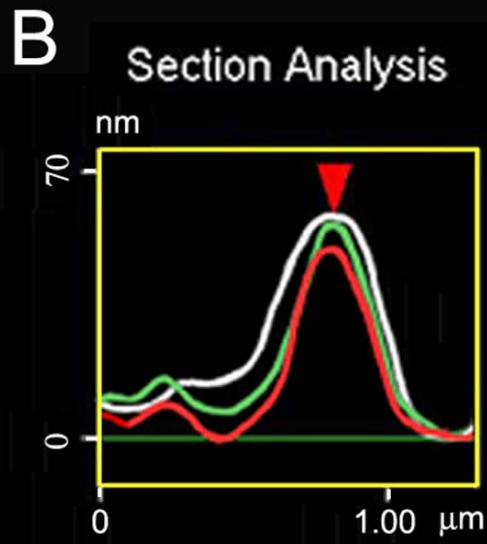
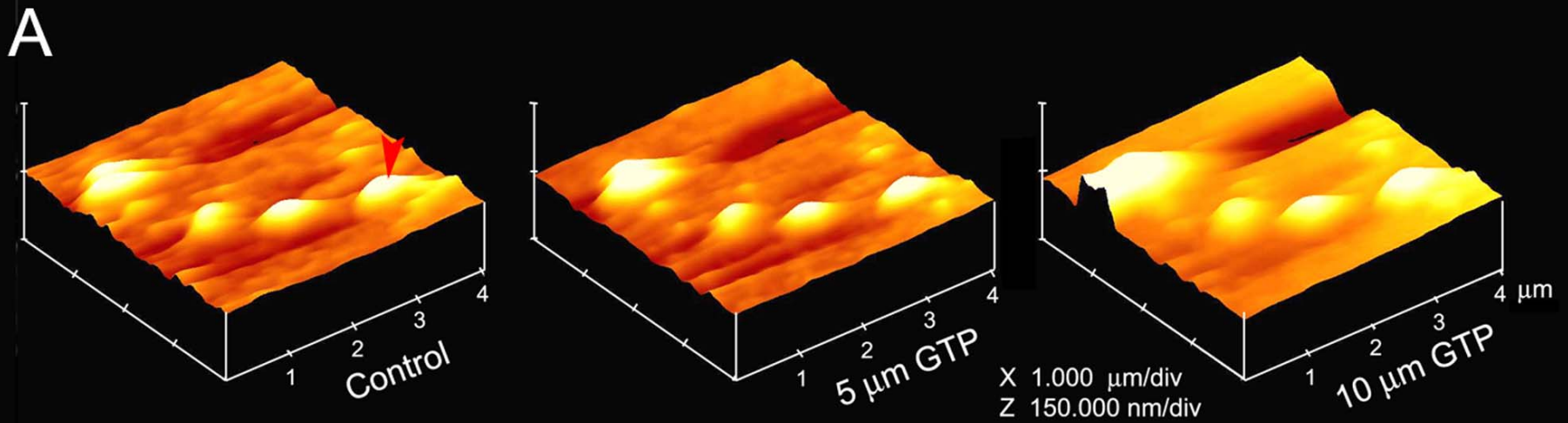


*Jena et. al. 1997 Proc. Natl. Acad. Sci. USA 94:13317-22*

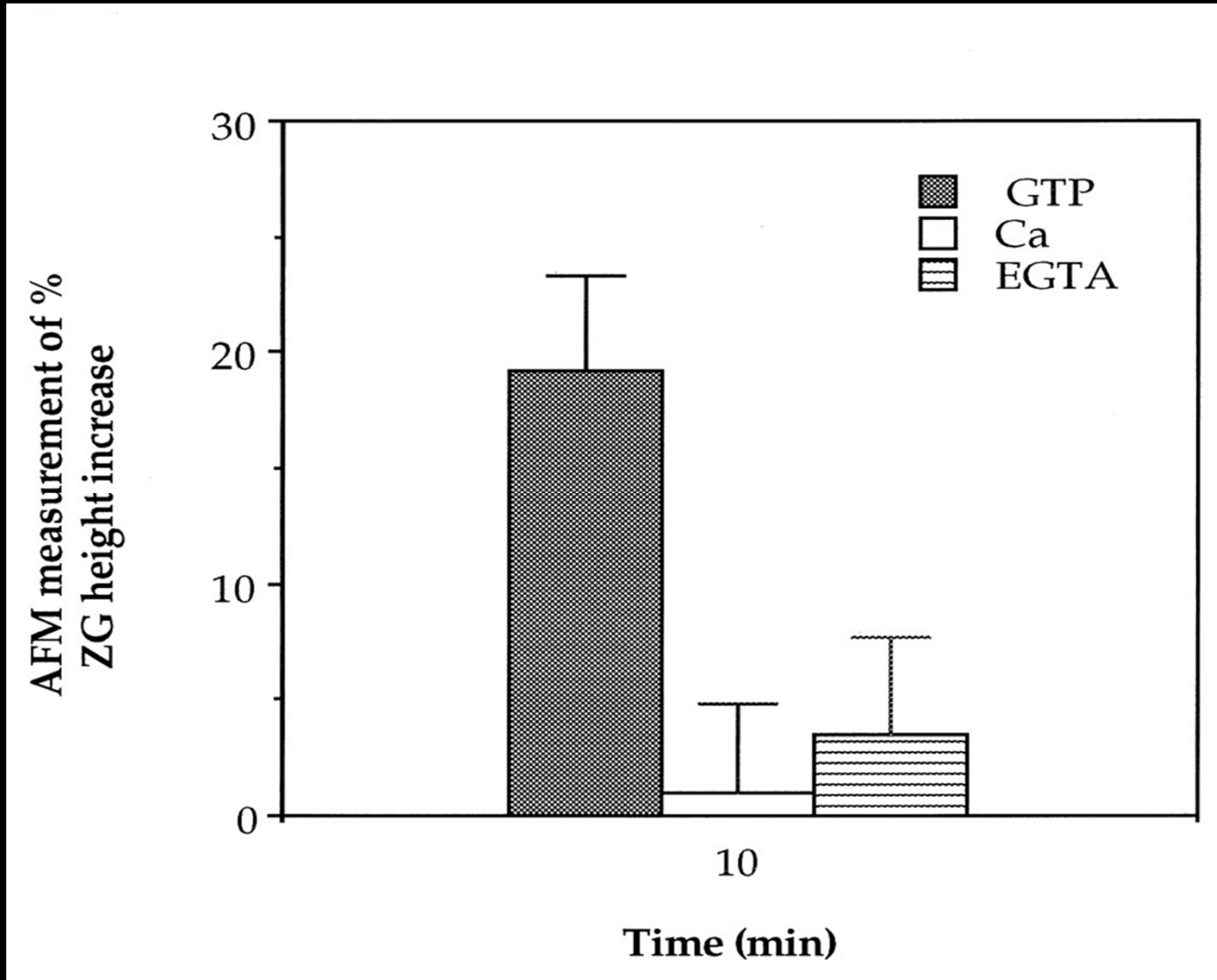




*Kelly et. al. 2004 Cell Biol. Int. 28:709-16*



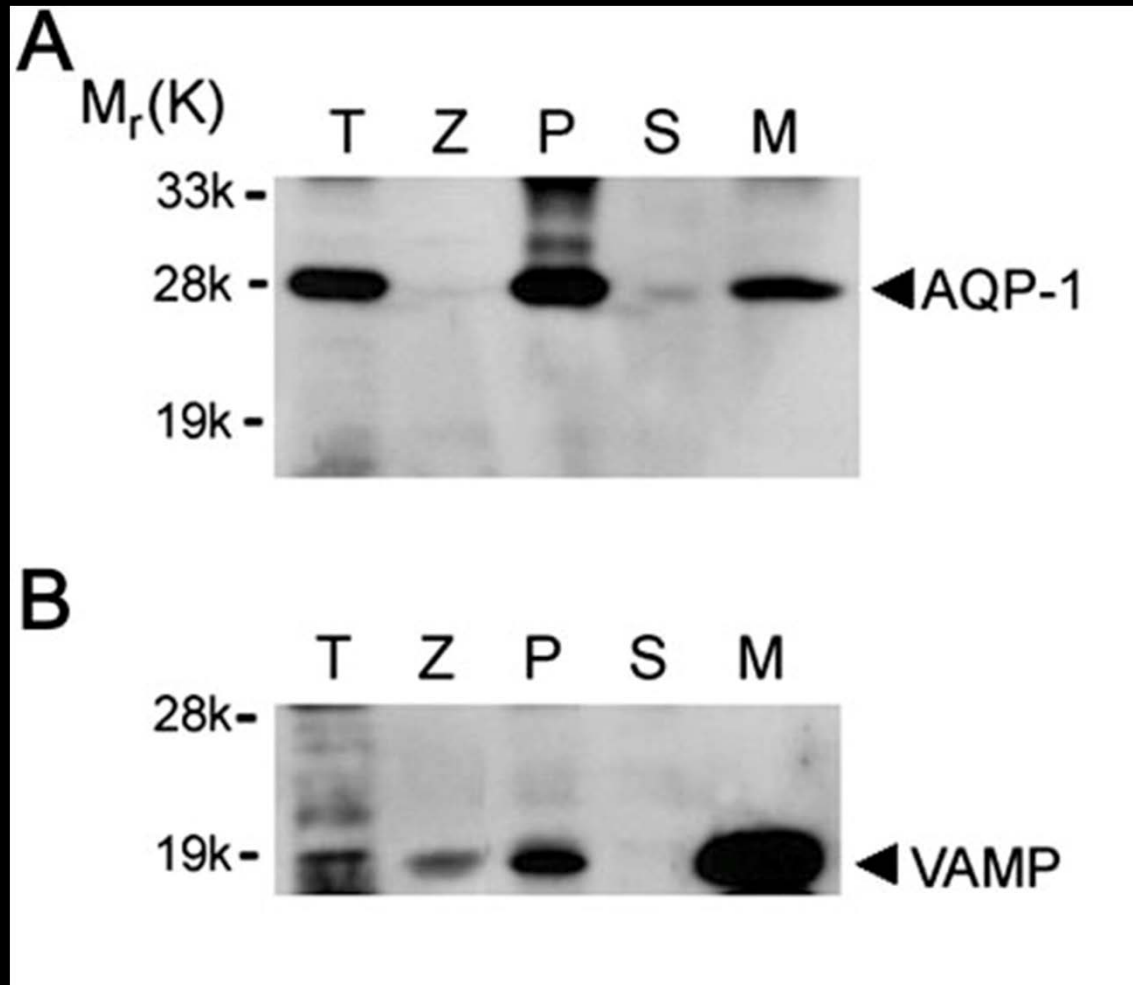
*Kelly et. al. 2004 Cell Biol. Int. 28:709-16*



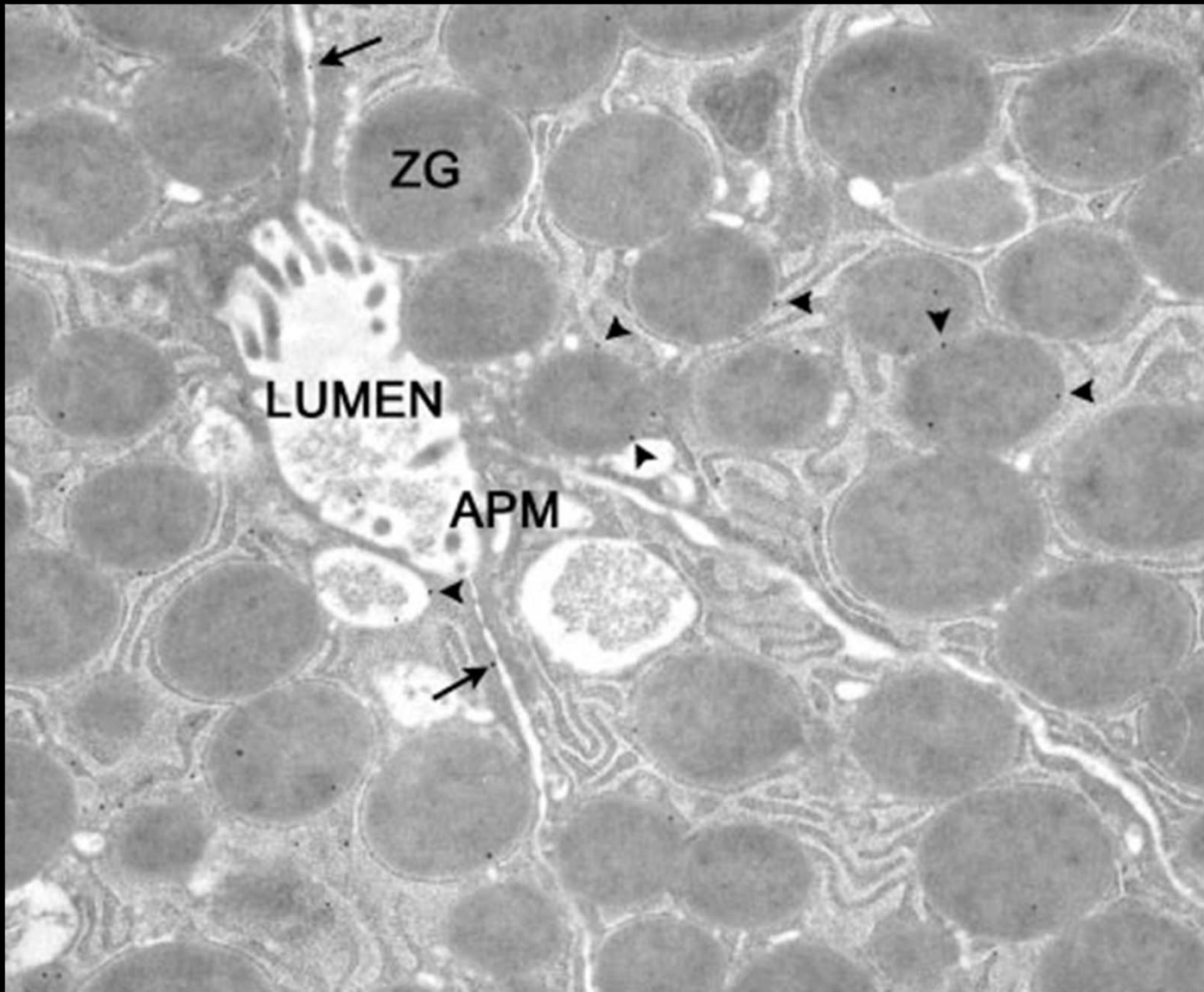
*Jena et. al. 1997 Proc. Natl. Acad. Sci. USA 94:13317-22*



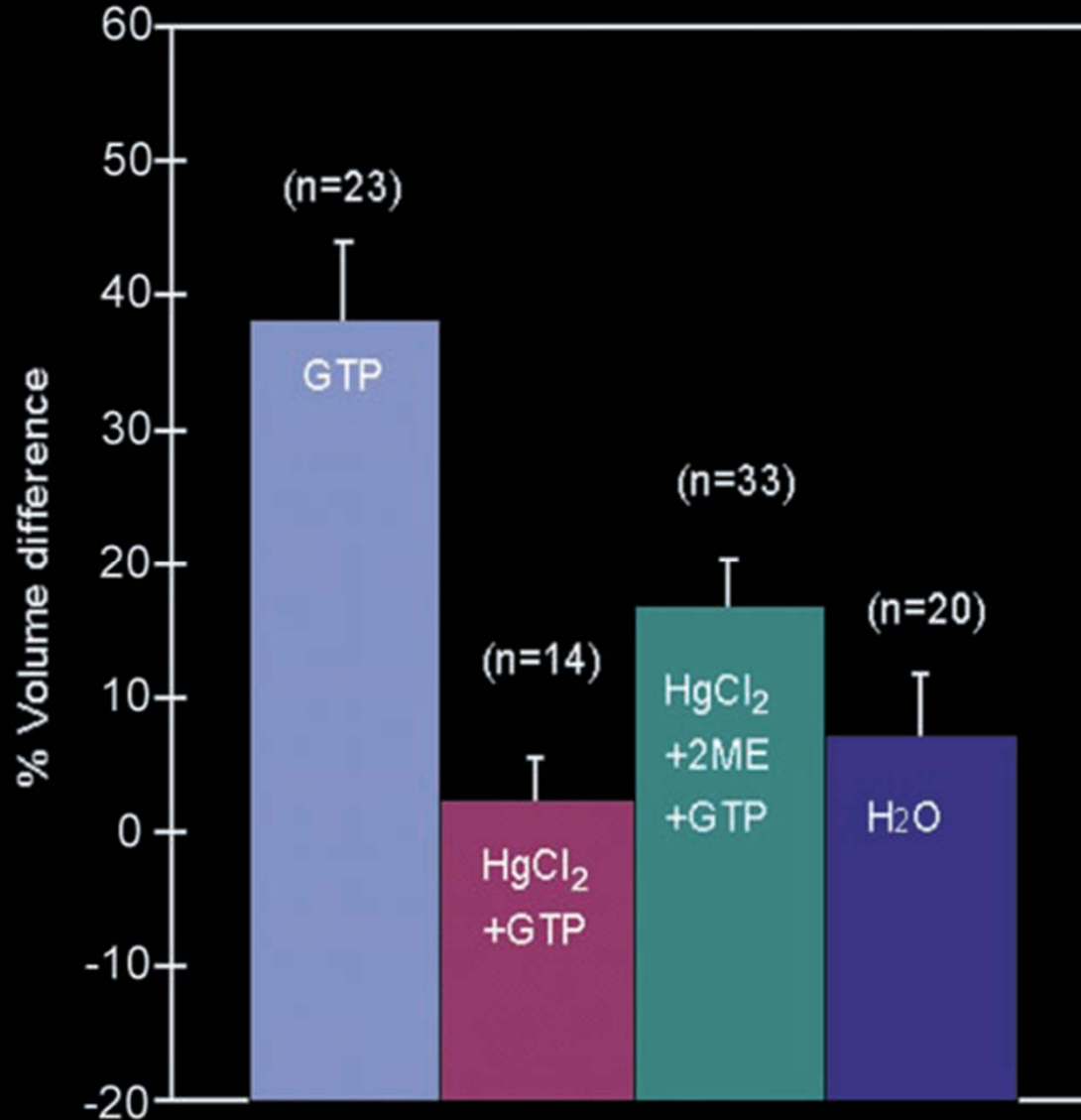
# Water-Channel AQP1 at ZG Membrane



*Cho et. al. 2002 Proc. Natl. Acad. Sci. USA 99:4720-24*

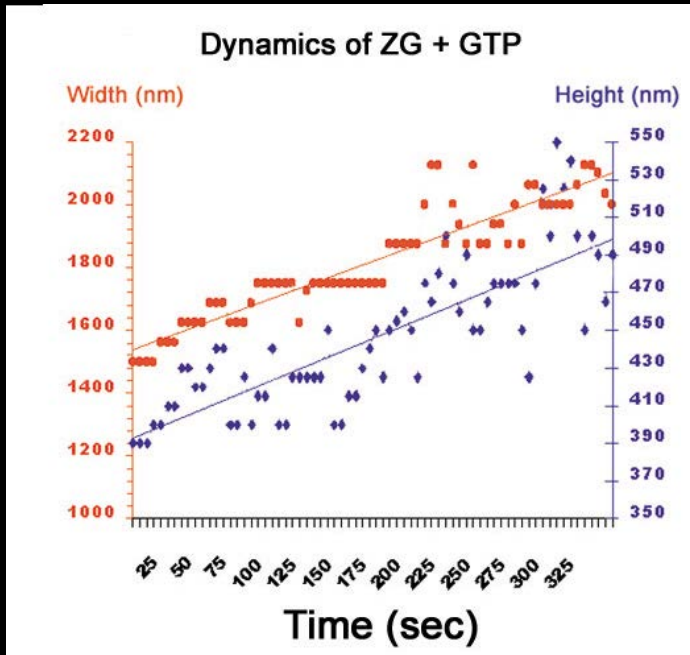
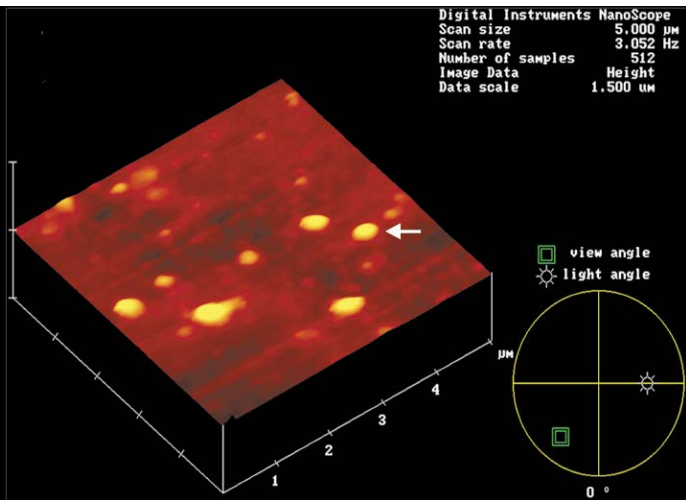


*Cho et. al. 2002 Proc. Natl. Acad. Sci. USA 99:4720-24*



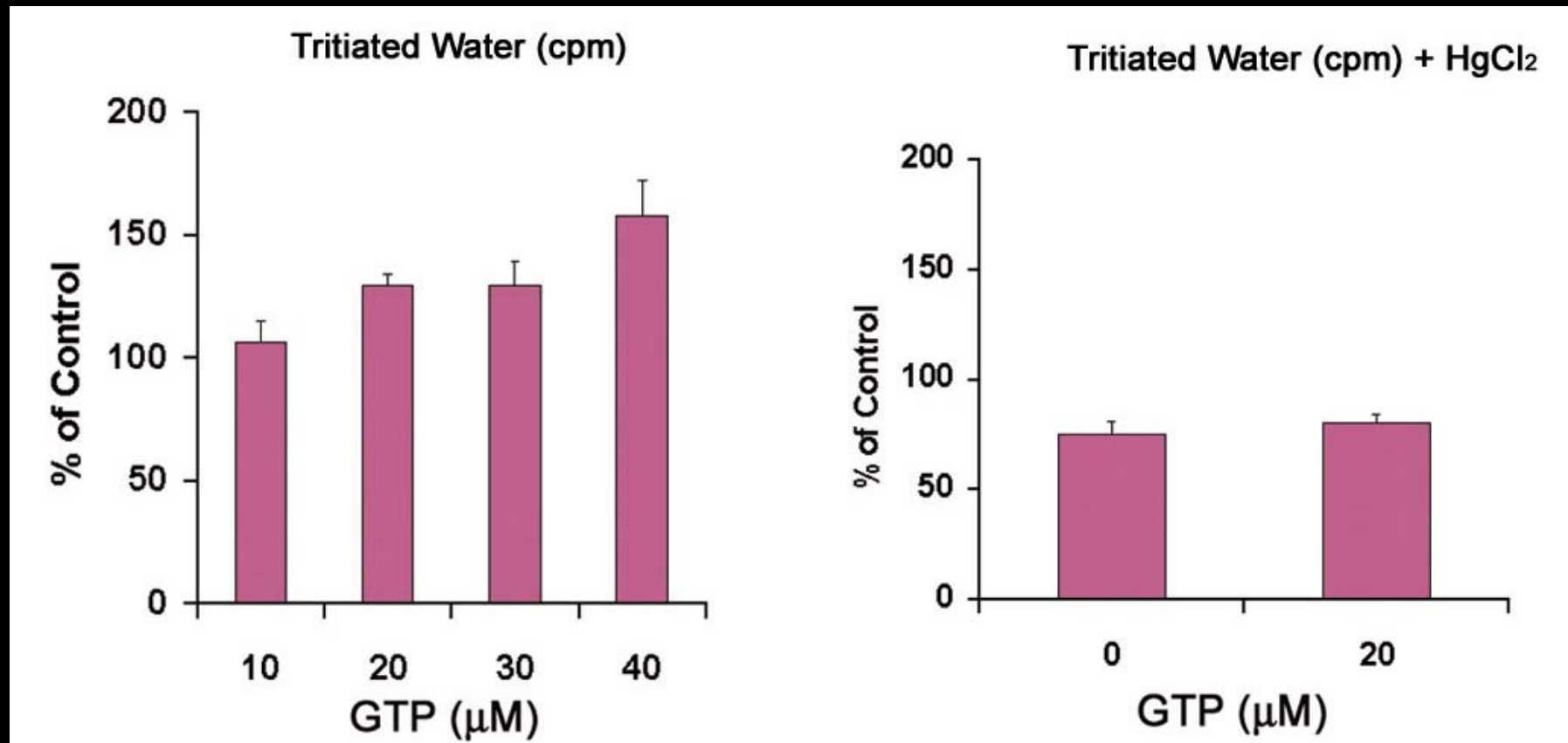
*Cho et. al. 2002 Proc. Natl. Acad. Sci. USA 99:4720-24*





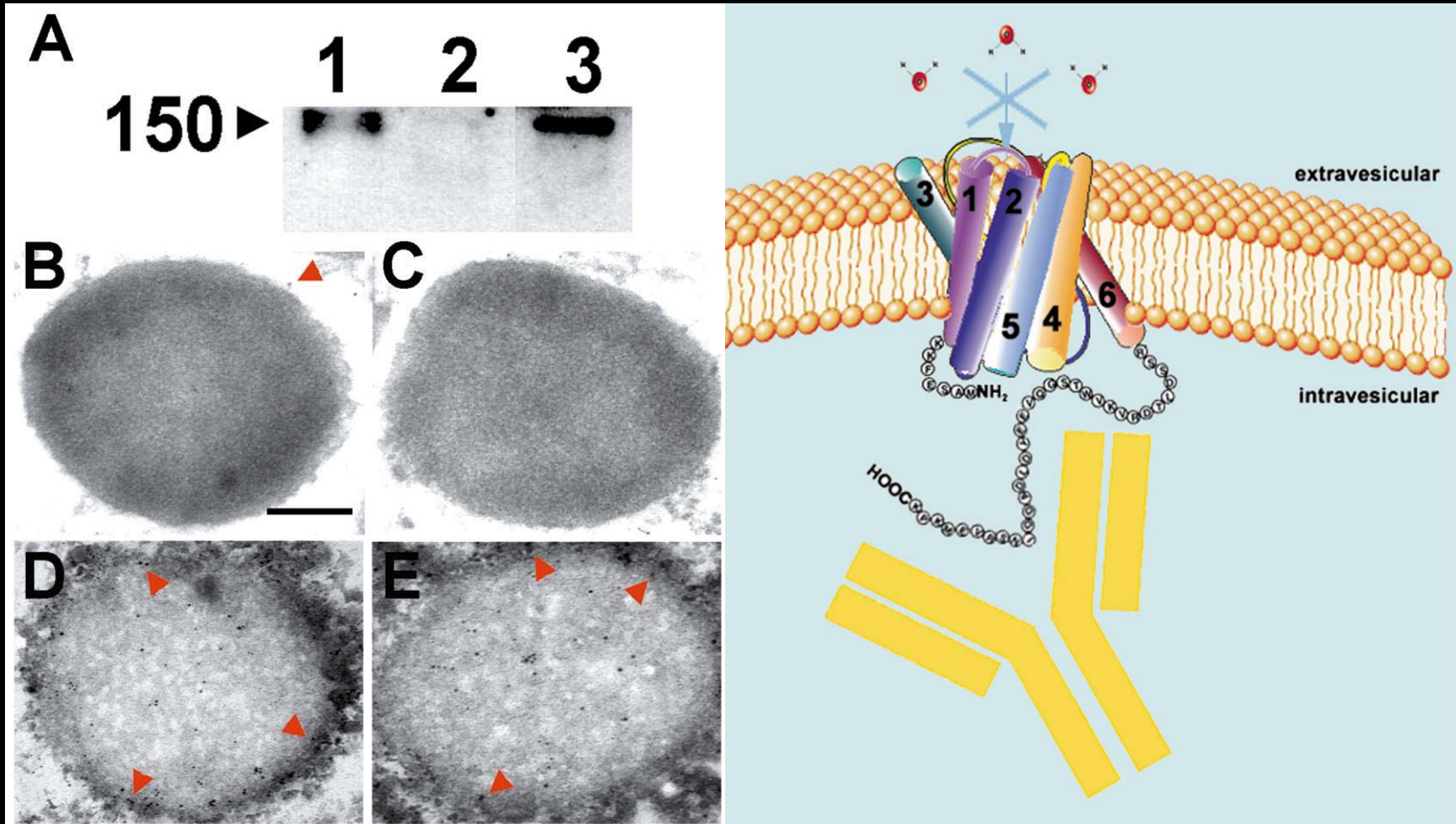
*Cho et. al. 2002 Proc. Natl. Acad. Sci. USA 99:4720-24*

# Tritiated Water Entry into ZG



*Cho et. al. 2002 Proc. Natl. Acad. Sci. USA 99:4720-24*

# Introduction of AQP1 antibody into ZG



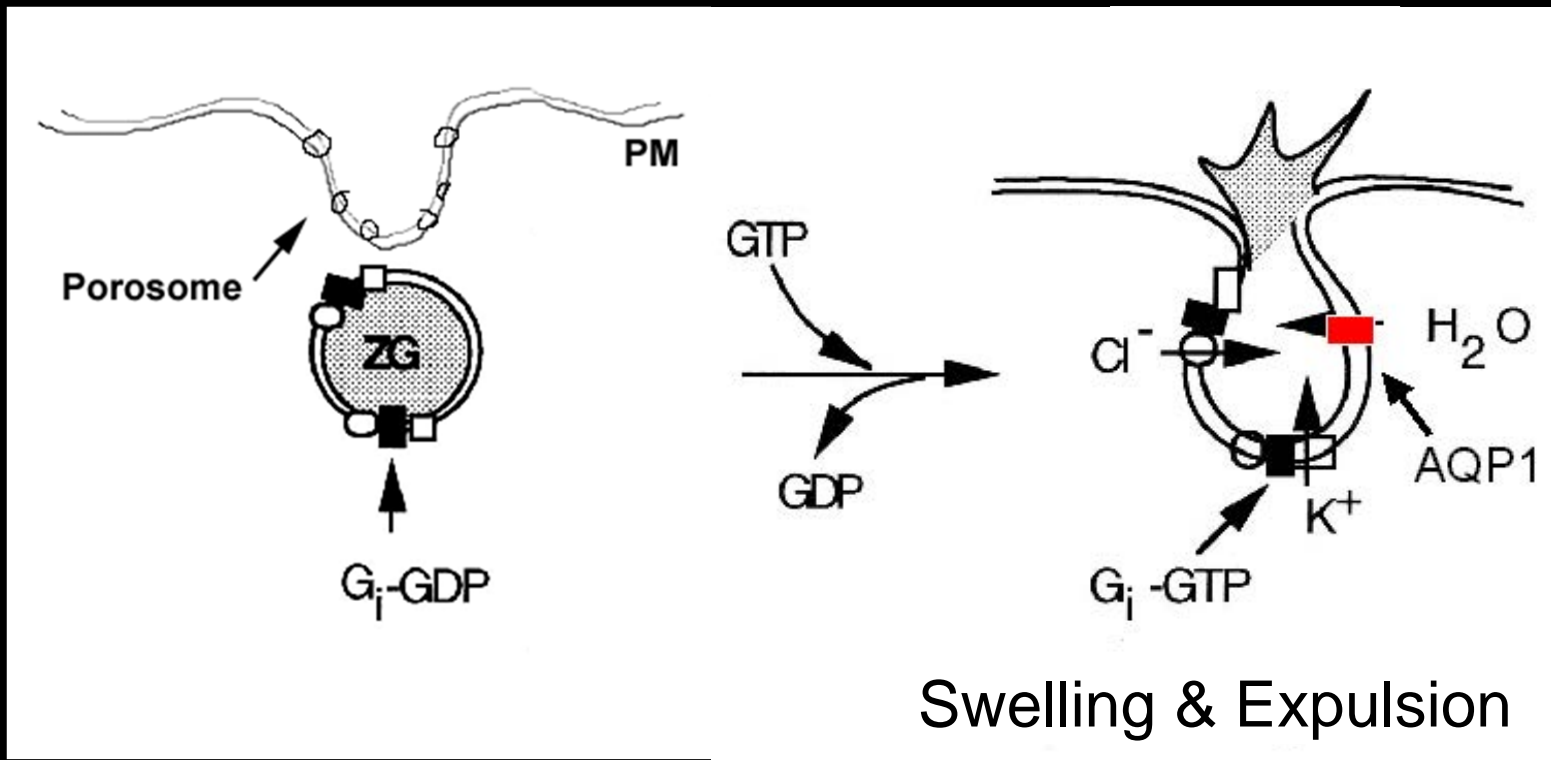
*Cho et. al. 2002 Proc. Natl. Acad. Sci. USA 99:4720-24*



*Cho et. al. 2002 Proc. Natl. Acad. Sci. USA 99:4720-24*



# Regulation of water entry into ZG

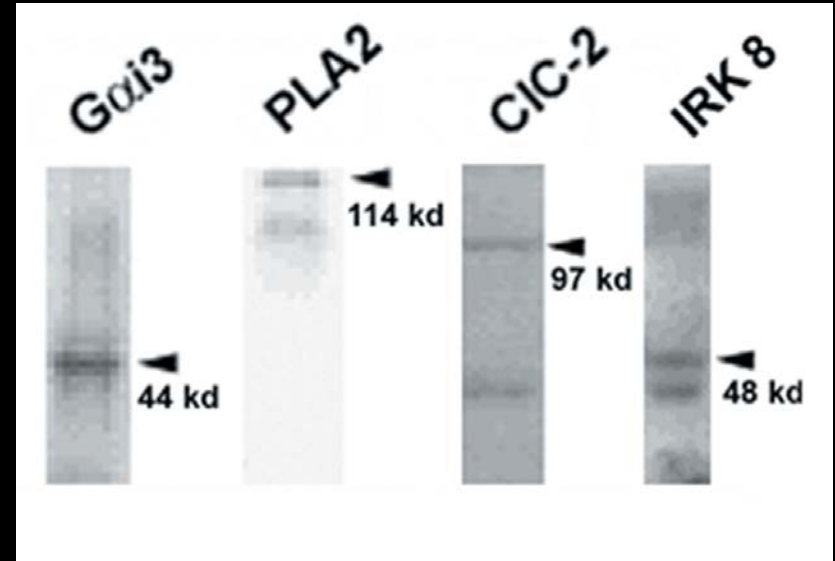


Jena et. al. 1997 PNAS Vol 94. 13317-22

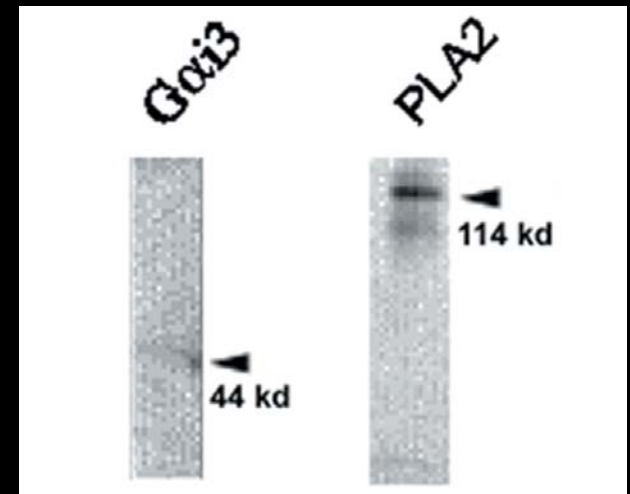
Cho et. al. 2002 PNAS Vol 99. 4720-24

# AQP1 Immunoisolated Complex

## Zymogene granules

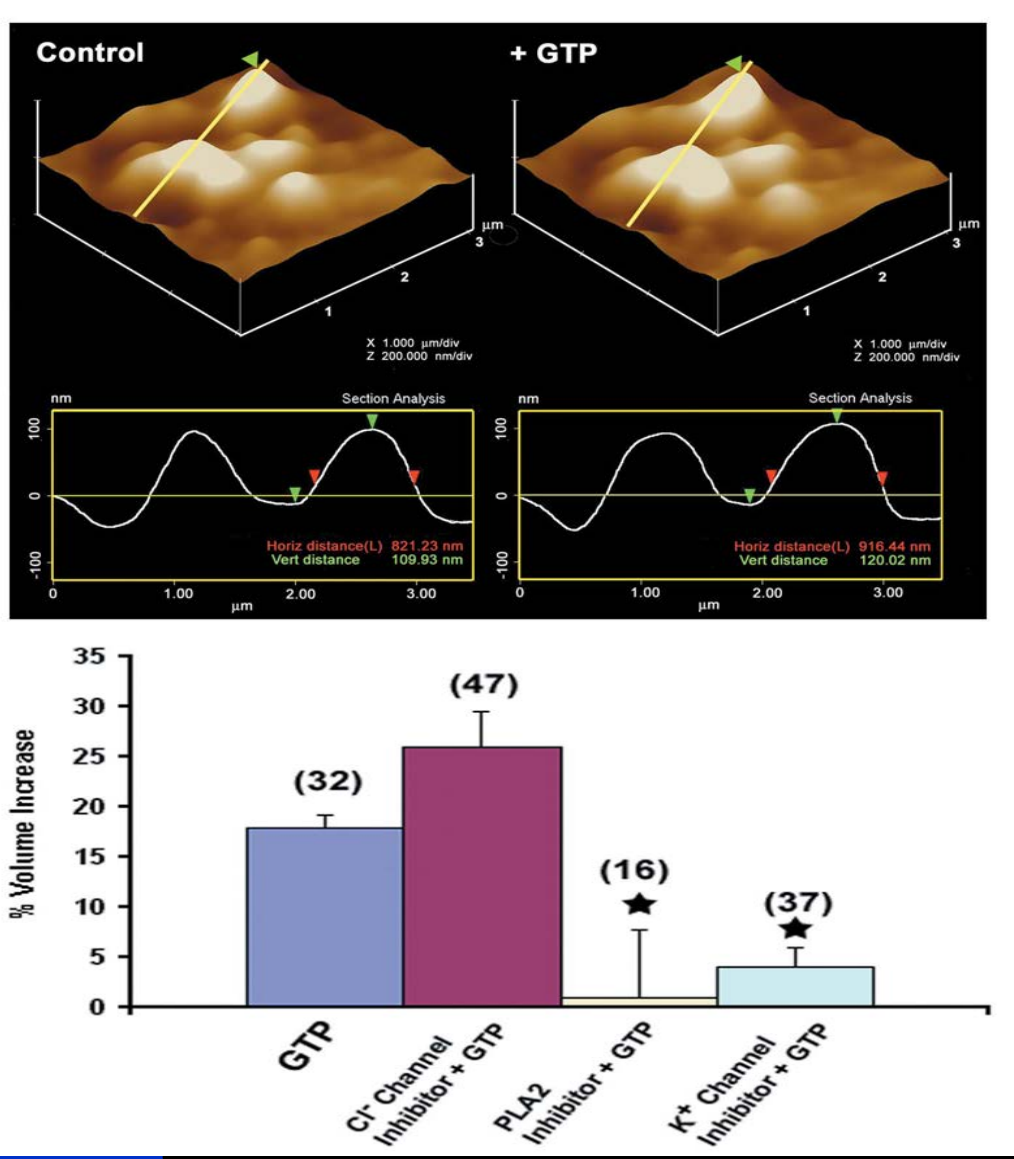


## Red blood cells



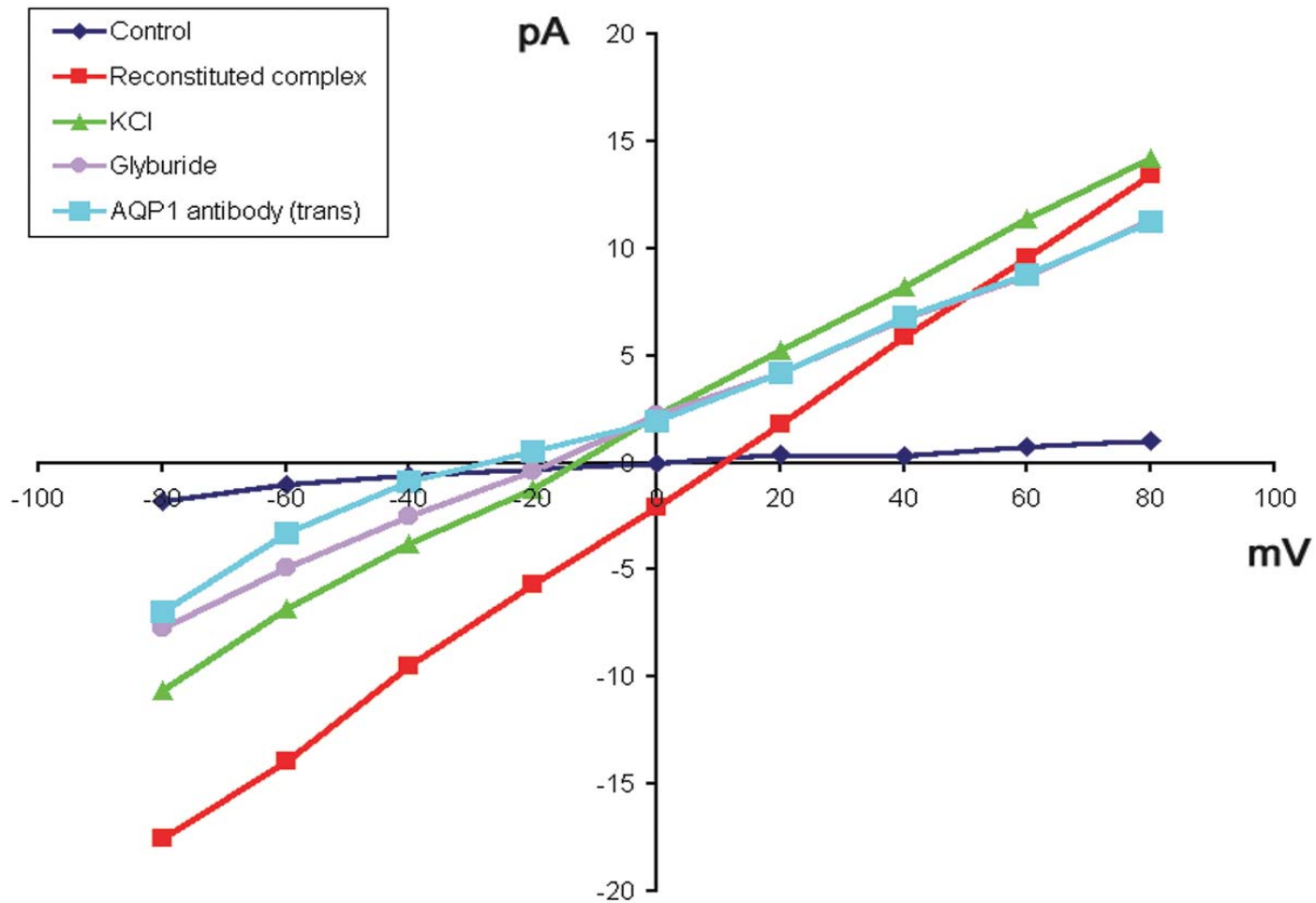
*Abu-Hamdah et. al. 2004 Cell Biol. Int. 28:7-17*

# ZG volume changes measured by AFM



*Abu-Hamdah et. al. 2004 Cell Biol. Int. 28:7-17*

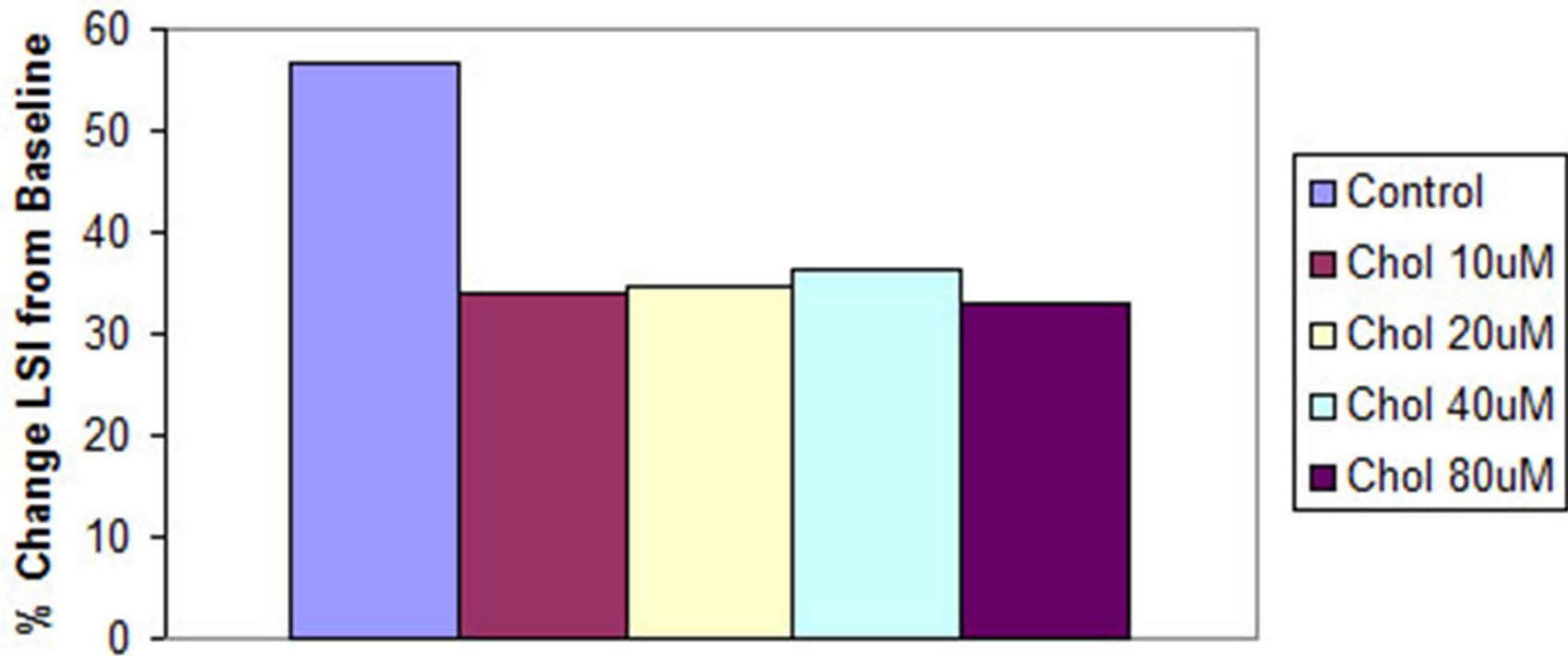
## Electrophysiological properties of AQP1-immunocomplex reconstituted in PC:PS bilayer



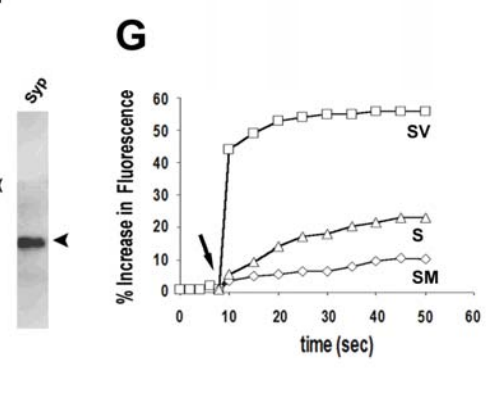
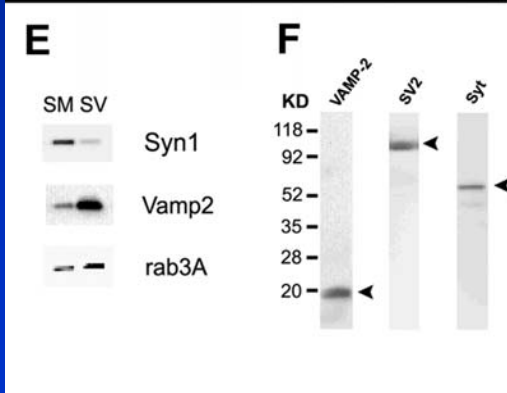
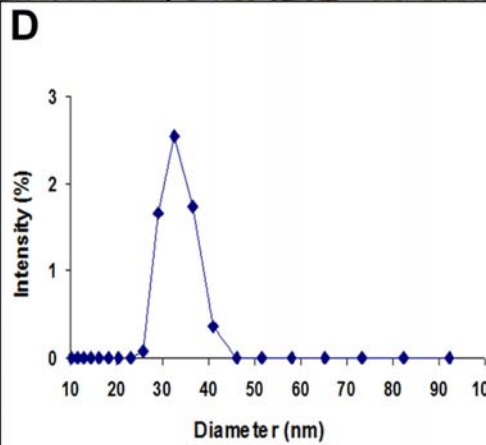
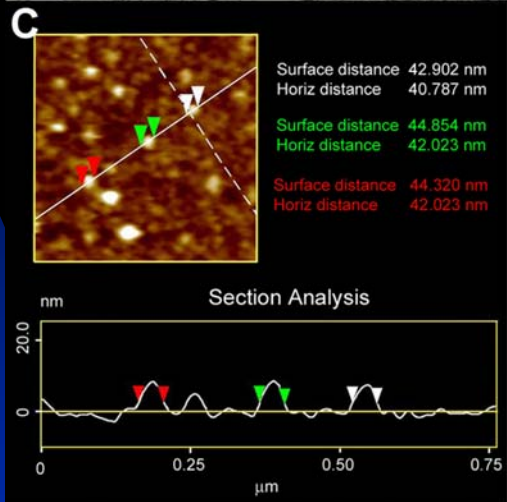
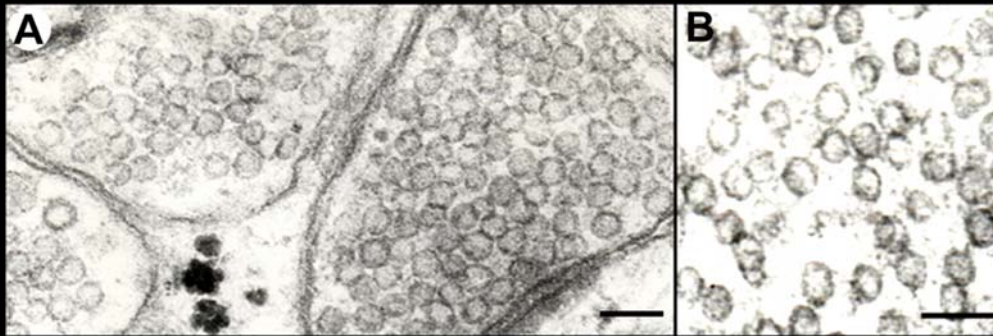
*Abu-Hamdah et. al. 2004 Cell Biol. Int. 28:7-17*



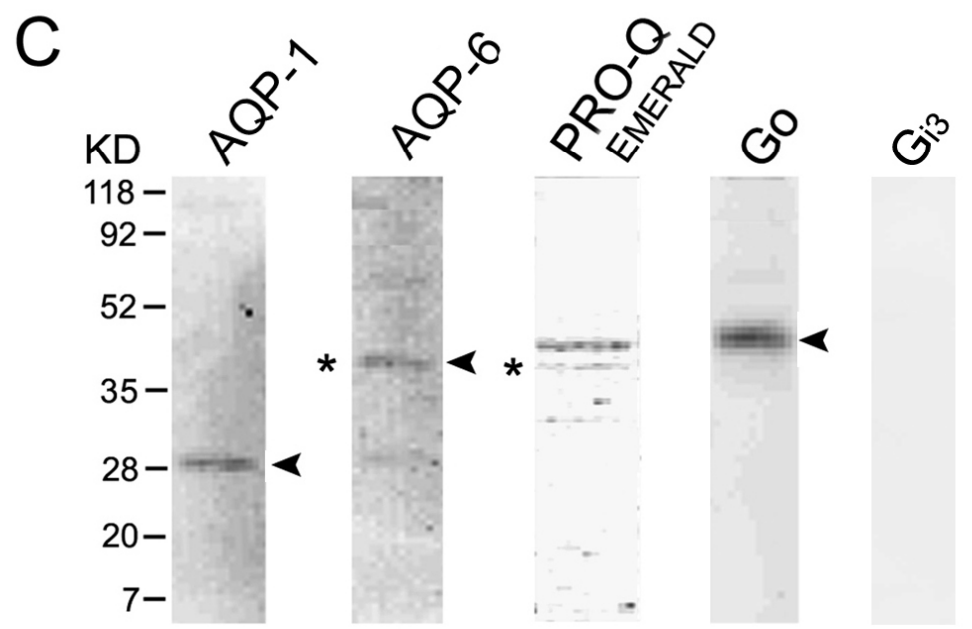
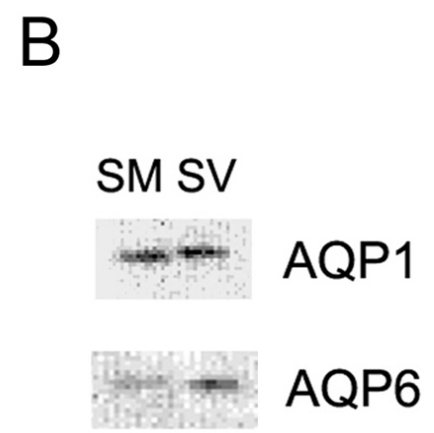
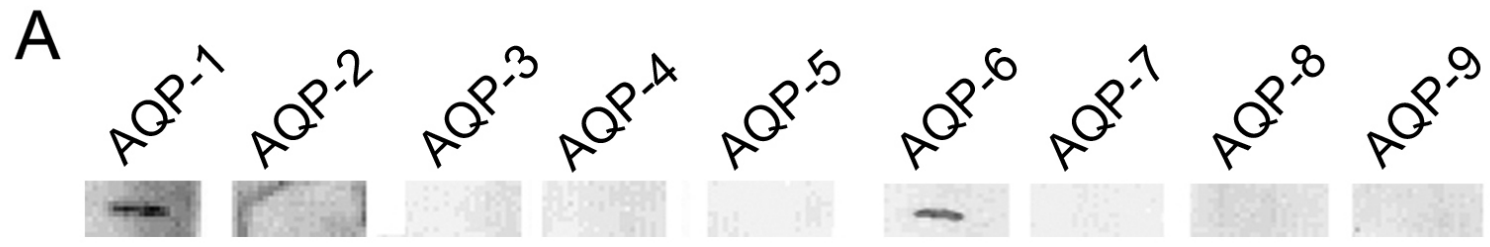
## ZG Swelling after Cholesterol Incubation



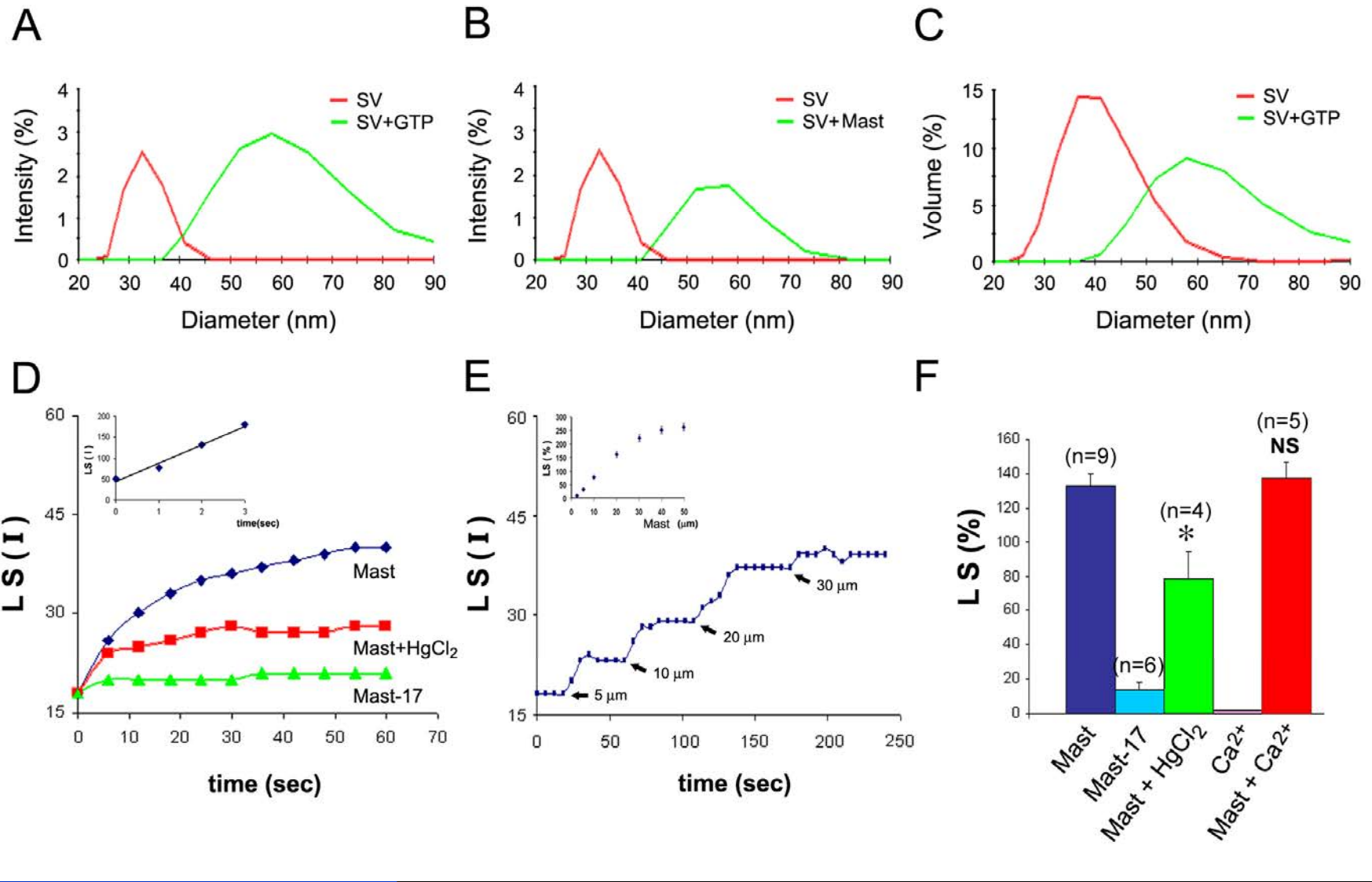
*Amanda F., Jena B.P. (unpublished observation)*



*Jeremic et. al. 2005 Exp. Biol. Med. 230:674-80*

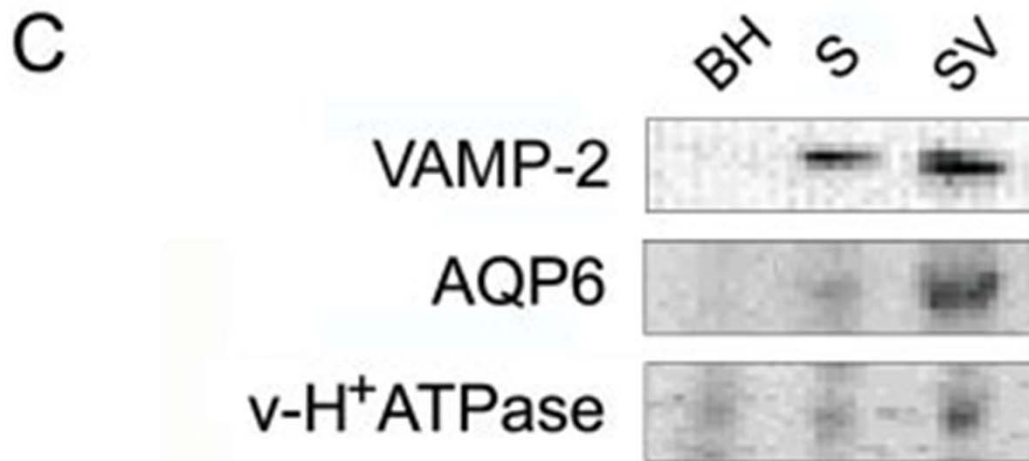
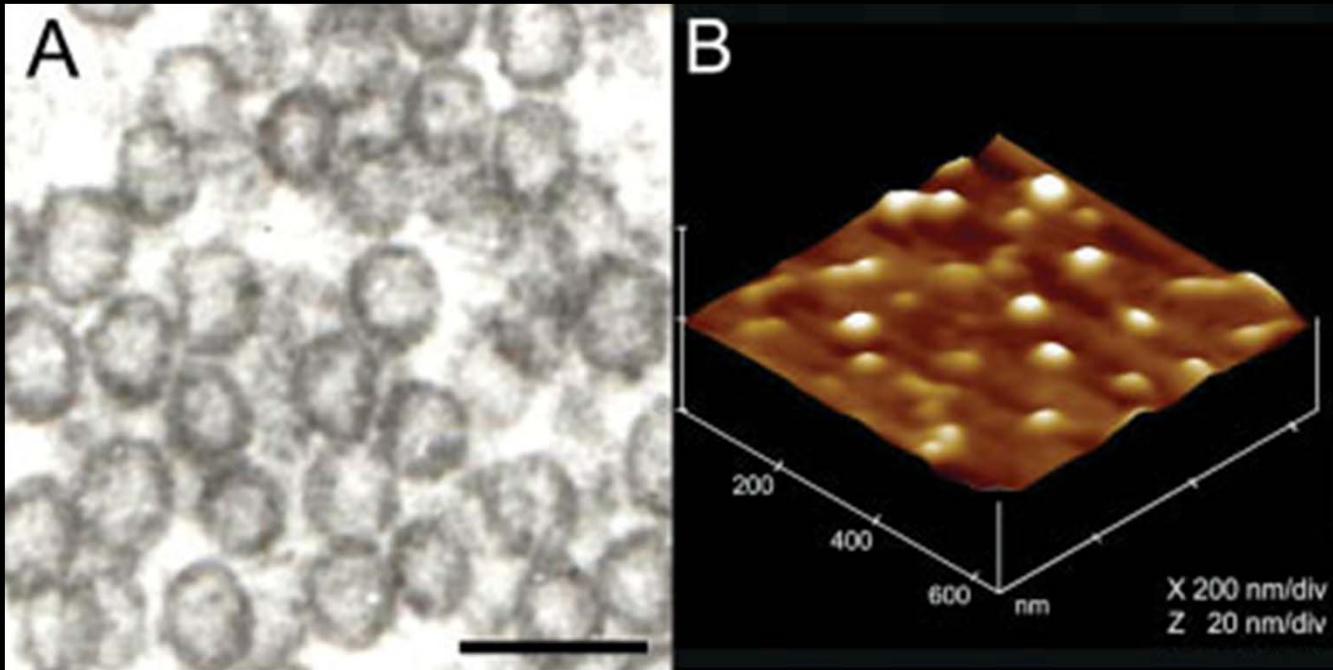


*Jeremic et. al. 2005 Exp. Biol. Med. 230:674-80*

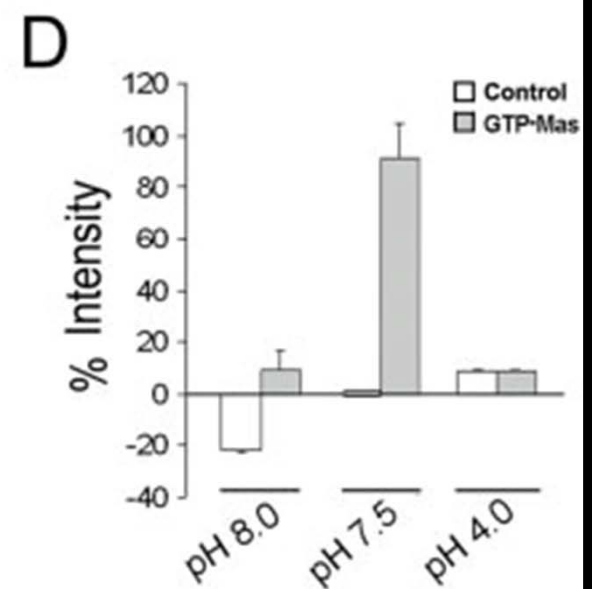
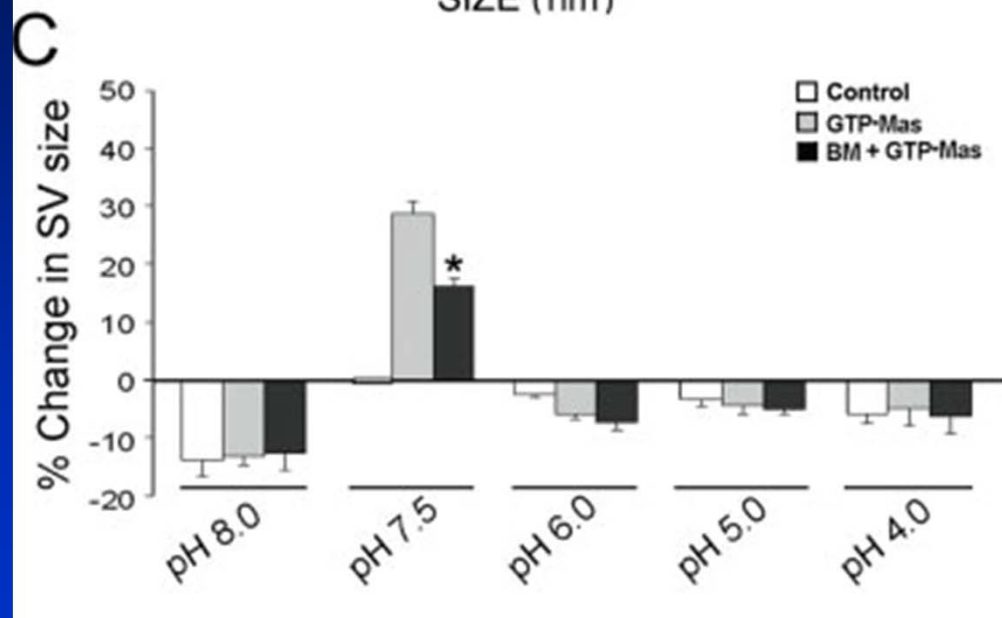
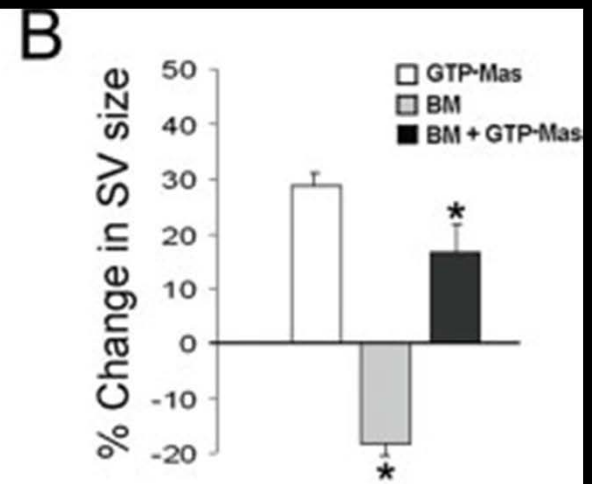
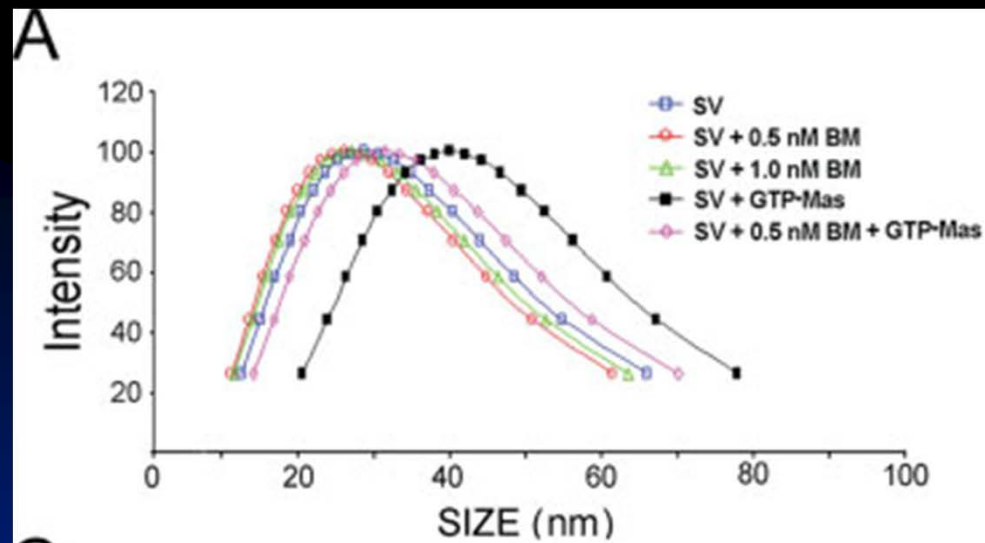


*Jeremic et. al. 2005 Exp. Biol. Med. 230:674-80*

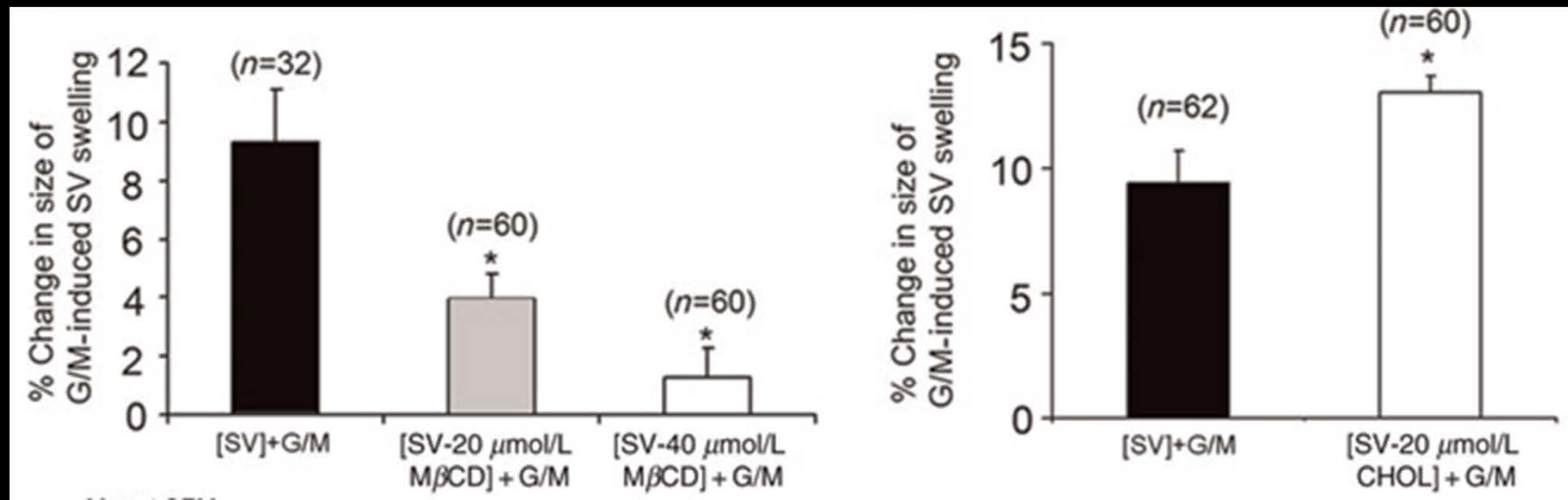




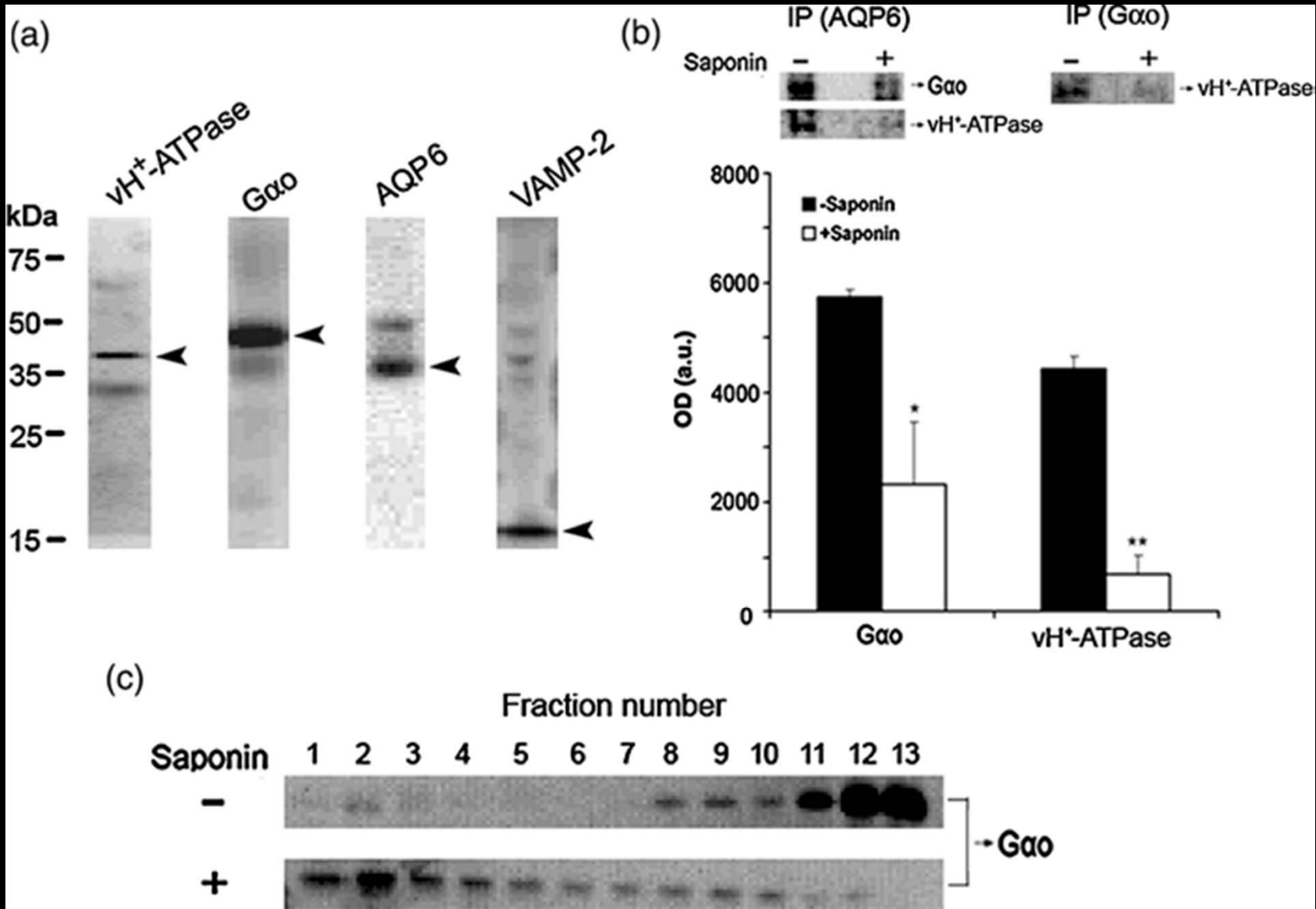
*Shin et. al. 2010 J. Neurosci. Res. 88:95-101*



*Shin et. al. 2010 J. Neurosci. Res. 88:95-101*

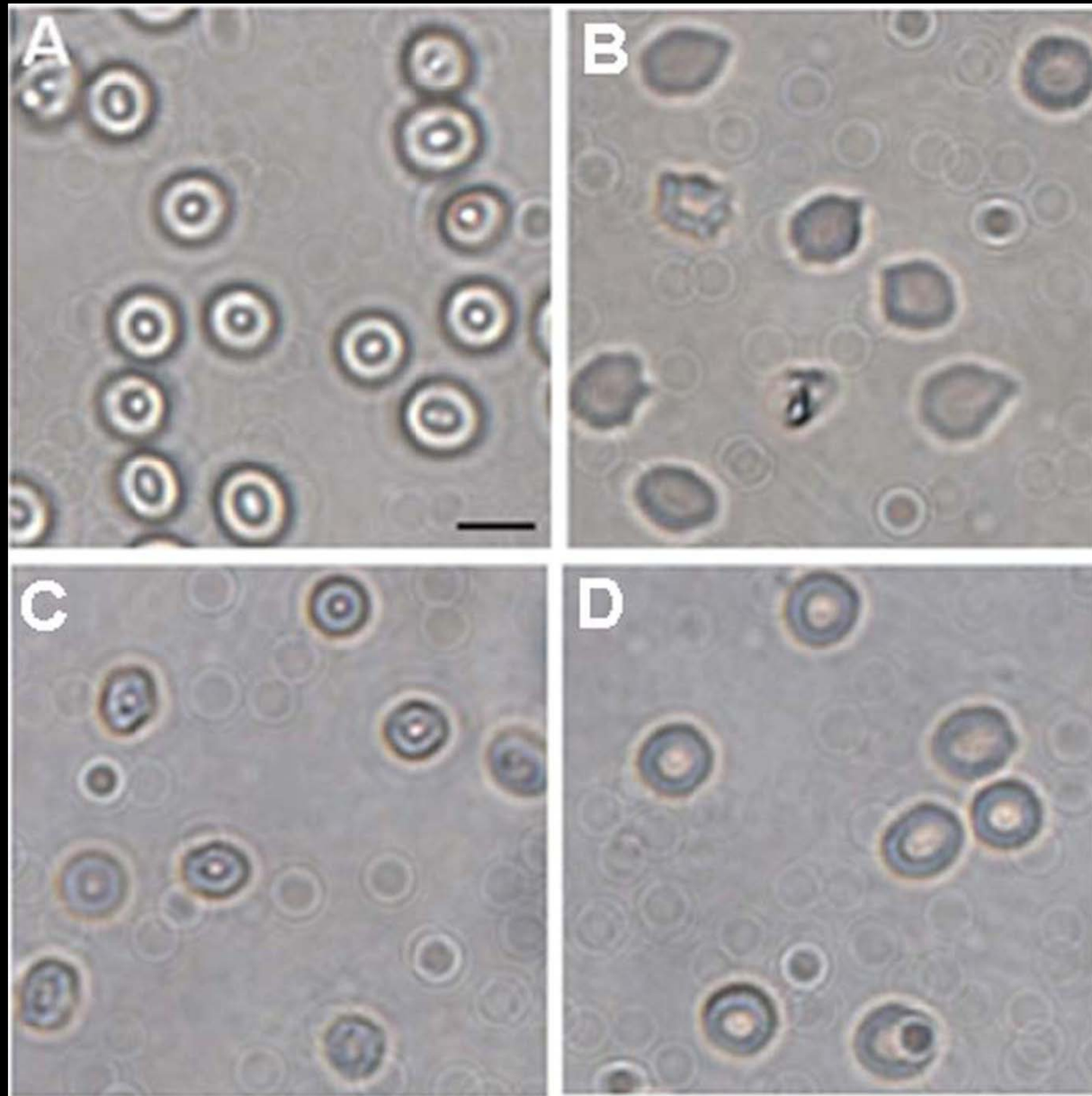


*Lee et. al. 2010 Exp. Biol. Med. 235:470-7*

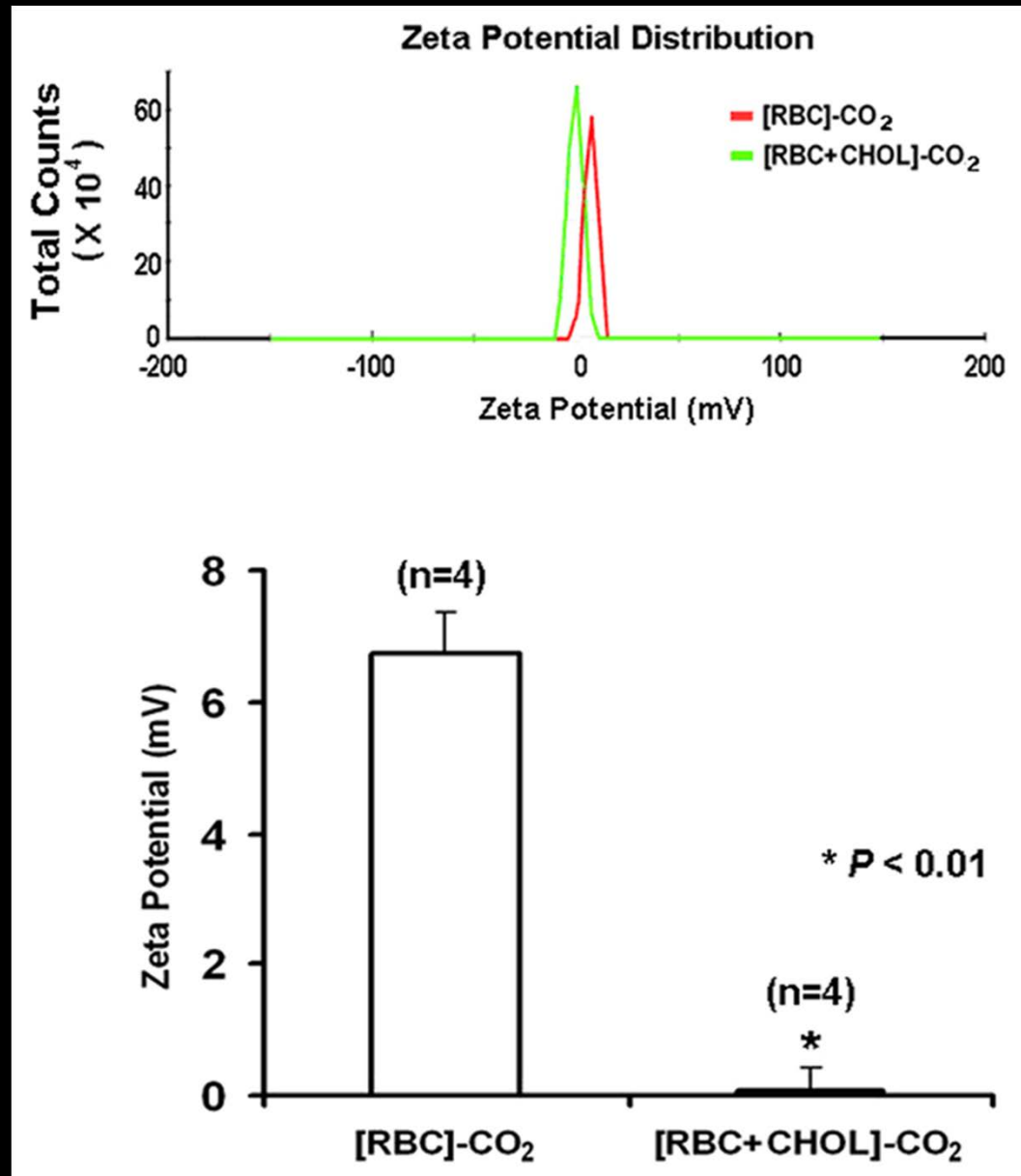


*Lee et. al. 2010 Exp. Biol. Med. 235:470-7*

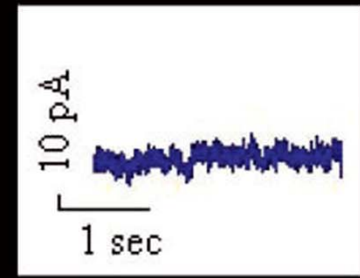
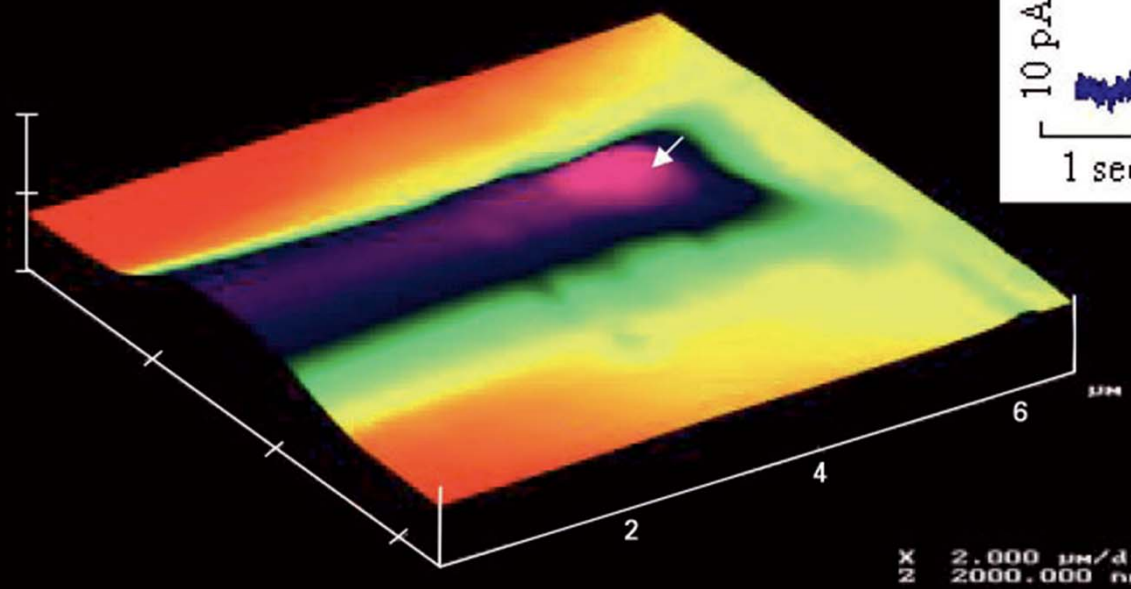
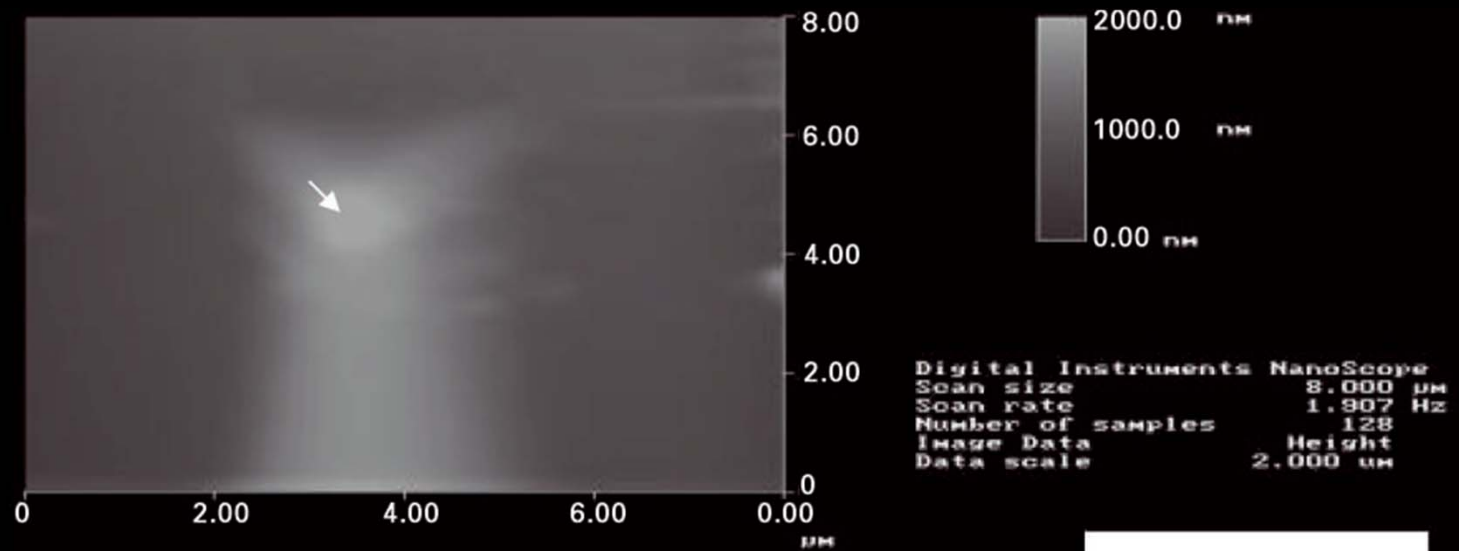




*Jena S.G., Lee J.-S. 2010 J. Biol. Phys. Chem. 10:127-34*



*Jena S.G., Lee J.-S. 2010 J. Biol. Phys. Chem. 10:127-34*



X 2.000 μm/div  
Z 2000.000 nm/div

*Kelly et al., 2005 Pancreatology 5:443-49*

