Glioblastoma multiform

*

Most aggressive and fatal brain tumor

*

Ranks third in cancer death in young adults

*

Of the 10 to 15% of patients that can undergo surgery, recurrence occurs in 80% of the cases

*

Chemotherapy and Radiation therapy lead to poor efficacy

*

Therapies fail mostly because residual tumor cells become resistant to treatments

*

Alternative therapies such as Photodynamic Therapy (PDT), and knowledge on the pathogenesis of Gliomas could lead to improved treatment and prognosis

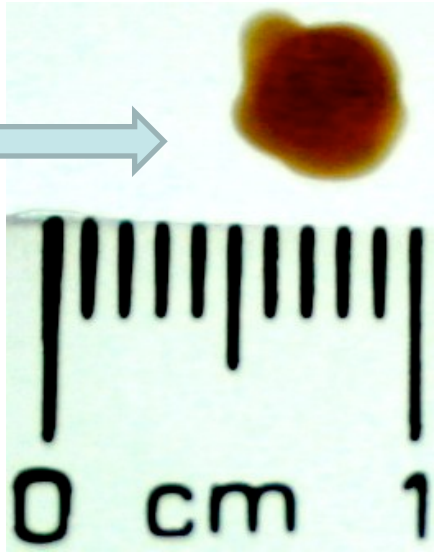
Glioblastoma multiform: multicell spheroid model

Human Brain Tumor

A generous gift of G. Granger
UC Irvine

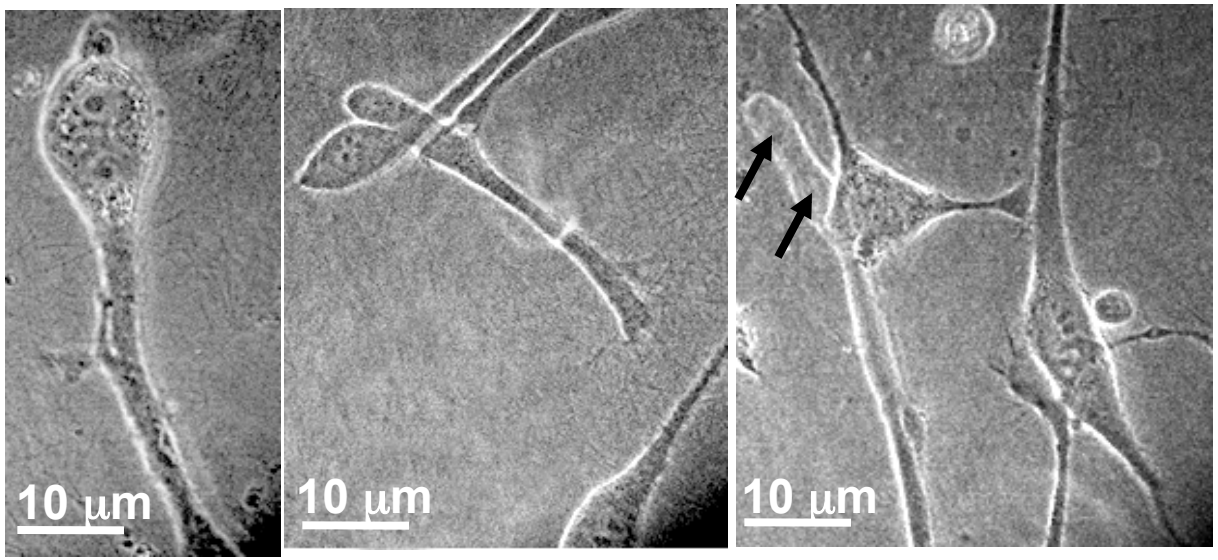
Sutherland, R.M.,
Science,
1988. 240: p. 177-184.

Human Brain Tumor in the Petri dish



Collaboration with Dr. Henry Hirschberg and
Dr. Chung-ho Sun
Beckman Laser Institute
UC Irvine

Focus: live migrating cells



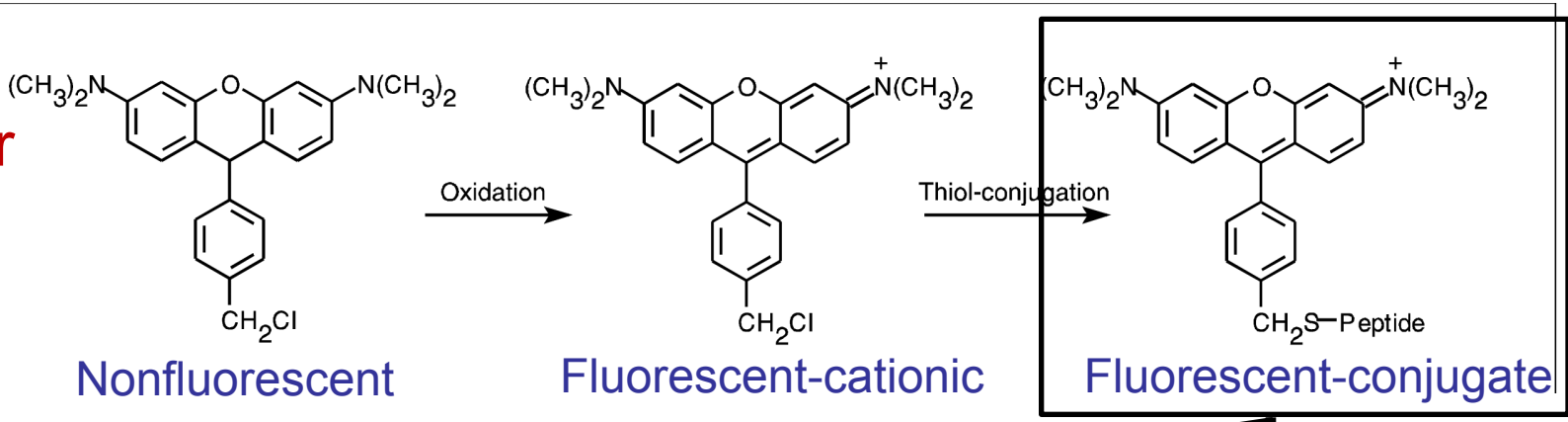
(a) Migrate in clusters

(b) Clearly interact with one another

(c) Majority is double-nucleated

Uptake of mitochondrial dyes identifies the mitochondria in ACBT glioblastoma model

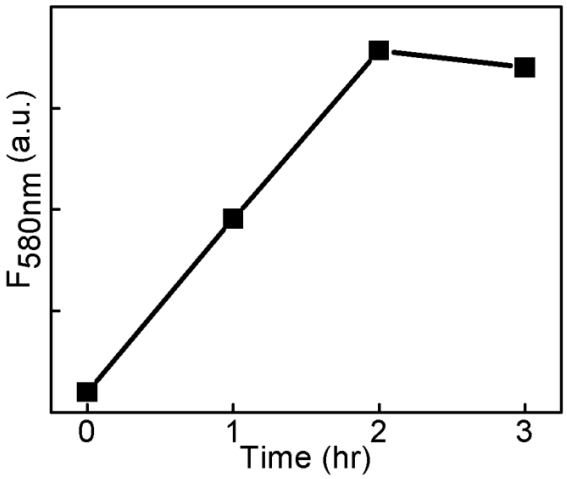
MitoTracker Orange

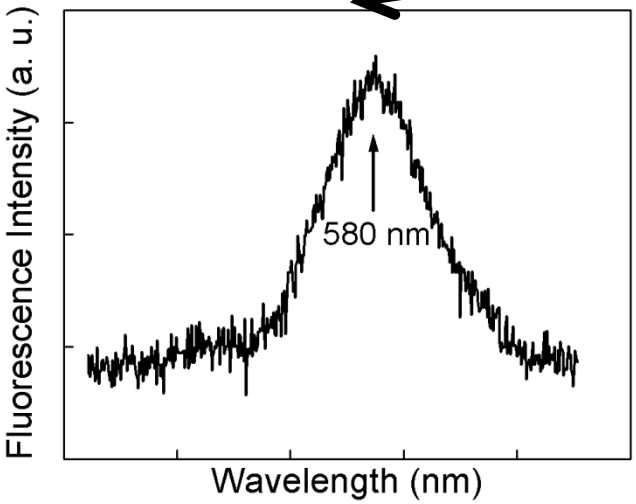


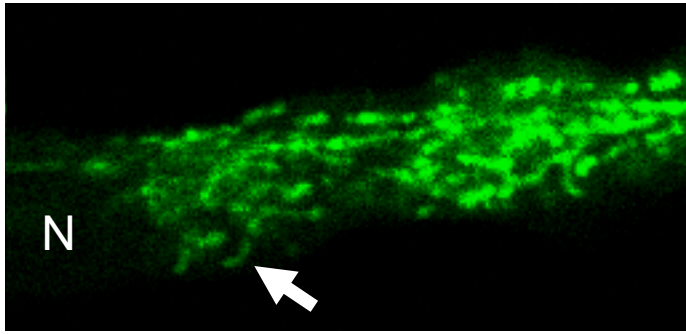
Nonfluorescent

Fluorescent-cationic

Fluorescent-conjugate

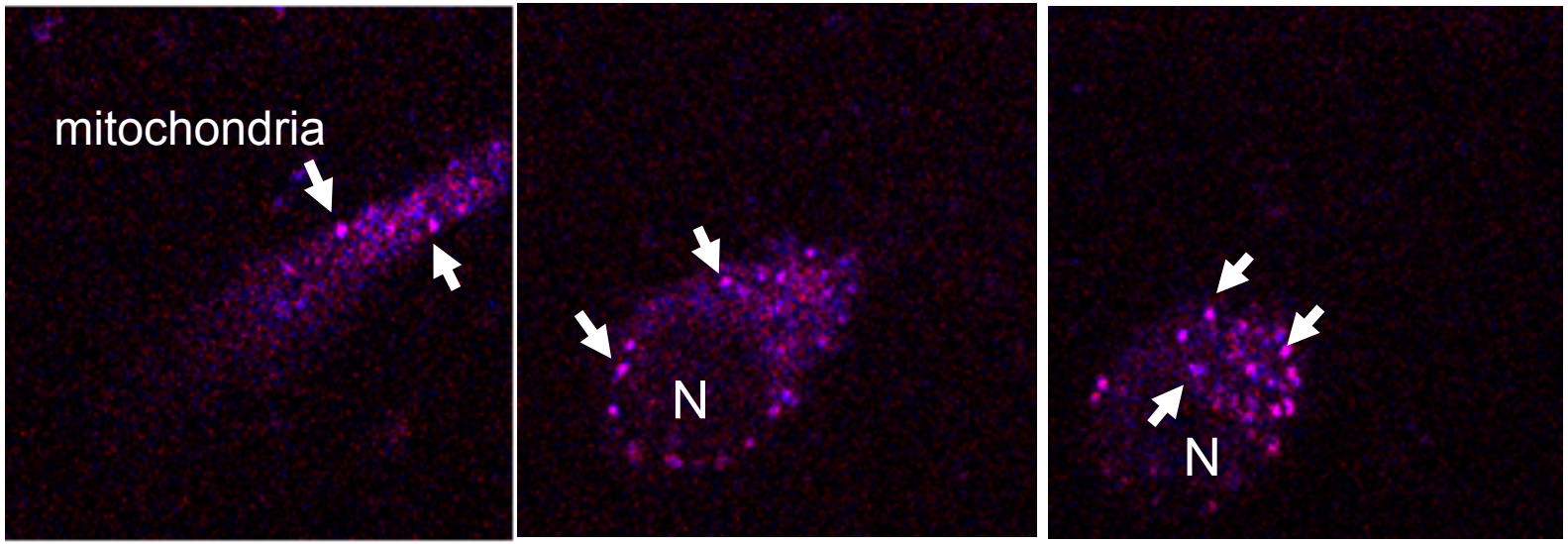






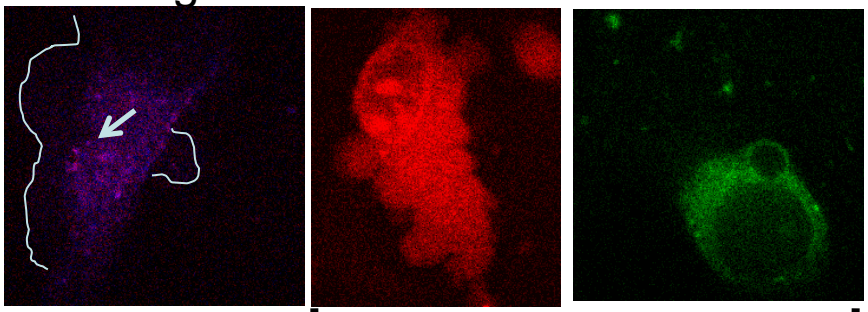
- Uptake takes a few hours

J.G. Lyubovitsky ACS 2008



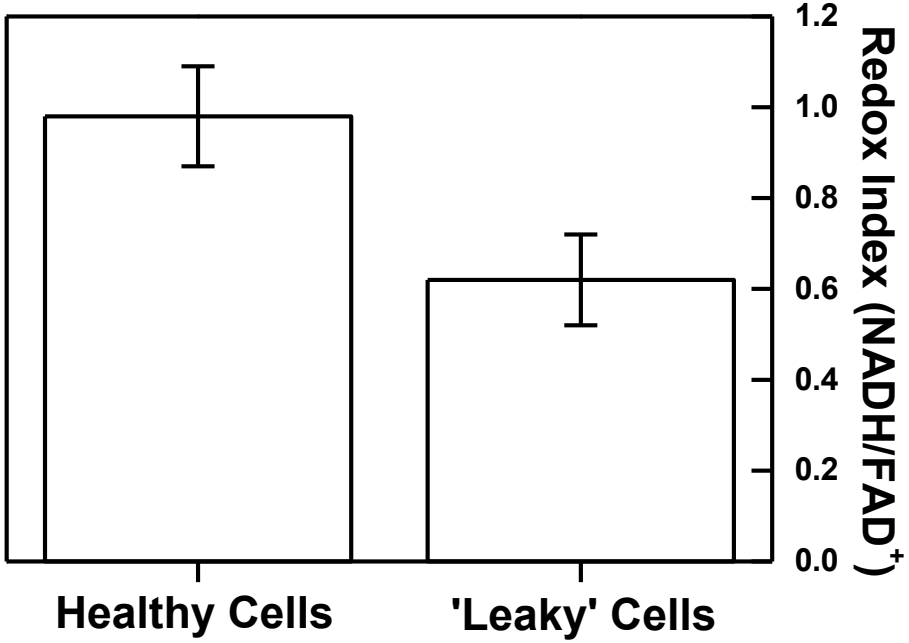
- Bubble formation
- Swelling
- Leaking Membranes

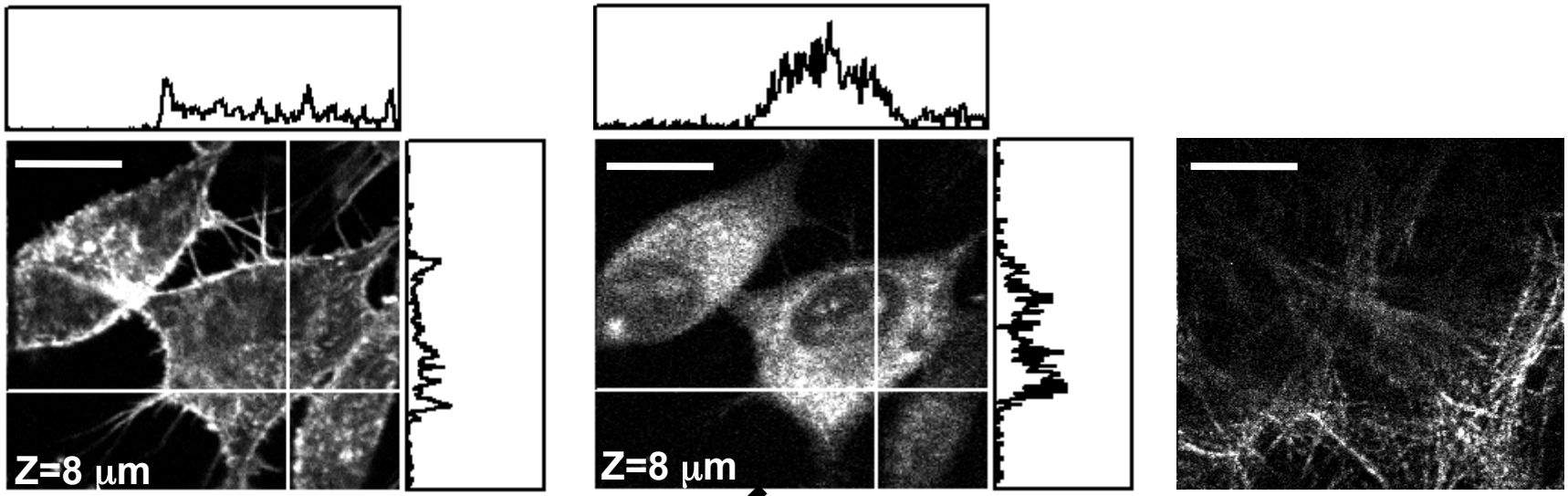
'Leaky Cells'

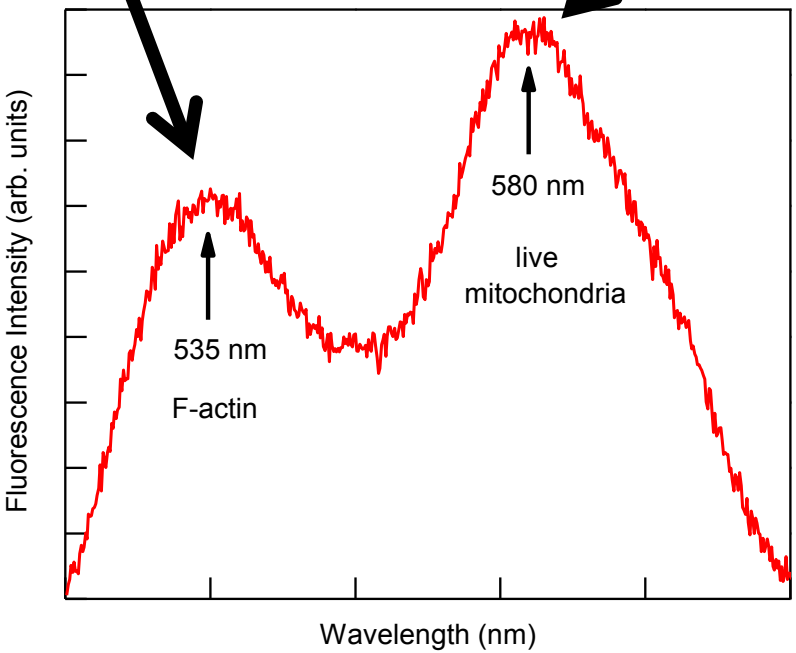


no dyes

+ a mitochondrial dye



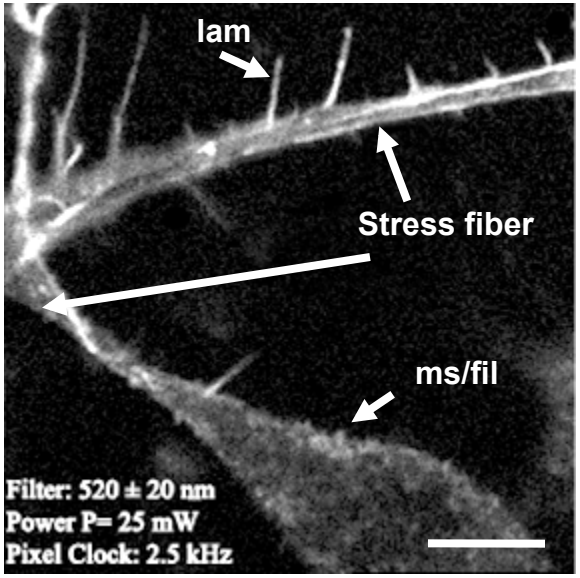

Z=8 μm
Z=8 μm


Fluorescence Intensity (arb. units)
Wavelength (nm)
535 nm
F-actin
580 nm
live
mitochondria

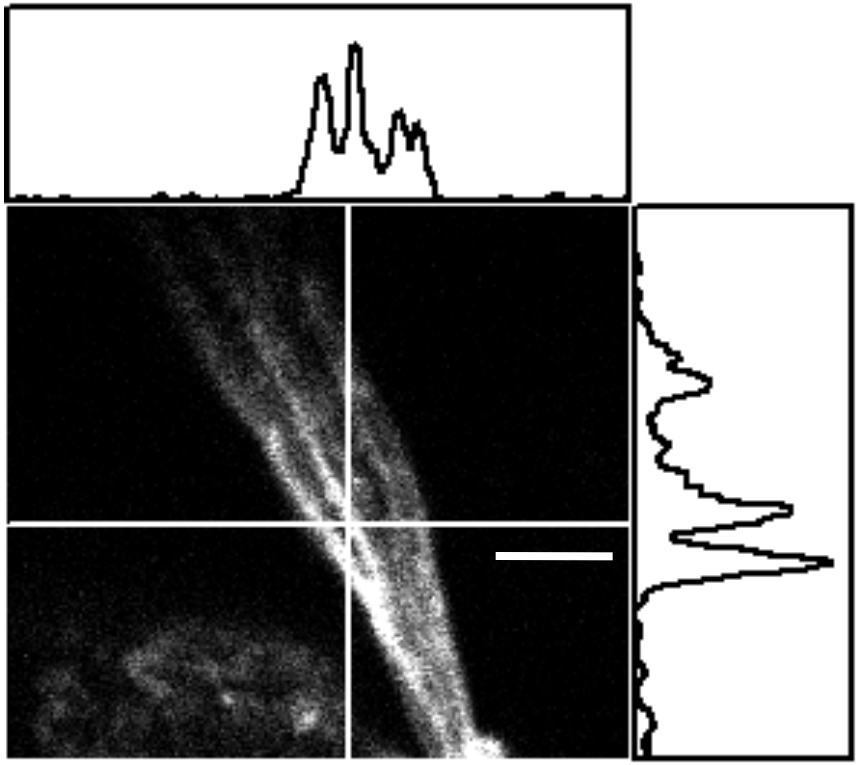
F-actin in the live migrating cells

J.G. Lyubovitsky ACS 2008

7 days of migration



3 days of migration



- variety of F-actin filaments are observed
- migratory section of the cell is characterized by stress fibers and lamellipodium (lam)
- non-migratory section of the cell is composed of microspikes and filopodium (ms/fil) and is more circular

F-actin in the live migrating cells: Up and close

J.G. Lyubovitsky ACS 2008