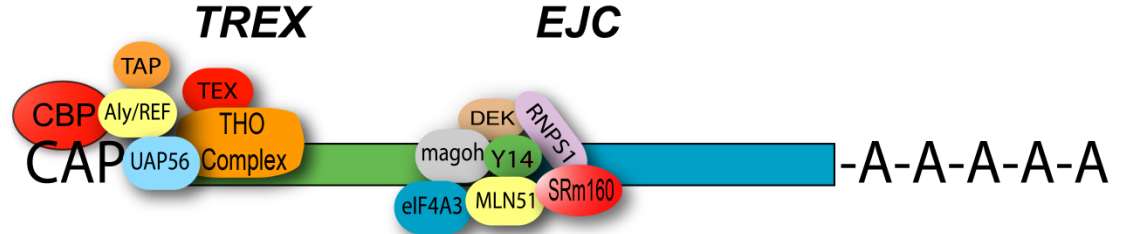


Regulation of mRNA Export



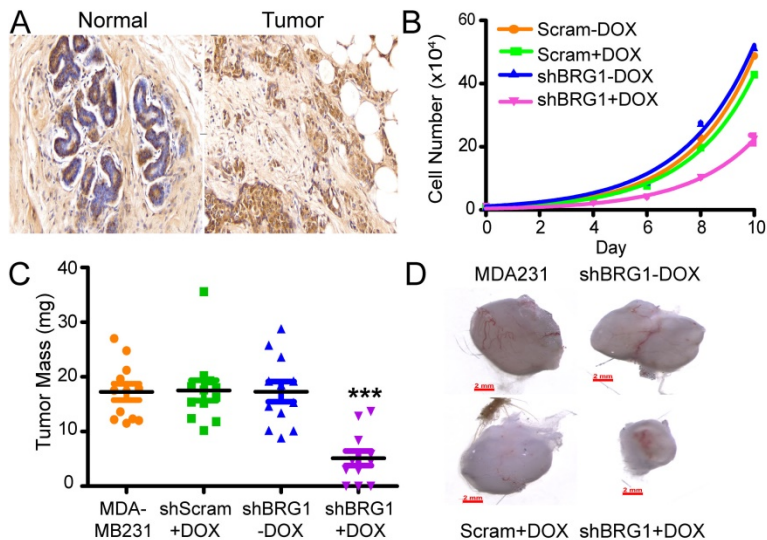
- **A strategy for linking cellular processes with the signal transduction pathways that regulate them by a novel Fluorescence Recovery after Photobleaching screen.**

Useful when: The cellular processes have mechanisms using macromolecular complexes and the binding of proteins in these complexes is regulated.

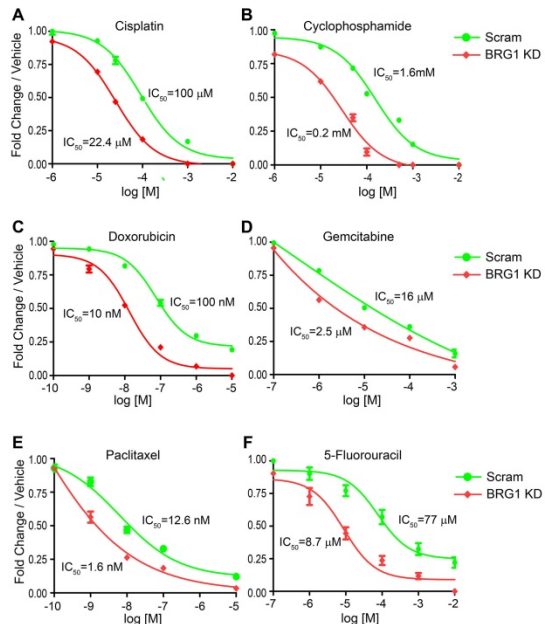
- **The regulation of mRNA export by AKT in the phosphatidylinositol signal transduction pathway.**

The active PI3 kinase/AKT pathway decreases rates of mRNA export to the cytoplasm for many mRNAs but not for mRNAs that have either a signal sequence or a mitochondrial targeting sequence. This is a novel method for controlling protein levels, especially for mRNAs with short lifetimes

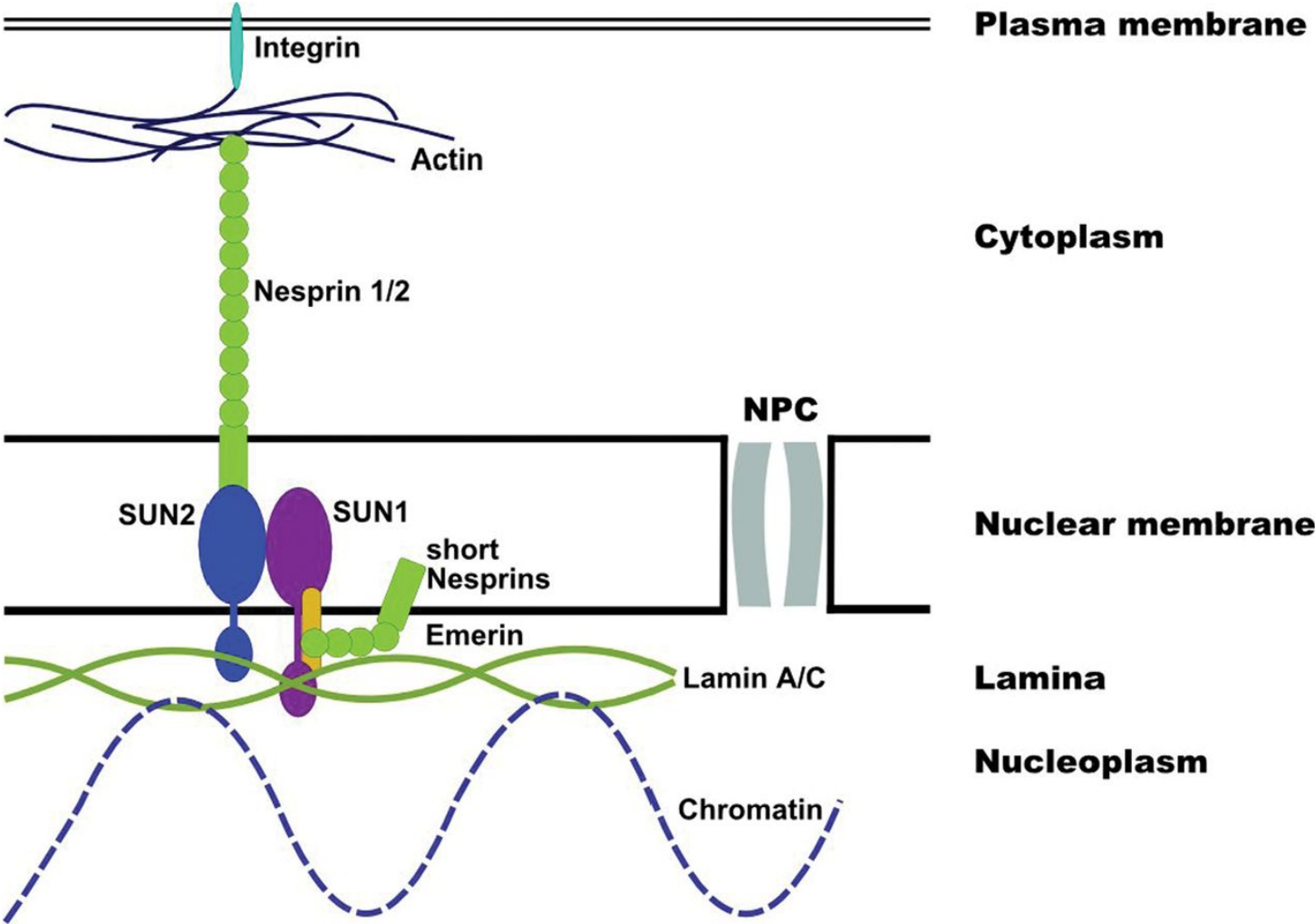
BRG1 is a therapeutic target for breast cancer



- (1) BRG1 is upregulated in essentially all breast tumors regardless of subtype or stage. We have concentrated on triple negative breast cancer (TNBC).
- (2) BRG1 function is required for TNBC cell proliferation and survival in culture and in xenografts.
- (3) The mechanism for this requirement for BRG1 is through BRG1-transcriptional upregulation of genes for essential enzymes in *de novo* lipid synthesis.
- (4) BRG1 knockdown or inhibition potentiates TNBC killing by all tested clinically used chemotherapy drugs.
- (5) The mechanism for this potentiation of killing is the requirement for BRG1 in the transcriptional induction of ABC transporters that pump out these chemotherapy drugs.
- (6) We have validated a candidate small molecule inhibitor – ADAADi.

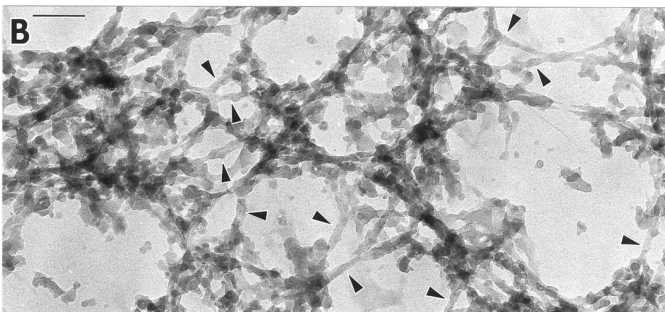
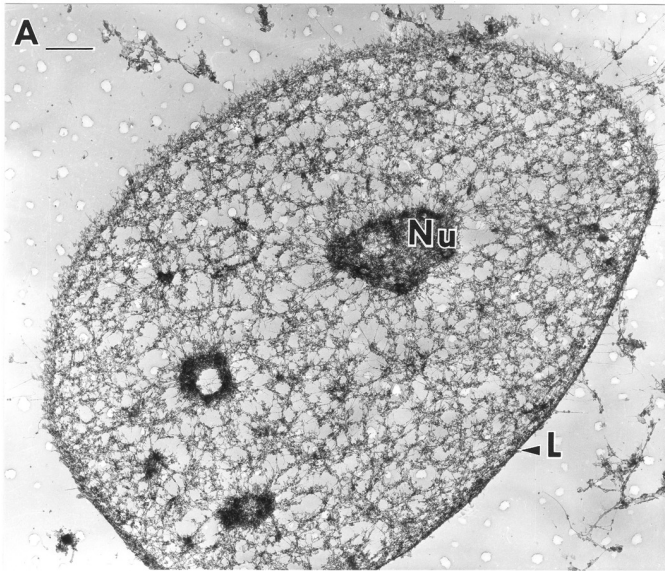


The Extracellular Matrix regulates genes through direct connections between the nucleus and the cytoskeleton



4D Nucleome: The genome is architecturally organized in space and time by nuclear structures constructed of ribonucleoproteins (RNPs)

RNP Networks of the nucleus



Two mechanisms for building structures from RNPs

