

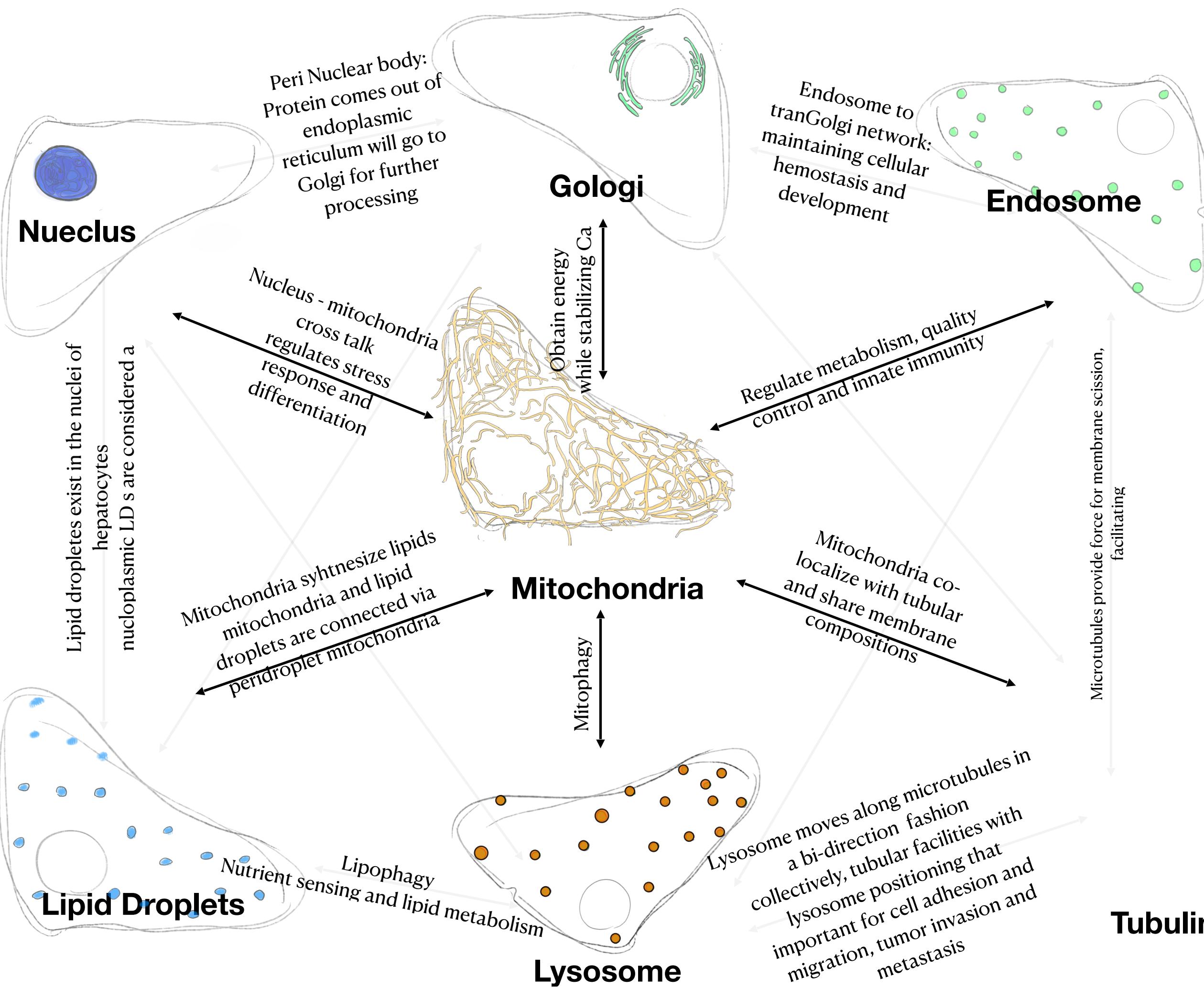
# Investigation of Metastasis Potential of PHLDA2 Gene

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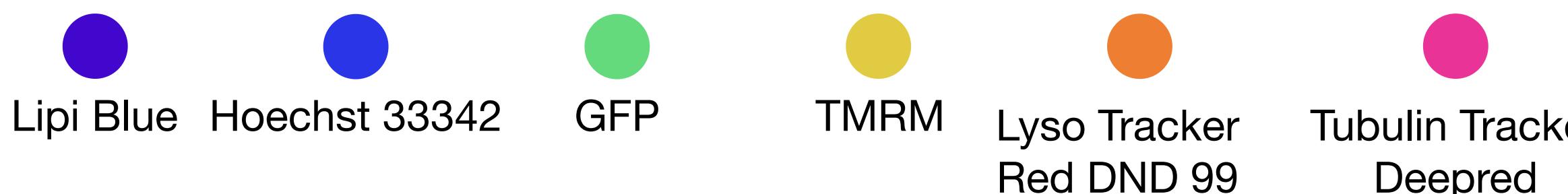
## ABSTRACT

Cell organelles are a set of subcellular structures that perform various functions inside of eukaryotic cells, working coherently to maintain cell function. Dynamic organelle interaction controls cell behavior, substrate transport and organelle-organelle communication, etc. Alterations in such intra organelle activity directly affect cellular physiology and are associated with pathology. However, most studies typically consider one organelle at a time which limits our understanding of organelle-organelle interaction, organelle-cytoskeleton interaction and cooperative behavior. Here, we propose to develop a method for simultaneous fluorescent labeling of up to seven organelles. We then unmixed their spectral emissions using the phasor analysis to quantify functional and morphological changes in such organelles upon different conditions.

## ORGANELLE INTERACTIONS

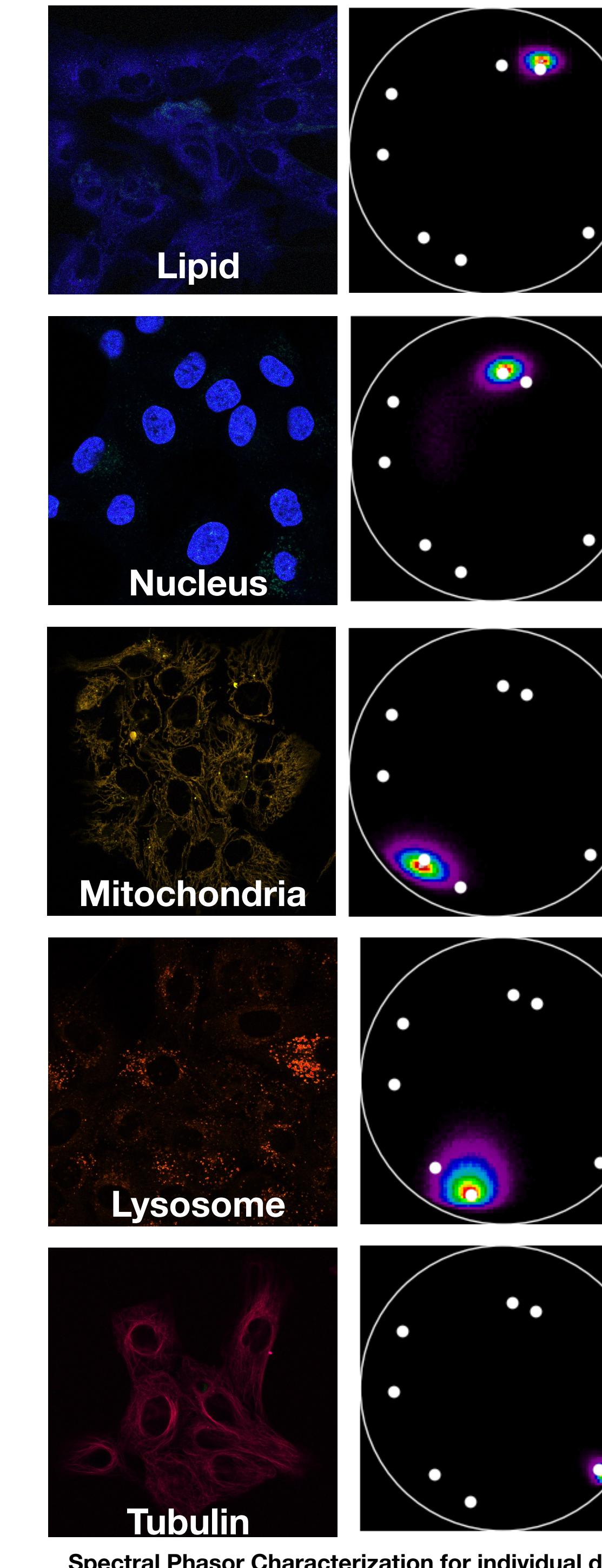
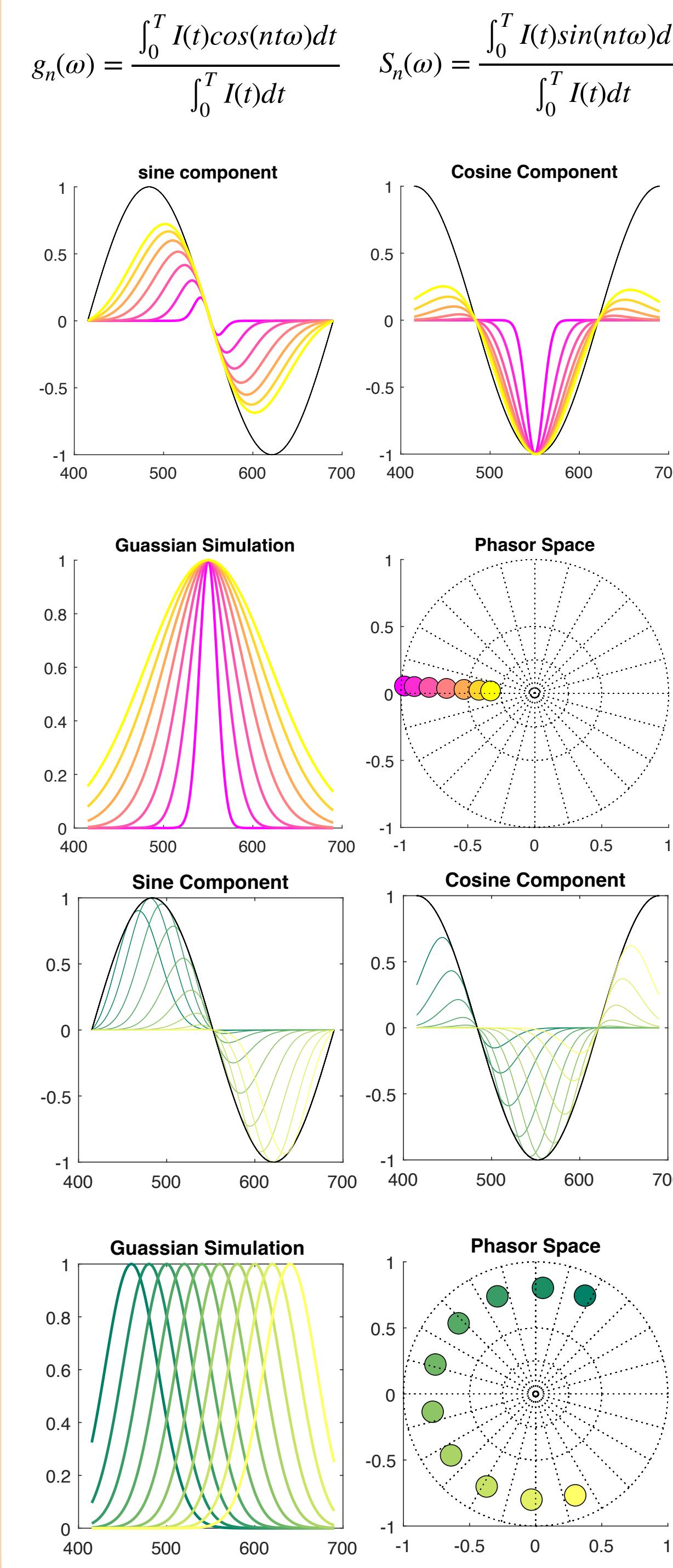


## ORGANELLE STAINING

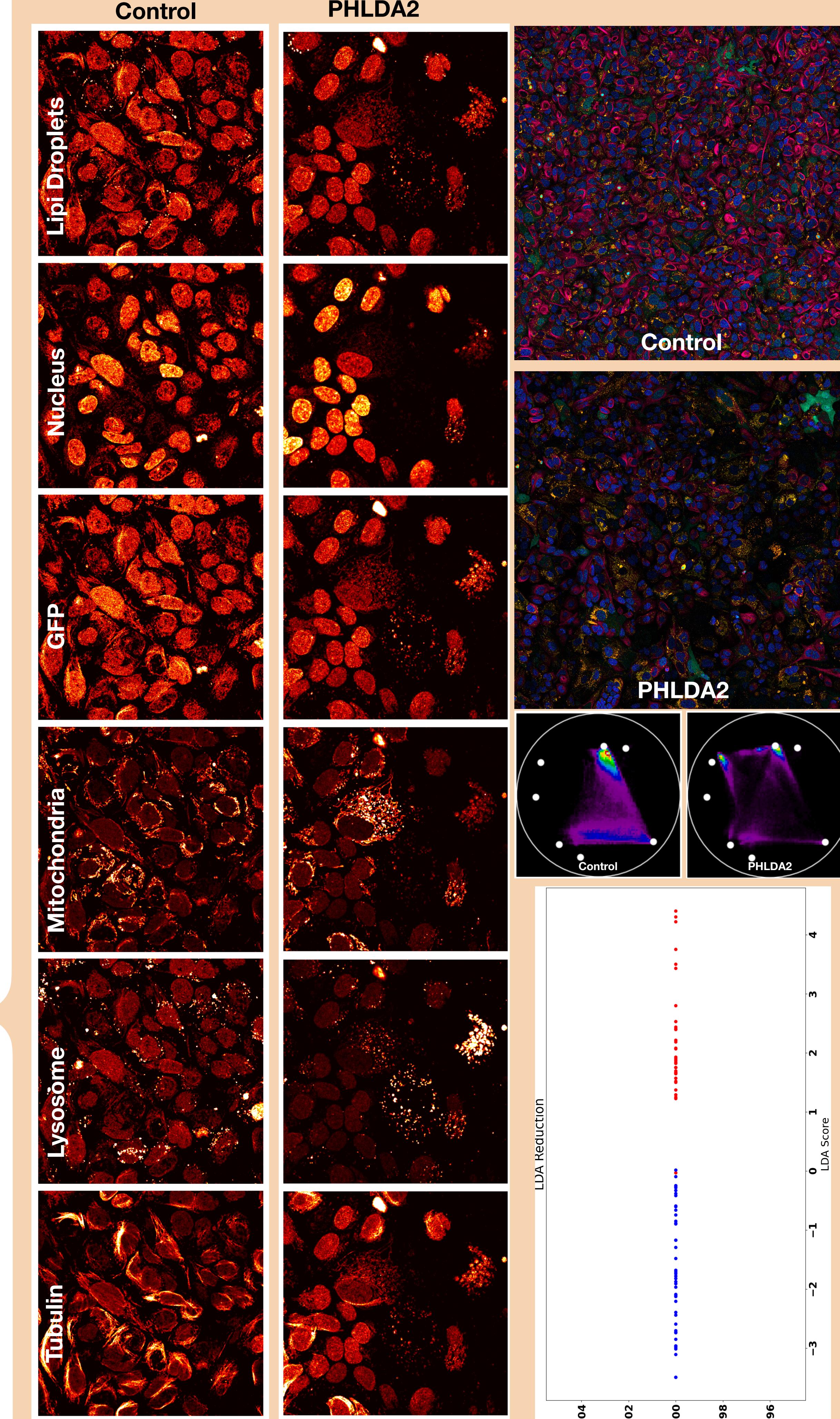


Fluorescent Dyes	Organelle/cytoskeletal structure	Color	Cell function
Lipi Blue	Lipid droplets	Blue	- Energy storage - Protection against oxidative stress
pHrodo	Endosome	Green	- Endocytosis - Proteins and lipids trafficking
TMRM	Mitochondria	Yellow	- Cellular respiration - Energy production
Lyso Red	Lysosome	Orange	- Macromolecule digestion - Autophagy
Tubulin DR	Tubulin	Red	- Intracellular transport - Mitosis

## SPECTRAL PHASOR SIMULATION

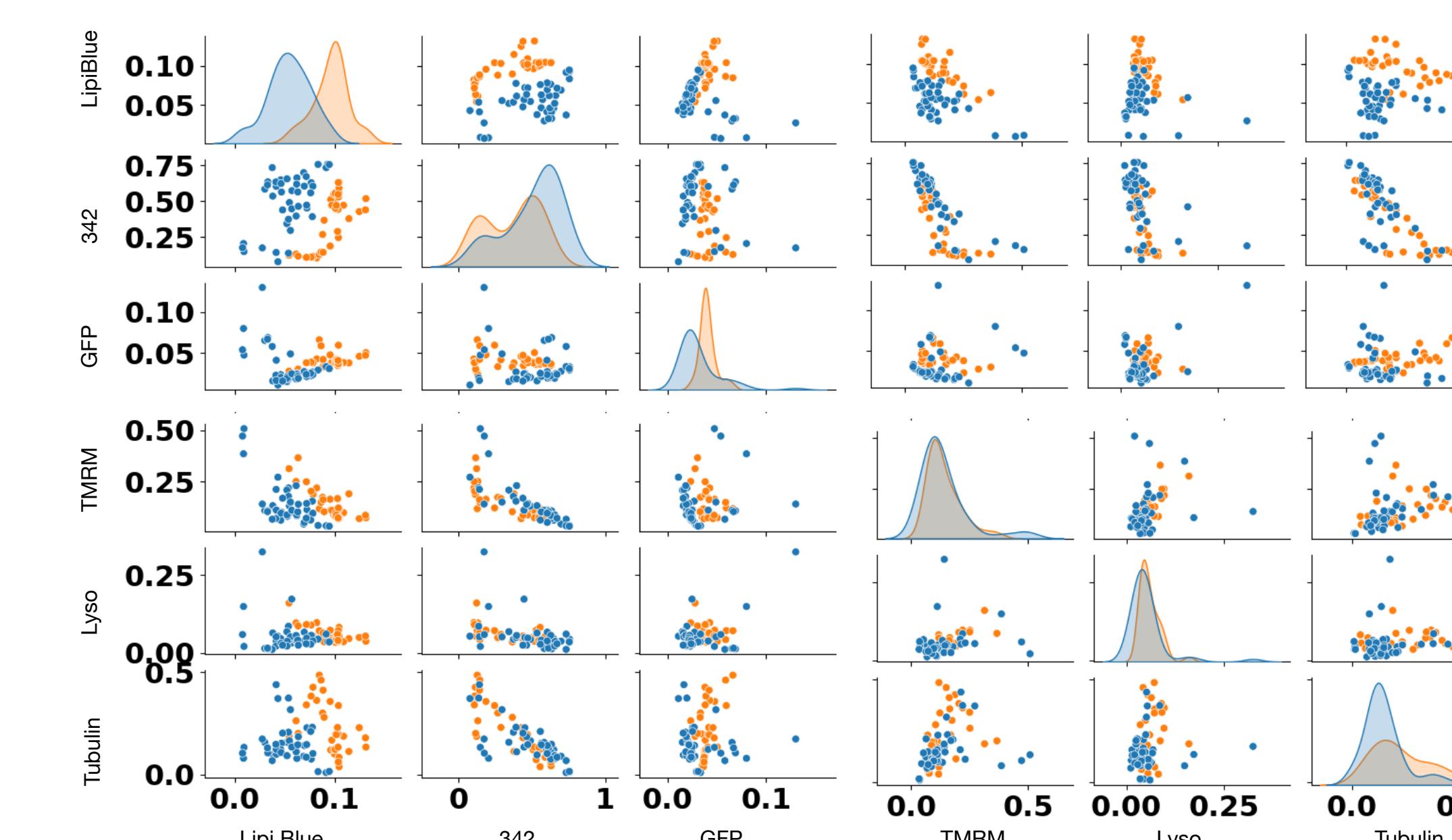


## RESULT & DISCUSSION



## DATA ANALYSIS METHOD

Let  $(\vec{\mu}_i, \Sigma_i)$  represent the mean and covariance of the conditional probability  $p(\vec{x} | y = i)$  where  $i$  represents the  $i^{th}$  class. If we also assume that  $\Sigma_0 = \Sigma_1$  for the classification of two classes, thus  $\vec{\omega} = \Sigma^{-1}(\vec{\mu}_1 - \vec{\mu}_0)\vec{x}$ . Where  $\vec{\omega}$  represents our projection vector for our dimensionality reduction and  $c = \frac{1}{2}\vec{\omega}^T(\vec{\mu}_1 - \vec{\mu}_0)$  representing threshold plane. Now we need to find  $\vec{\omega}^T\vec{x} > c$



## CONCLUSION

In the present investigation, we successfully delineated the variances in organelle composition between the conventional CAL 51 cellular model and its counterpart featuring augmented expression levels of PHLDA2. Through the synergistic utilization of phasor analysis, hyperspectral imaging, and Linear Discriminant Analysis (LDA), our objective is to scrutinize the impact of PHLDA2 overexpression on cellular invasiveness at the subcellular organelle level.

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