

Nuclear structures upon changes in the expression of cytoplasmic actin isoforms

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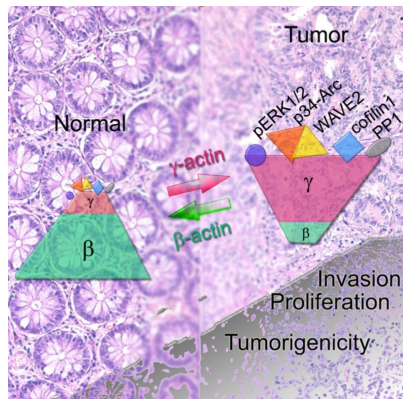
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Background

Down-regulation of cytoplasmic actin isoforms alters the phenotype and karyotype of MDA-MB-231 breast cancer cells, moreover β -actin depletion leads to the progression of chromosomal instability with endoreduplication and aneuploidy increase. On the contrary, γ -actin down-regulation results not only in reduced percentage of mitotic carcinoma cells, but leads to chromosome stability, reduced polyploidy and aneuploidy.

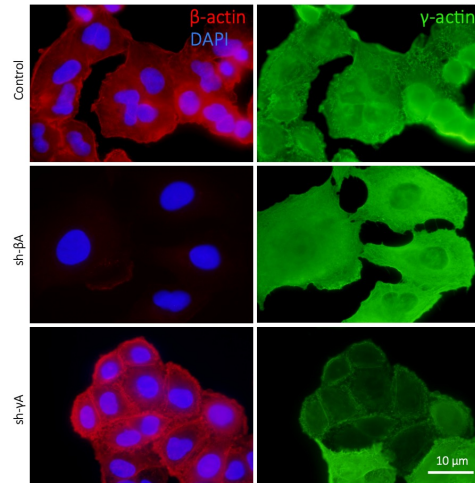
(Dugina et al., *Oncotarget* 2015; Dugina et al., *Molecules* 2021)



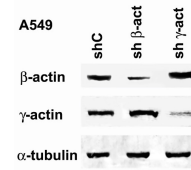
Recent data indicate the importance of the nucleus as an active cell compartment that responds to the degree of cell deformation and contributes to the cell's decision to change the type of migration.

Methods

We used lentiviral genetically-engineered constructs to change actin isoforms in lung carcinoma cell line A549 (ATCC® CCL-185™). The efficiency was confirmed using western-blotting.

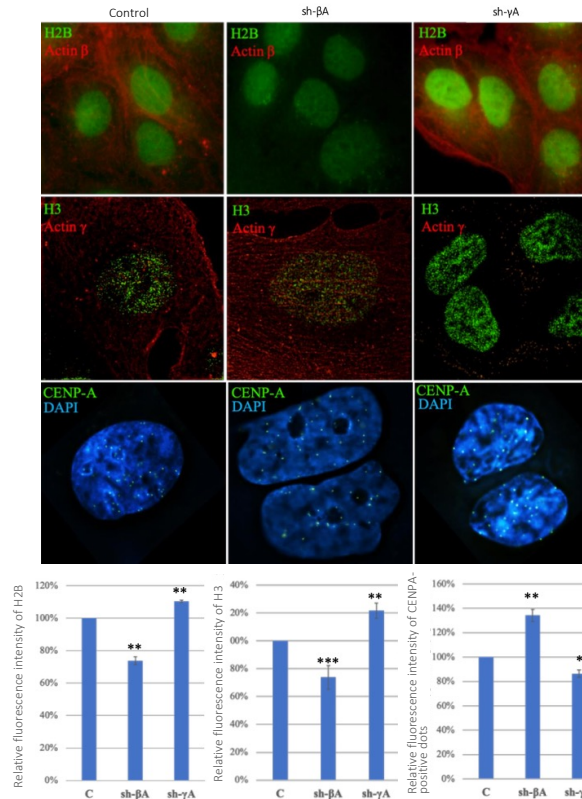


β -actin down-regulation resulted in more mesenchymal phenotype, while γ -actin down-regulation induced more epithelioid phenotype.



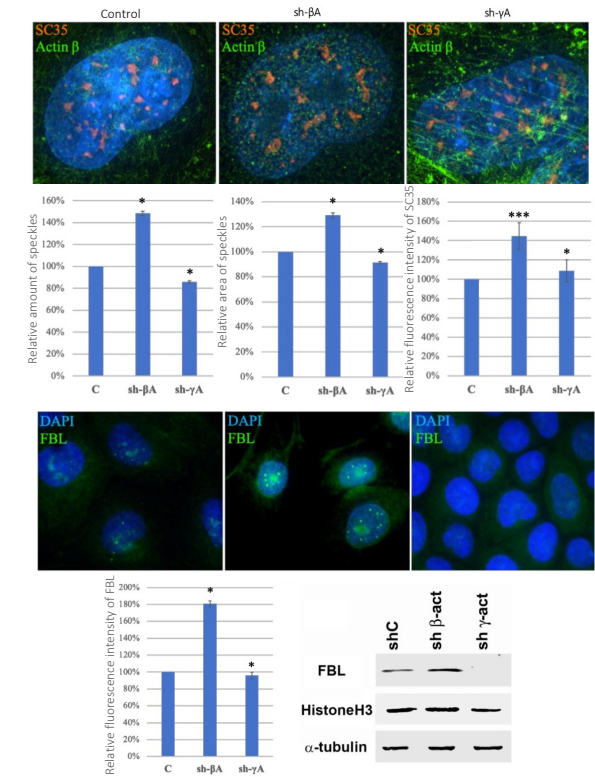
2

Actin is responsible for the organization and rearrangement of the nucleus.



3

The morphology/distribution of nuclear bodies (nuclear speckles and nucleoli) and the level of expression and accumulation of nuclear proteins SC35 and FBL were investigated.

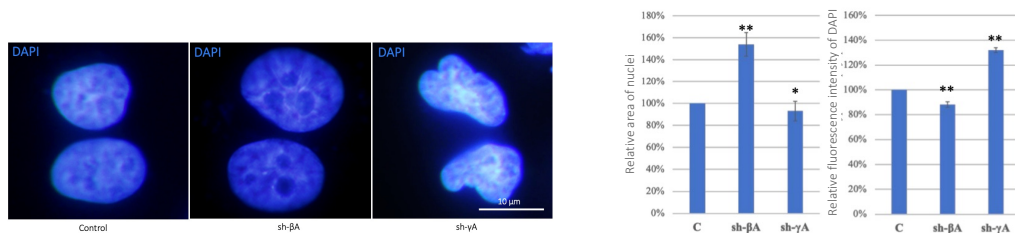


Conclusions

The modulation of the expression of cytoplasmic β - and γ -actin isoforms affect the morphology of the nucleus and nuclear structures: down-regulation of β -actin expression entails nuclear changes connected with carcinogenesis progression. Disclosure of Potential Conflicts of Interests: Authors do not have any conflicts of interests.

1

Using IF and N-SIM microscopy in cells with a changed ratio of the expression levels of actin isoforms, changes in the morphology of the nucleus and chromatin were studied. Cells with down-regulated β actin expression showed an almost 2 times larger nuclear area compared with control. The fluorescence intensity increased in γ -actin down-regulated cells.



4

When the expression of the β -actin isoform is down-regulated the fluorescence intensity of Lamin B decreases by one third.

