

NOVEL NUCLEOPLASMIC STRUCTURES - PHOSPHATIDYLINOSITOL 4,5-BISPHOSPHATE ISLETS – ARE ESSENTIAL FOR EFFICIENT TRANSCRIPTION

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KEY WORDS: Cell nucleus, DNA transcription, lipids, chromatin, super-resolution microscopy, TEM, EELS

It is known that transcription of multiple genes is clustered to form transcription factories. Nevertheless, how this compartmentalization of transcription is achieved is unclear. Here we show that nascent RNA transcripts, Pol II, and the general transcription factors TFIID, TFIIE, TFIIH, and NM1 associate with phosphatidylinositol 4,5-bisphosphate (PIP2) in the nucleus. Strikingly, we found that this nucleoplasmic PIP2 is organized in globular 40-100 nm structures distinct from nuclear speckles and nucleoli, which we referred to as PIP2 islets. Furthermore, we revealed that the surface of PIP2 islets harbors preferentially transcriptionally active DNA. Integrity of PIP2 islets and the interaction of PIP2 with NM1 are required for efficient Pol II transcription. The periphery of PIP2 islets contains mainly PIP2 molecules, while ceramide, cholesterol, and RNA constitute its minor part. We hypothesized that PIP2 islets might serve as a structural platform, which facilitates the clustering of Pol II transcription factories thus participating in nuclear architecture.

Acknowledgements: GACR (GA16-03346S, GA17-09103S), TACR (TE01020118), The Microscopy Centre (Light Microscopy and Electron Microscopy Core Facilities), IMG ASCR, Prague, Czech Republic, supported by MEYS (LM2015062 Czech-BioImaging).