



HAL
open science

Heterogenous distribution of VACht and VGLUT3 in striatal cholinergic varicosities revealed by a nanoscopic analysis

Mazarine Desplanque, Paola Cristofari, Odile Poirel, Alison Hébert, Sylvie Dumas, Jean-François Gilles, Etienne Herzog, Lydia C Danglot, David Geny, Susanne Bolte, et al.

► **To cite this version:**

Mazarine Desplanque, Paola Cristofari, Odile Poirel, Alison Hébert, Sylvie Dumas, et al.. Heterogenous distribution of VACht and VGLUT3 in striatal cholinergic varicosities revealed by a nanoscopic analysis. FENS Forum 2022, Jul 2022, Paris, France. 2022. hal-03972255

HAL Id: hal-03972255

<https://cnrs.hal.science/hal-03972255v1>

Submitted on 3 Feb 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

FENS Forum 2022

Paris 9-13 July 2022

Heterogenous distribution of VACHT and VGLUT3 in striatal cholinergic varicosities revealed by a nanoscopic analysis

Mazarine Desplanque, Paola Cristofari, Odile Poirel, Alison Hébert, Sylvie Dumas, Jean-François Gilles, Etienne Herzog, Lydia Danglot, David Geny, Susanne Bolte, Véronique Fabre, Stéphanie Daumas, Nicolas Pietrancosta, Salah El Mestikawy and Véronique Bernard

Aim

Striatal cholinergic interneurons (CINs) use both acetylcholine (ACh) and glutamate (Glut) to regulate the striatal network. CINs express vesicular transporters for acetylcholine (VACHT) and Glut (VGLUT3) with a high degree of coexpression in cholinergic varicosities. Whether VACHT and VGLUT3 are present on the same or on different pools of synaptic vesicles (SVs) remains an open question. This is an important issue since the vesicular sorting of both transporters could lead to simultaneous and/or independent release of ACh and/or Glut from CINs.

Methods

We used super-resolution STimulated Emission Depletion microscopy to characterize and quantify the distribution of VACHT and VGLUT3 in CINs SVs.

Results

Nearest-neighbor distances analysis between VACHT and VGLUT3-immunofluorescent spots revealed that 34% of cholinergic SVs contain both VACHT and VGLUT3. 40% of CINs SVs express only VACHT, while 26% contain only VGLUT3. Thus, we propose that CINs terminals have the potential to store and release simultaneously or independently ACh and/or Glut. We also determined the distribution in VACHT and/or VGLUT3 expressing SVs, of vesicular associated membrane proteins (VAMPs), proteins of the SNARE complex involved in neurotransmitter release. Fluorescent in situ hybridization demonstrated that only VAMP2 and VAMP7 are expressed by CINs. We observed that the canonical VAMP2 is expressed in a large part of VACHT and VGLUT3 striatal SVs (63% and 86%). Interestingly, in the shell part of nucleus accumbens, 25% of VACHT and VGLUT3-immunopositive SVs are also VAMP7-positive.

Conclusion

Our results advocate for an unexpected level of anatomical and functional heterogeneity of SVs in CINs varicosities.