Nouveau marqueur de la qualité ovocytaire

BLEFCO- Paris-2026

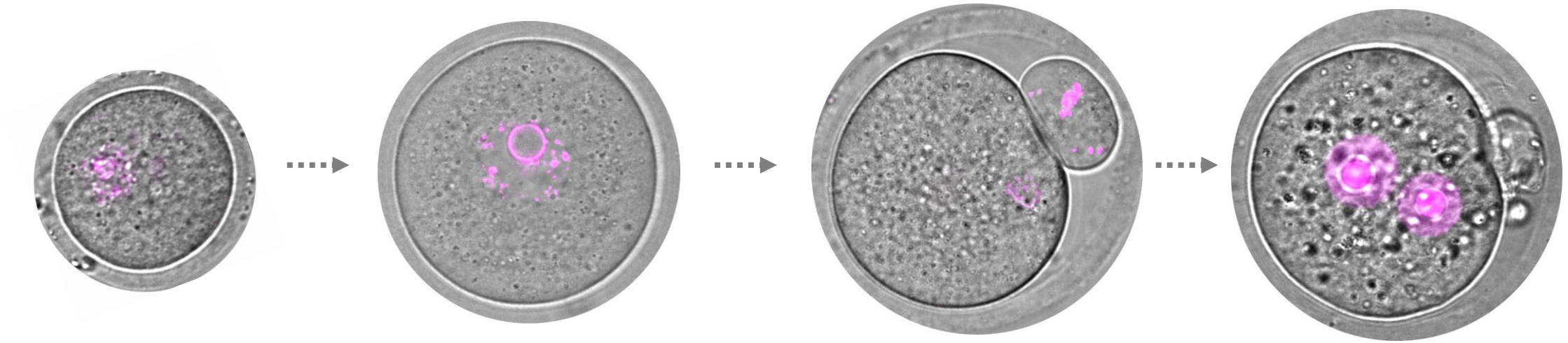
Marie-Hélène Verlhac
(CIRB, Collège de France, Paris)

L'ovocyte de souris comme modèle de transmission de l'héritage maternel

Fin de la croissance dans l'ovaire

Divisions asymétriques

Développement pré-implantatoire



ovocyte

ovule

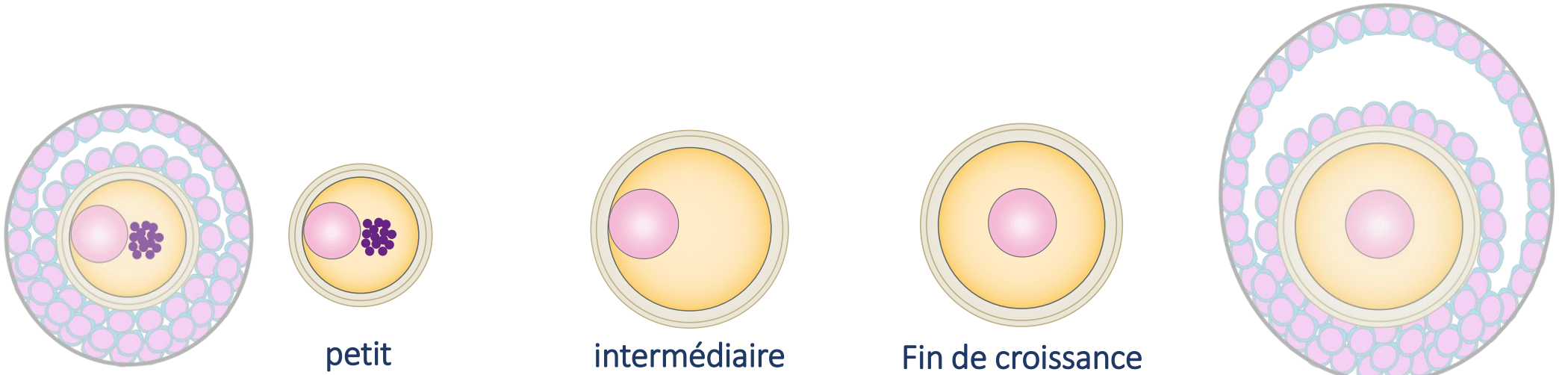
embryon

transcription

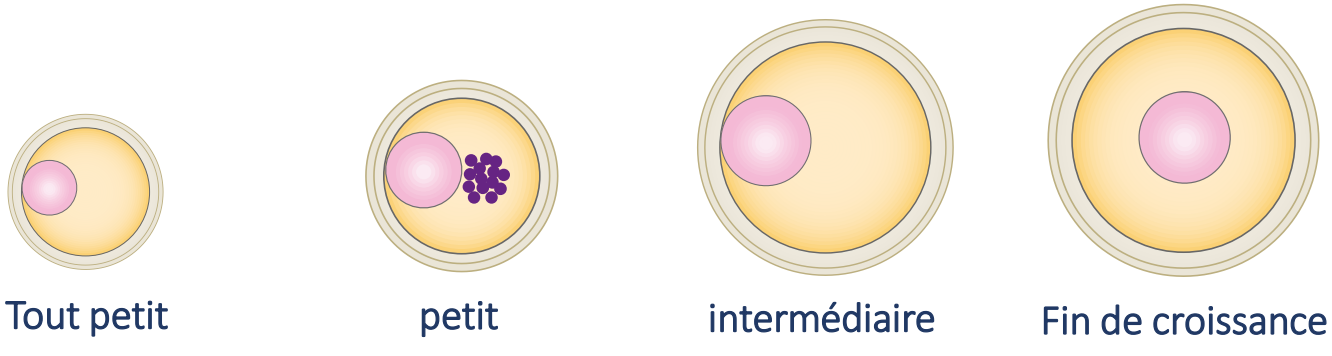
Noemi Zollo
(PhD, SU)

Maria Almonacid
(CRCN, CNRS)

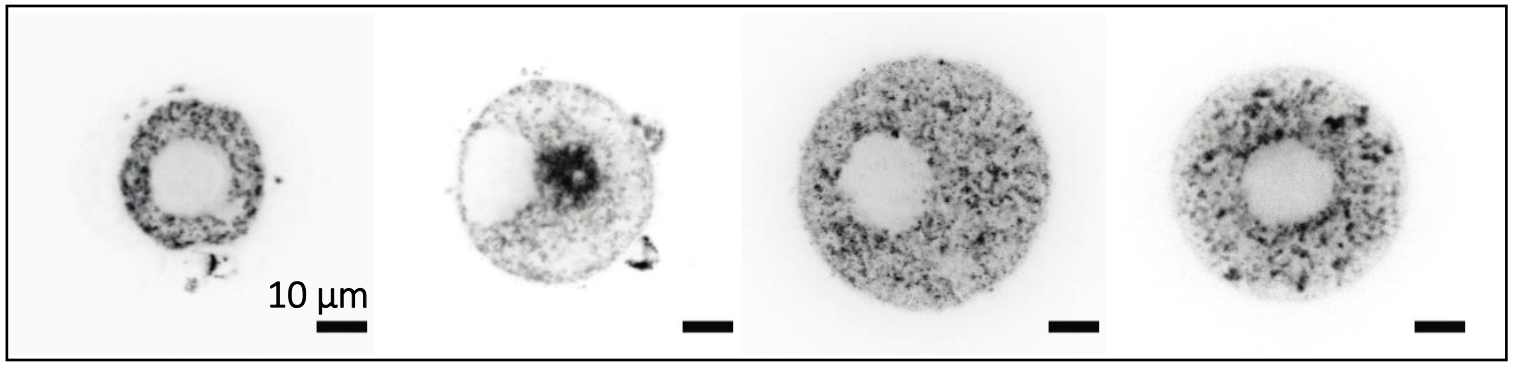
Découverte d'une accumulation locale d'ARNs dans les petits ovocytes



Cette structure contient aussi des mitochondries

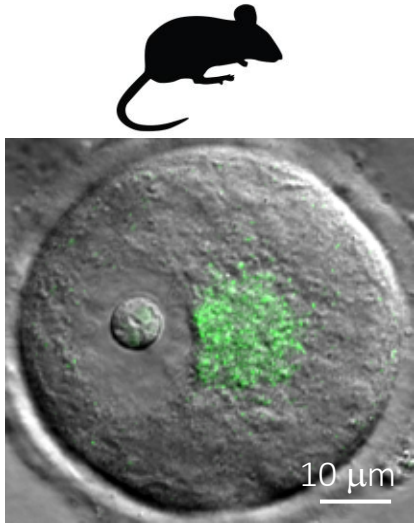


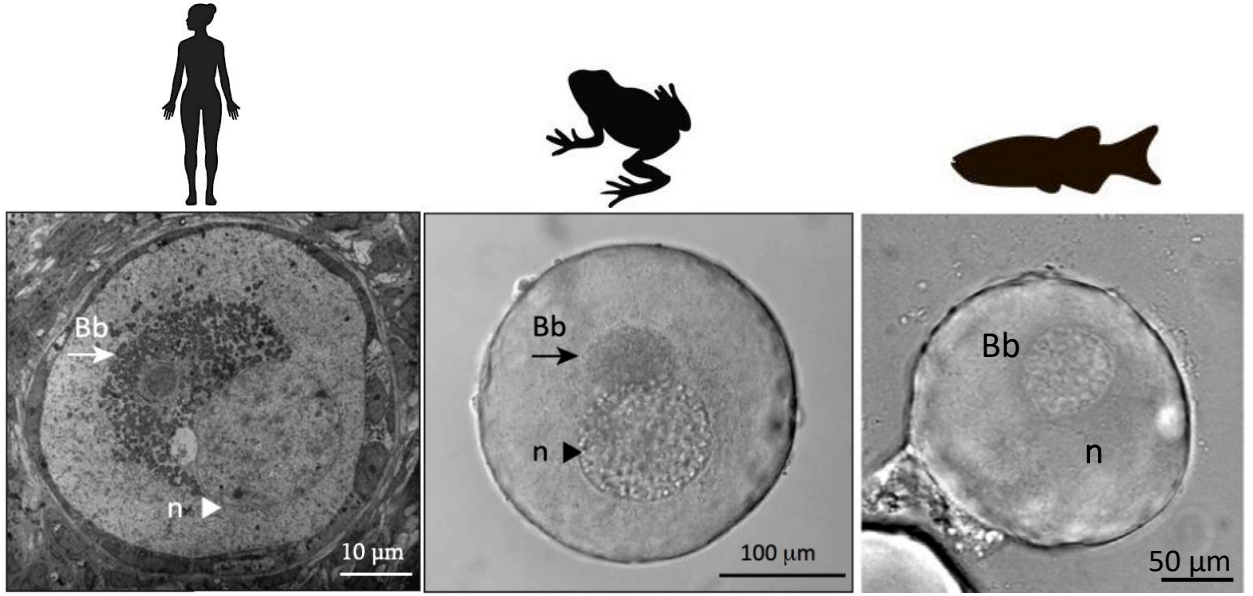
IF Mitochondrie



Cette structure évoque le corps de Balbiani

SYTO RNASelect





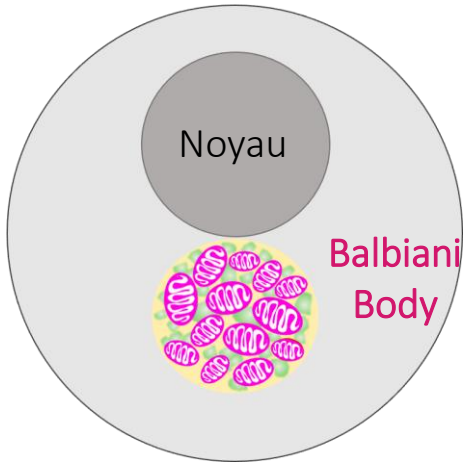
Hertig & Adams
J Cell Biol 1967

Böke *Cell* 2016

Jamieson-Lucy
Dev Biol 2022

mitochondrie

RNP

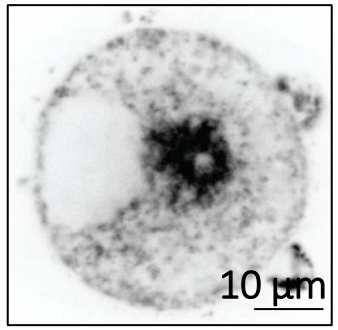


- présent très tôt dans l'ovogenèse (stade primordial)
- agrégat sans membrane fait de RNPs et d'organites
- associé à la dormance: protection des transcrits et organites

Quelle est donc cette structure observée par Noemi présente beaucoup plus tard dans l'ovogenèse?
Nous le nommons le Zollo Body

Découverte d'un super-organelle, le Zollo Body

mitochondrie



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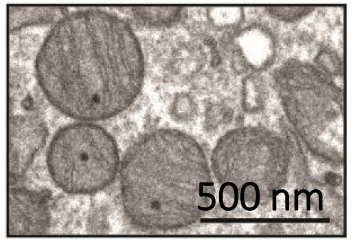
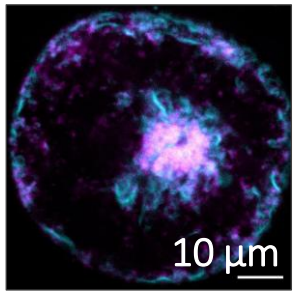


EM

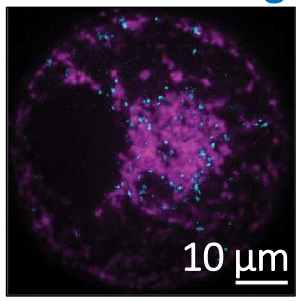
mito ER

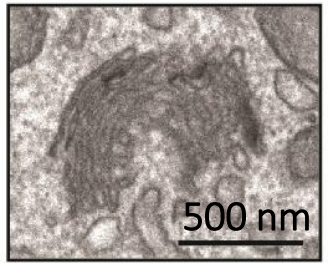


ER

Golgi

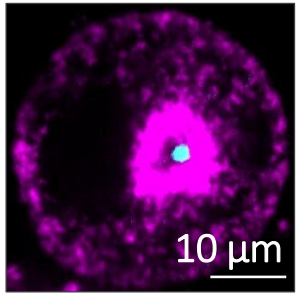
mito Golgi

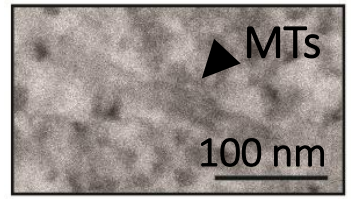




MTOC and microtubules

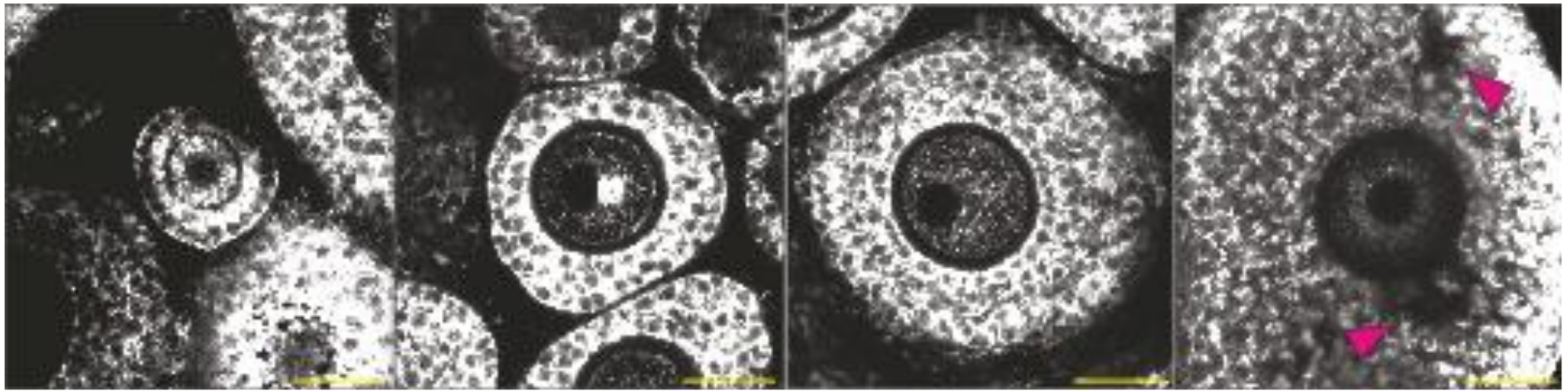
mito MTOC





(Collaboration Alexis Cannette, IBPS)

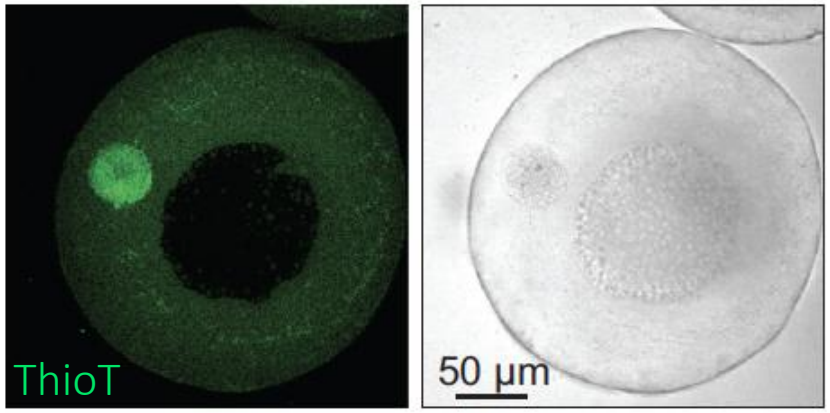
Le Zollo Body est présent au sein des follicules secondaires



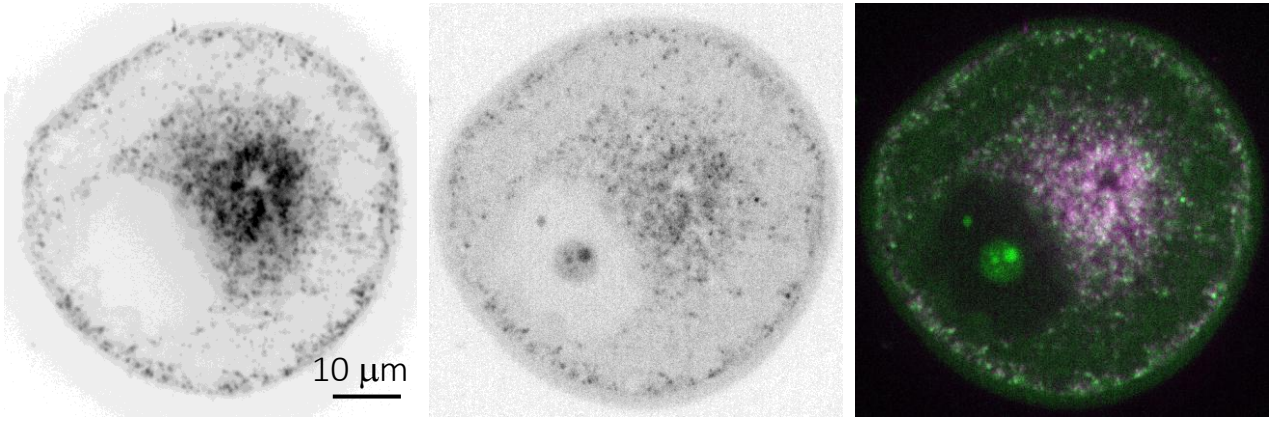
(Collaboration Christopher Thomas, IBDM)

Le Zollo Body contient des protéines de type amyloïde

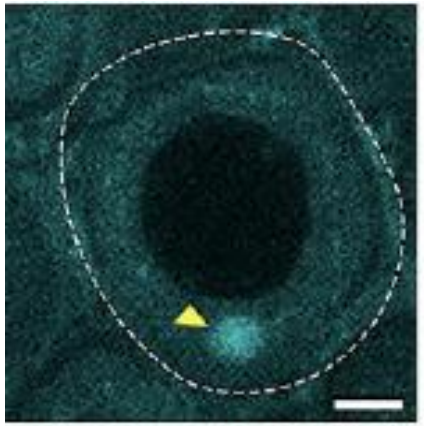
Böke *Cell* 2016



mitochondrie ThioT Merge

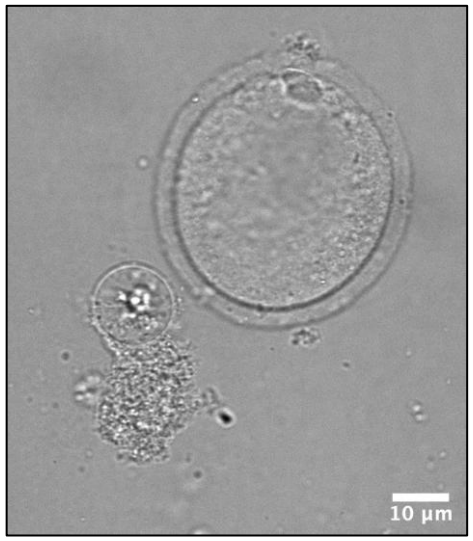


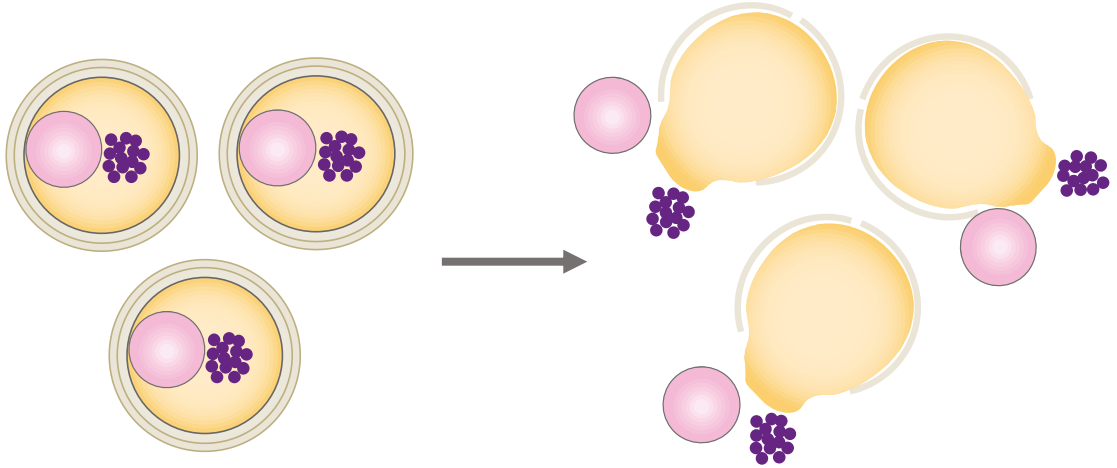
Kar *Curr Biol* 2025



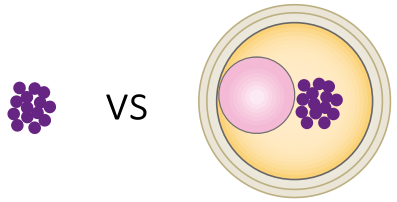
Thioflavine T marque les protéines amyloides riches en feuillets β (Alberti *Methods Enz* 2010)

Le Zollo Body peut être isolé mécaniquement



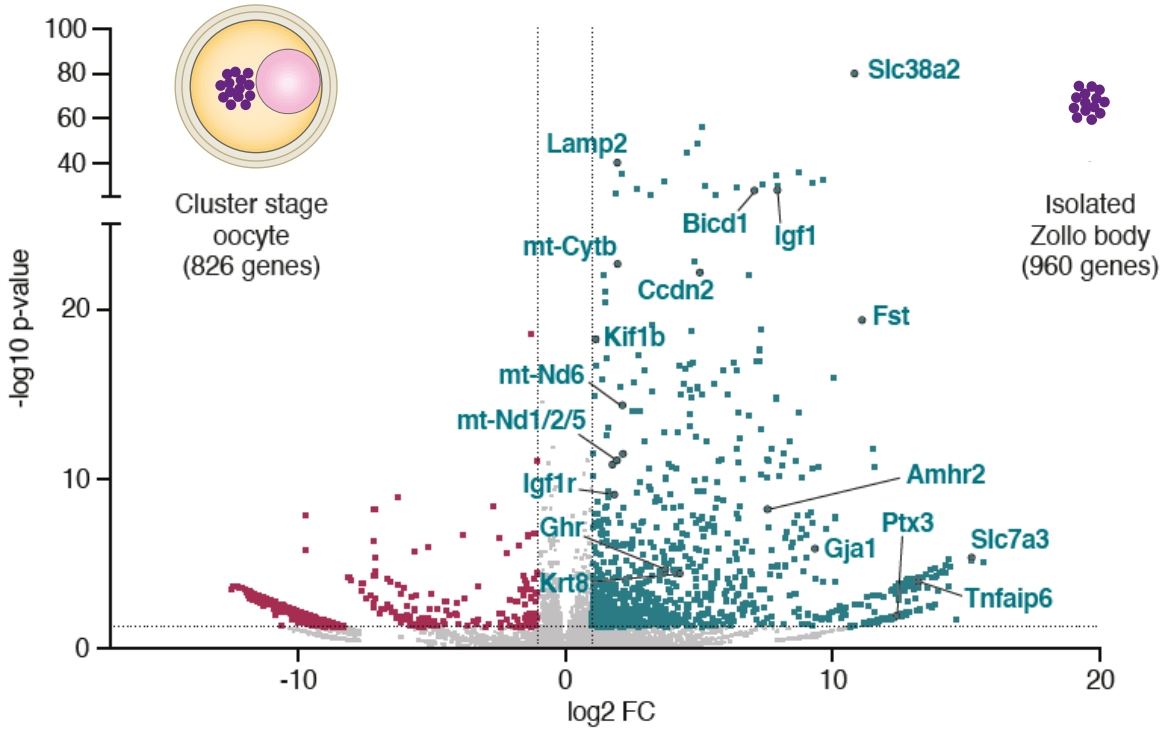


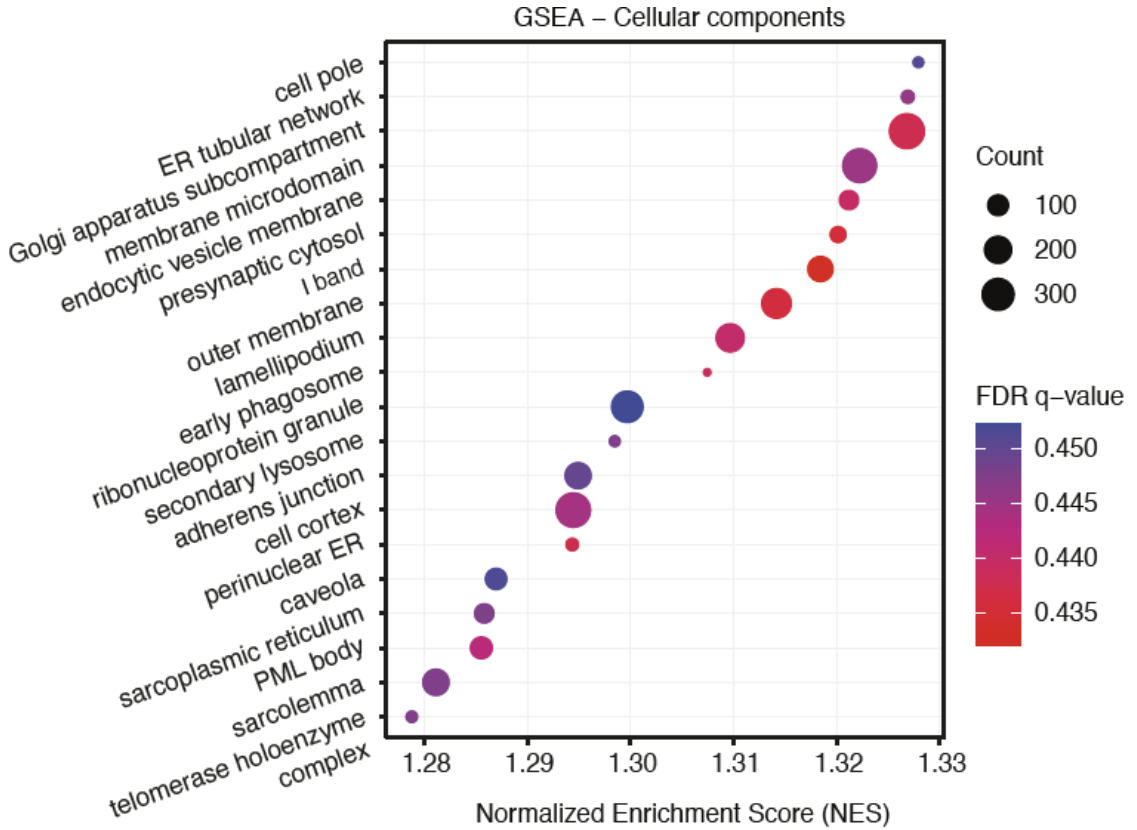
Structure isolée stable pendant des heures, comme le BB (Böke *Cell* 2016)



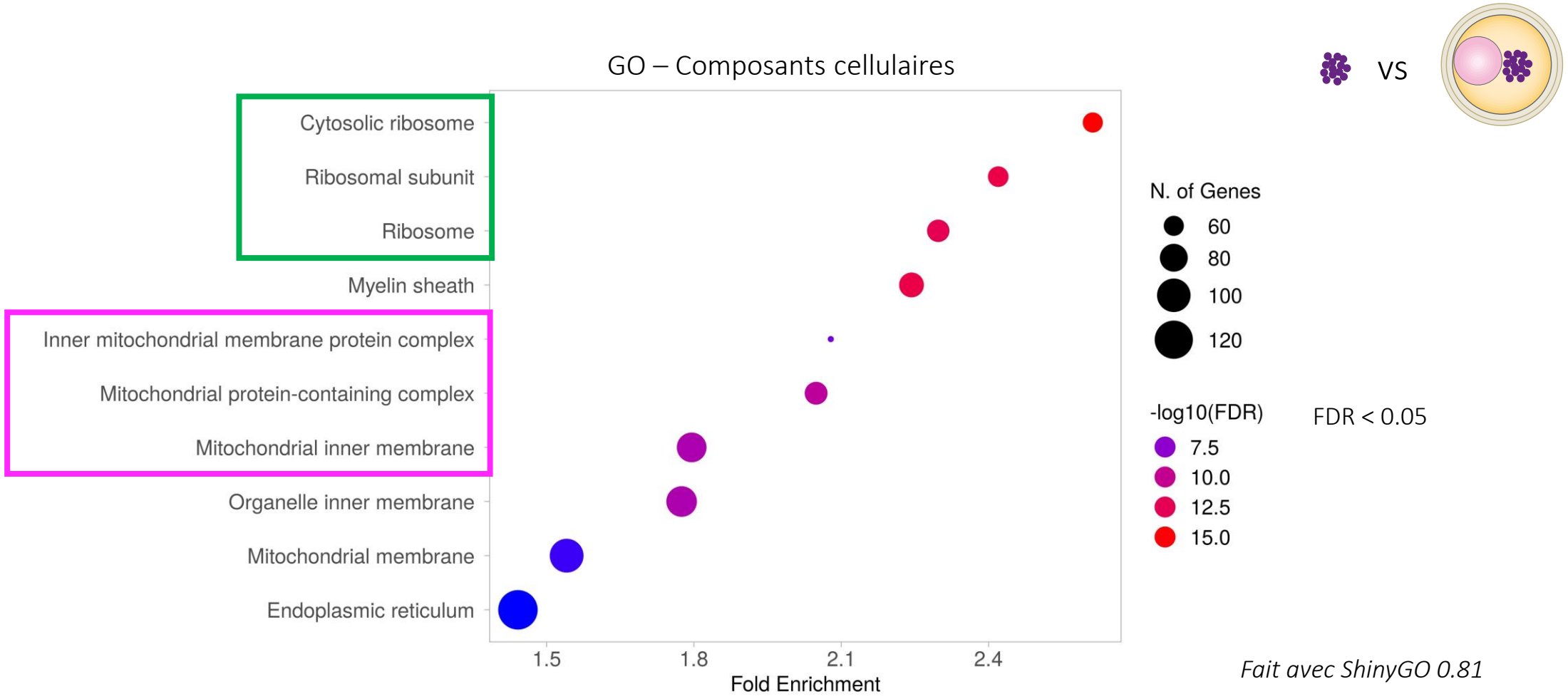
Séquençage ARNs & Spectrométrie de masse

Le Zollo Body est enrichi en ARNs codants pour des organelles





Le Zollo Body est enrichi en protéines mitochondriales et ribosomales



Fait avec ShinyGO 0.81

(Collaboration Gabriele Zaffagnini & Elvan Böke, CRG)

RNPs avec domaines type prion identifiées en spectrométrie de masse

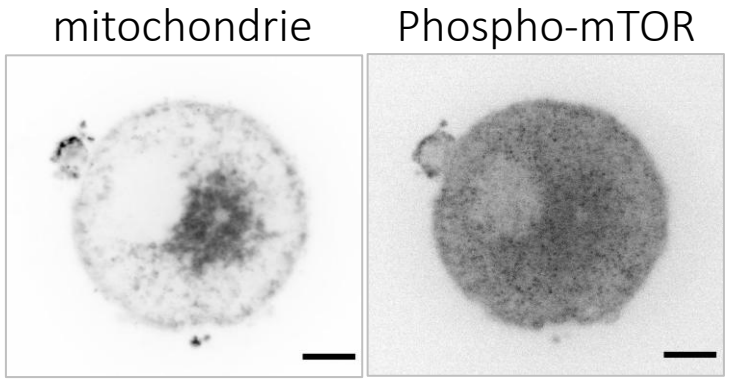
- Ythdf2 (RNA m6A Reader required for oogenesis; Ivanova *Mol Cell* 2017)

- Ybx2 (RNA stability and storage of oocyte; Yu *Biol Rep* 2002; Flemr *Biol Rep* 2010; Medvedev *Biol Rep* 2011; Zhang *Cell Res* 2023)

- DDX5 (RNA helicase required for zebrafish ovary development; Sone *Sci Rep* 2020)

- DDX3X (RNA helicase required for early mouse development; Li *J Biomed Res* 2014; Tsai S-Y *Cell Death Disc* 2024)

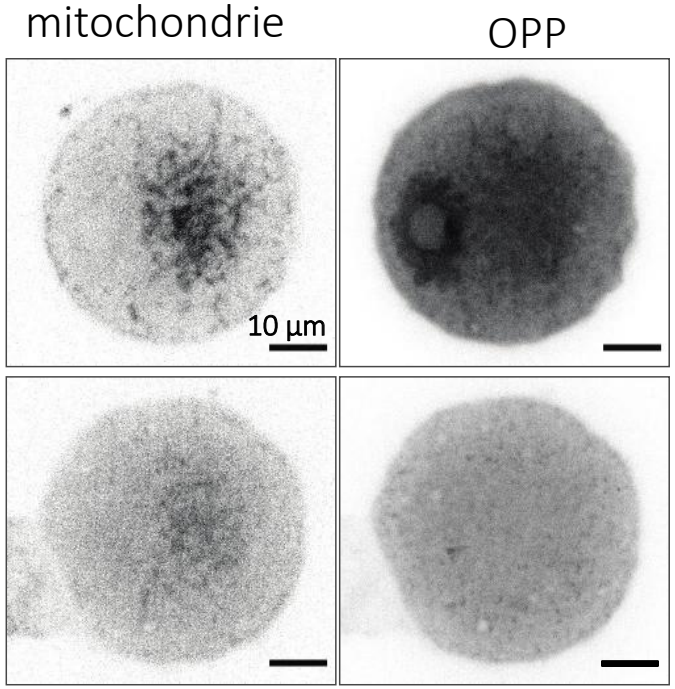
Le Zollo Body présente une traduction localisée

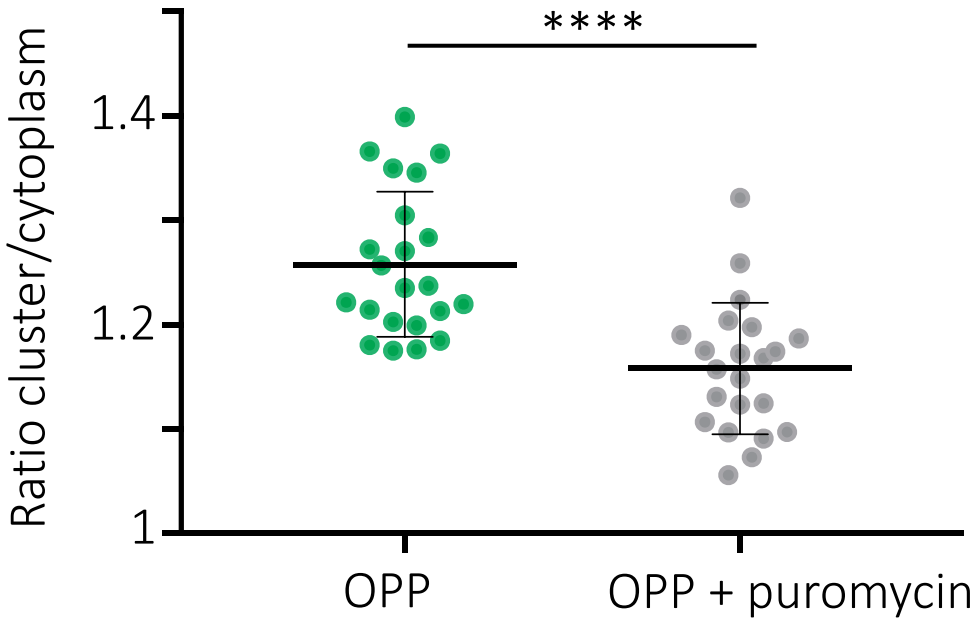


Positive for Phospho-mTOR!

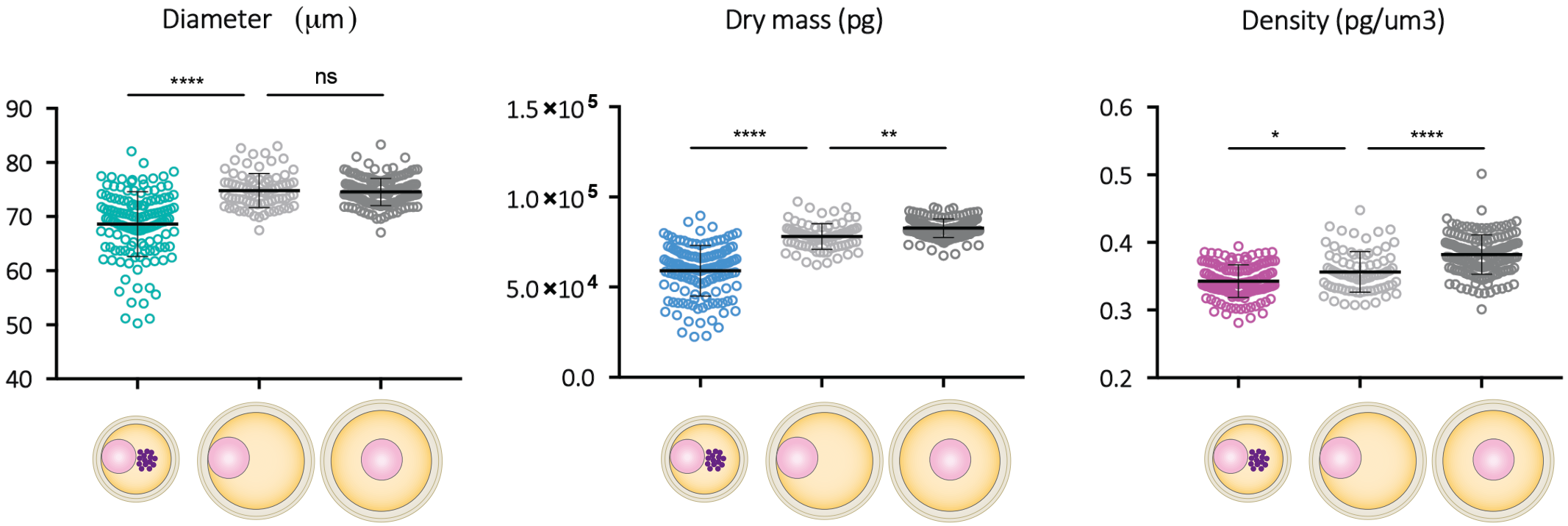
Traduction naissante

+ puromycin





Stimuler la traduction permet d'éviter une chute de densité pendant la croissance ovocytaire



Dry mass measured with a phase optics camera:
mostly proteins (Rollin *eLife* 2023)

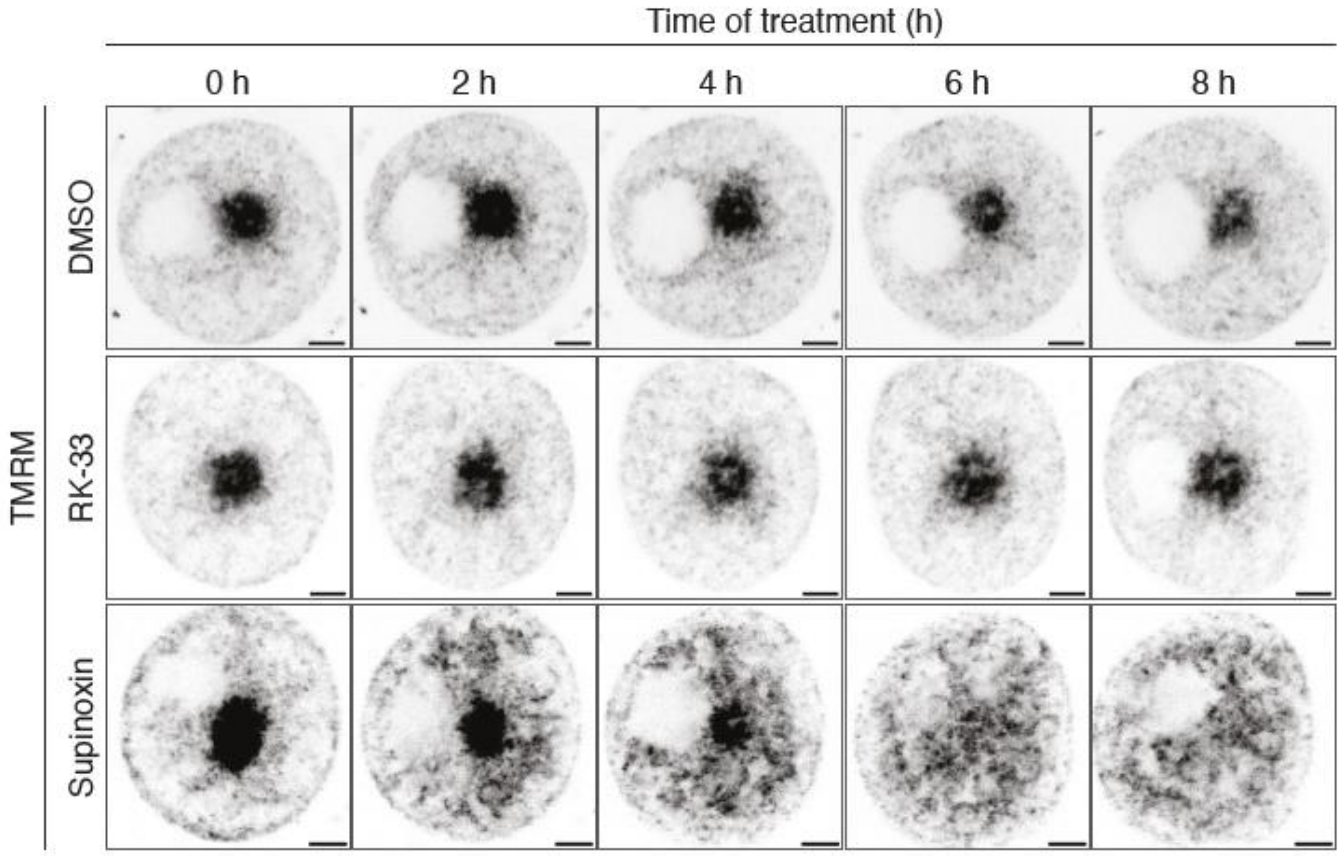
(Collaboration Benoit Wattellier)

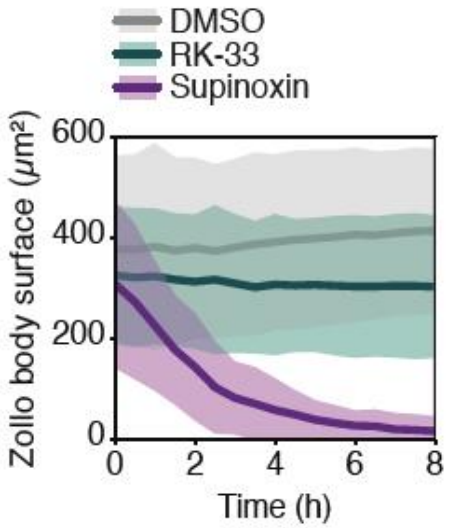
PHASICS
the phase control company

Supinoxin, inhibiteur de DDX5, induit dissolution du ZB dans ovocytes isolés

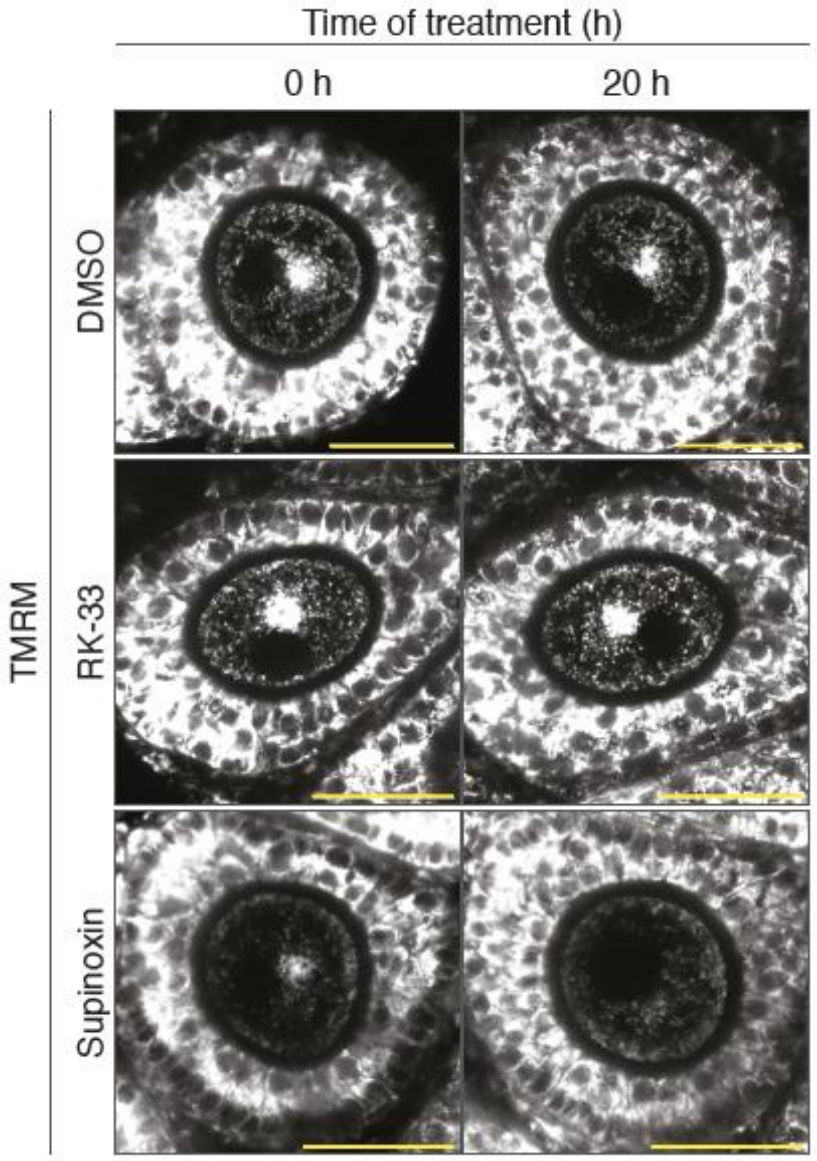
RK-33: inhibiteur DDX3X

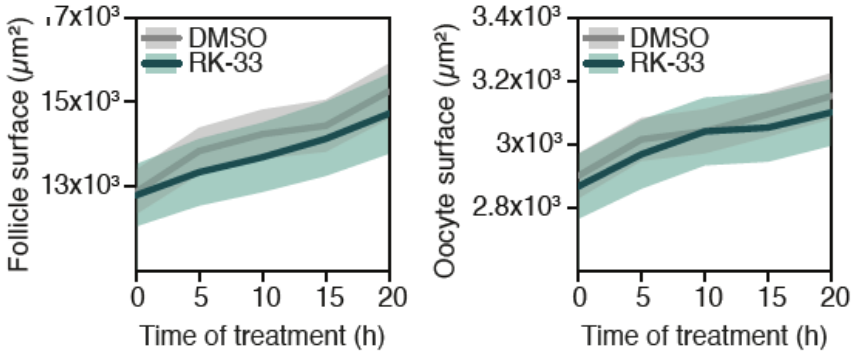
Supinoxin: inhibiteur DDX5

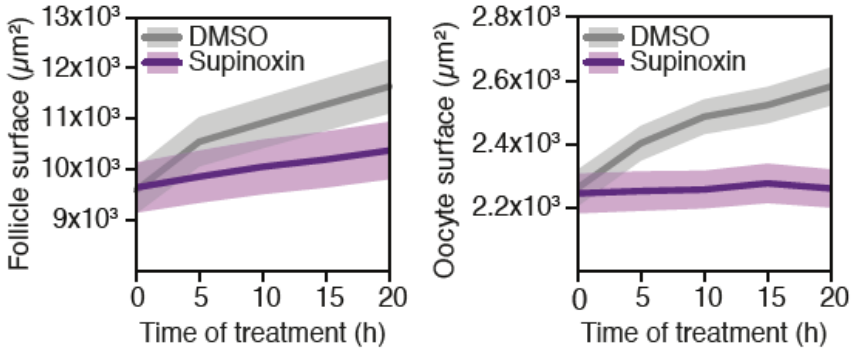


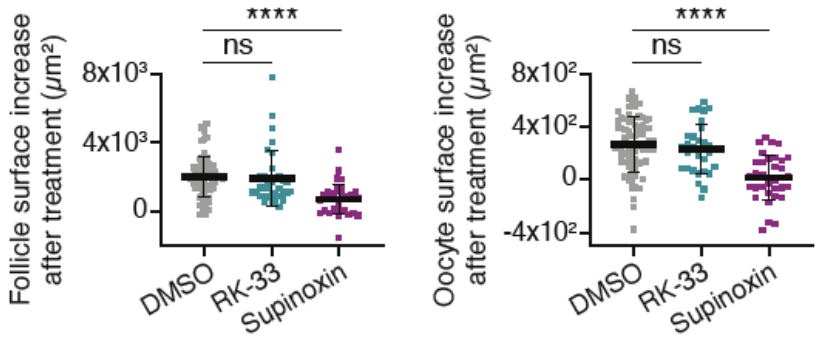


Le ZB est important pour la croissance ovocytaire et folliculaire

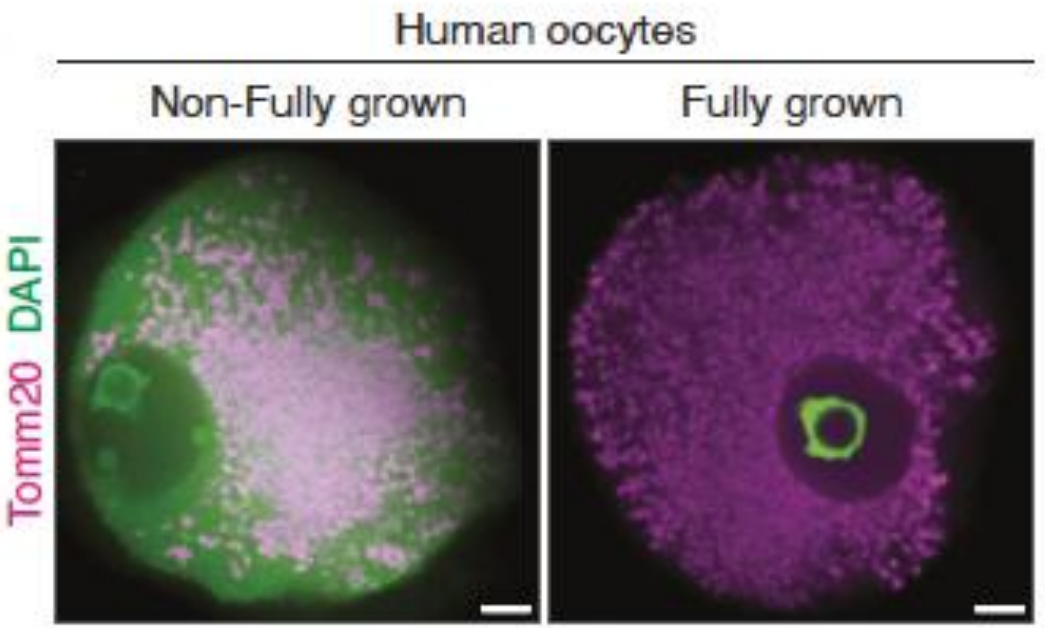








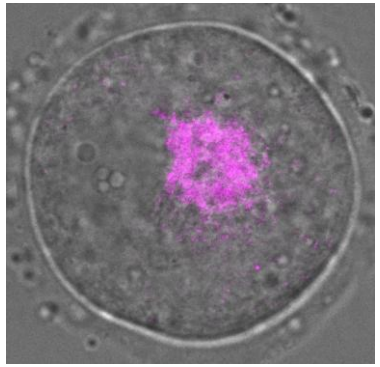
Le Zollo body est peut-être aussi présent dans les ovocytes humains

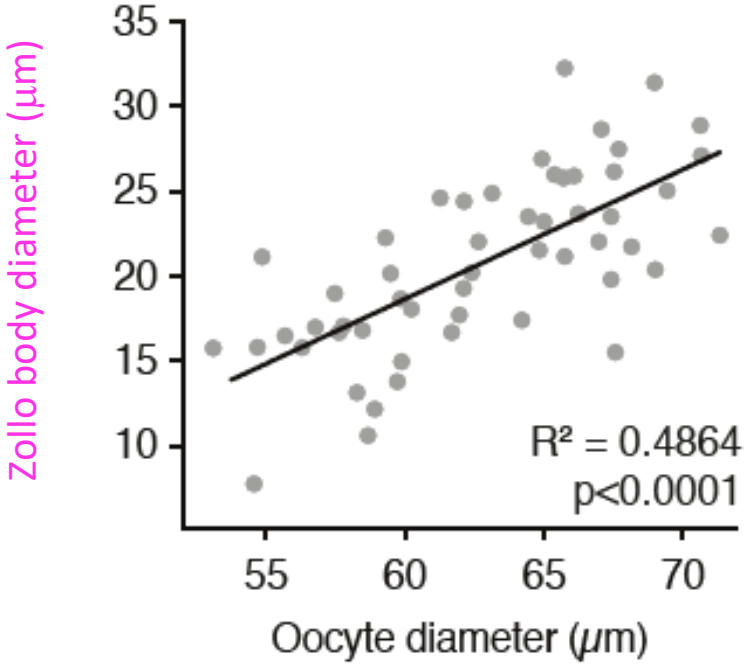


(Collaboration Elsa Labrune, HCL)

(Zollo *BioxRiv* 2025)

Importance du Zollo body dans la croissance





Biogenèse des organelles afin d'éviter dilution du cytoplasme lorsque l'ovocyte grossit

Mesure de la masse sèche: nouveau marqueur non invasif de qualité ovocytaire et zygotique?

(Collaboration Xavier Pollet-Villard & Mohamed Yahiatene, Nataliance et Benoit Wattellier, Phasics)

nataliance

PHASICS
the phase control company

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