



## **Curso de Post-grado**

### **"Biología Celular del RNA"**

**Coordinadora:** Graciela L. Boccaccio

## **Programa 2017**

### **CONTENIDOS TEÓRICOS:**

**Módulo I: Introducción:** Proteínas de unión a RNA: generalidades y mecanismos de interacción.

Relevancia global de la regulación de y por RNAs: la red Enzima-Metabolito-RNA. El ER y el citoesqueleto como plataformas para el aparato traduccional.

**Módulo II: foci de silenciamiento de RNA.** Gránulos de Estrés y P-Bodies. Silenciamiento traduccional por estrés celular. Mecanismos moleculares: inactivación del aparato traduccional, rol de 5' tRNAs. Dinámica de gránulos de estrés y PBs: motores moleculares y mecanismos de agregación proteína-proteína. Dominios prion-like, secuencias repetitivas y de baja complejidad. El proteosoma y la autofagia en la regulación de foci de silenciamiento de RNAs.

**Módulo III: Transporte subcelular de RNA y polaridad celular.** Relevancia durante el desarrollo embrionario temprano. Polaridad neuronal: transporte de RNA a dendritas y axones. El transcriptoma sináptico. Modificaciones . Señales de reconocimiento. Exportación de RNAm por el poro nuclear y por pathways alternativos: evaginación de gránulos de RNA. Motores moleculares y adaptadores involucrados en el transporte de mRNA.

**Módulo IV: Traducción localizada;** relevancia en motilidad celular y en plasticidad sináptica.

Mecanismos moleculares: Rol de RNAs pequeños no codificantes: BC-RNAs, miRNAs y piRNAs.

Regulación por polyadenilación citoplasmática. Regulación de ARC mRNA: decaimiento disparado por traducción ectópica (*translation-dependent decay*). Autoagregación de RBPs regulatorias, CPEB y Pumilio.

**Módulo V: Desregulación y patogénesis.** FMRP y Síndrome de "Fragil X Mental Retardation".

Agregación de proteínas de unión a RNA en neurodegeneración. RNA con repeticiones en patologías: toxicidad del RNA y traducción independiente de ATG (*RAN translation*).

### **Módulo VI:**

**Tópico especial I:** estructura y dinámica de los ARN virales. Elementos de estructura secundaria. Relevancia en la replicación y traducción virales.

**Tópico especial II:** splicing y regulación por vías de regulación

**Tópico especial III:** Regulación post-transcripcional en tripanosomas

**Tópico especial IV:** Función y metabolismo de RNAs pequeños. Regulación en cis por modificaciones post-transcripcionales y en trans por sus propios targets

### **TRABAJO PRÁCTICO:**

-Microscopía confocal de PBs y SGs en células de mamífero, insecto y levaduras y en cortes de tejido. Knockdown por RNAi de componentes estructurales y catalíticos de PBs

-Análisis cuantitativo automatizado de imágenes mediante algoritmos de MATLAB.

### **SEMINARIOS:**

Cada estudiante realizará una presentación oral (45 min) de un artículo indicado por los docentes y relacionado a los temas teóricos.

## Bibliografía –Tópicos de Biología Celular Avanzada-Biología Celular del ARN 2017:



### Clases teóricas y de seminarios

#### Modulo I:

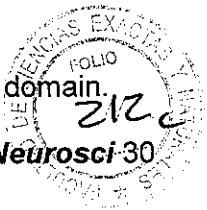
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#### Modulo II:

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- Buchan JR, et al Eukaryotic Stress Granules Are Cleared by Autophagy and Cdc48/VCP Function. *Cell*. 2013 153(7):1461-74.
- Arribere et al. Reconsidering movement of eukaryotic mRNAs between polysomes and P bodies. *Mol Cell*. 2011 44(5):745-58.
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#### Modulo III:

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- Dix CI et al. Lissencephaly-1 promotes the recruitment of dynein and dyneactin to transported mRNAs. *J Cell Biol*. 2013 ; 202(3):479-94.
- Speese SD, et al (2012) Nuclear envelope budding enables large ribonucleoprotein particle export during synaptic Wnt signaling. *Cell* 149 (4):832-846.
- Udagawa et al. (2012) Bidirectional control of mRNA translation and synaptic plasticity by the cytoplasmic polyadenylation complex. *Mol Cell* 47 (2):253-266.
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- Majumdar et al (2012) Critical role of amyloid-like oligomers of Drosophila Orb2 in the persistence of memory. *Cell* 148 (3):515-529



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### Modulo V:

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### Modulo VI:

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#### Trabajo Práctico:

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