

## MOLECULAR BIOLOGY OF BIRNAVIRUS



**José F. Rodríguez-Aguirre**

### Summary

Members of the Birnaviridae family are characterized by possessing a bipartite dsRNA genome enclosed within an icosahedral capsid formed by a single protein layer.

Some birnaviruses have a major economic impact on the poultry and fish-farming industries.

Current birnavirus control measures, mainly based on live vaccines, are rather inefficient. A good example of this is the situation of Infectious bursal disease virus (IBDV), our major working model.

The systematic use of live IBDV vaccines has not prevented the spread of the disease and the constant increase on virus virulence. Our goal is to develop efficient and safe strategies to controlling birnavirus-borne diseases.

We believe that the only realistic way to achieve this goal is by getting a deep understanding of key aspects of the birnavirus molecular biology.

We have focussed our effort on three main topics: i) IBDV morphogenesis and structure; ii) Development of IBDV subunit vaccines;

and iii) Generation of genetically-resistant chicken lines.

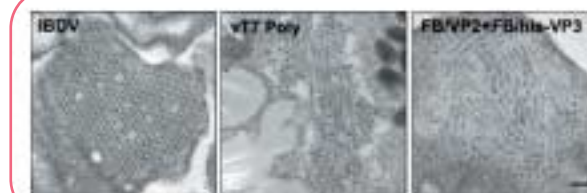


Figure 1. Detection of IBDV assemblages formed in different expression systems. EM images correspond to chicken embryo fibroblasts infected with IBDV, BSC-1 cells infected with the recombinant vaccinia virus vT7 Poly that expresses the IBDV polyprotein, and H5 insect cells coinfecting with the recombinant baculoviruses FB/pVP2 and FB/his-VP3, respectively. Scale bar indicates 250 nm

## PERSONNEL



### Group Leader:

Jose F. Rodríguez-Aguirre, investigador científico CSIC  
M<sup>a</sup> Dolores González de Llano, científico titular OPIS

### Postdoctoral Fellows:

Ana M<sup>a</sup> Oña  
Fernando Abaitua

### Predocctoral Fellows:

Roberto Clemente  
Aitor Navarro  
Yolanda Lorenzo  
Laura Delgui

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## PUBLICATIONS

Maraver, A., Clemente, R., Rodríguez, J.F., Lombardo, E. (2003). Identification and molecular characterization of the RNA polymerase-binding motif of infectious bursal disease virus inner capsid. *J. Virol.* **77**, 2459-2468.

Kochan, G., González, D. and Rodríguez, J.F. (2003). Characterization of the RNA-binding activity of VP3, a major structural protein of Infectious bursal disease virus. *Arch. Virol.* **148**, 723-744.

Maraver, A., Oña, A., Abaitua, F., González, D., Clemente, R., Ruiz-Diaz, J.A., Caston, J.R., Pazos, F. and Rodríguez, J.F. (2003). The oligomerization domain of VP3, the scaffolding protein of infectious bursal disease virus, plays a critical role in capsid assembly. *J. Virol.* **77**, 6438-6449.

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Capua, I., Terregino, C., Cattoli, G., Mutinelli, F. and Rodríguez, J.F. (2003). Development of a DIVA (Differentiating Infected from Vaccinated Animals) strategy using a vaccine containing a heterologous neuraminidase for the control of avian influenza. *Avian Pathol.* **32**: 47-55.

Eichwald, C., Rodríguez, J.F. and Burrone, O. (2004). Characterisation of rotavirus NSP2/NSP5 interaction and dynamics of viroplasm formation. *J. Gen. Virol.* **85**, 625-634.

Oña, A., Luque, D., Abaitua, F., Maraver, A., Castón, J.R. and Rodríguez, J.F. (2004). The C-terminal domain of the pVP2 precursor is essential for the interaction between VP2 and VP3, the capsid polypeptides of infectious bursal disease virus. *Virology* **322**, 135-142.

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## RESEARCH PROJECTS

**José F. Rodríguez-Aguirre.**

Phylogenetic sequence analysis and improved diagnostic assay systems for viruses of the family *Reoviridae*  
EU, 199,000, 01-01/06-04.

**José F. Rodríguez-Aguirre.**

IBDV morphogenesis  
Ministerio de Ciencia y Tecnología, Spain, 133,250, 01-01/12-03.

**José F. Rodríguez-Aguirre.**

Development of IBDV oral vaccines  
Comunidad Autónoma de Madrid, Spain, 108.182 , 01-01/12-02.

**José F. Rodríguez-Aguirre.**

Development of IBDV subunit vaccines  
Comunidad Autónoma de Madrid, Spain, 130,000 , 06-03/06-05.

**José F. Rodríguez-Aguirre.**

Development of IBDV marker vaccines  
Ministerio de Ciencia y Tecnología, Spain, 203,500 , 01/12/03-30/11/06.

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## DOCTORAL THESES

**Roberto Clemente Cervera (2004).**

Estudio del papel funcional de la proteína estructural VP3 en el proceso morfogénico del virus de la bursitis infecciosa.  
Universidad Autónoma de Madrid, Facultad de Ciencias Biológicas.

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## PATENTS

**Rodríguez, J.F., González de Llano, D., Oña, A., Abaitua, F., Maraver, A., Clemente, R., Castón, J.R. and Rodríguez, J.R.**  
Procedimiento de producción de partículas vacías (VLPS) del virus inductor de la bursitis infecciosa (IBDV), composiciones necesarias para su puesta a punto y su uso en la elaboración de vacunas frente al IBDV.  
CSIC/ BIONOSTRA S.A.  
Patent#: 200300751, date: 31.03.03.

**Rodríguez Aguirre, J.F., Ruíz Castón, J., González de Llano, M.D., Rodríguez Aguirre, M.D., Blanco Chapinal, S., Oña Blanco, A.M., Saugar Gómez, I., Abaitua Elustondo, F., Luque Buzo, D., y Rodríguez Fernández-Alba, J.R.**  
Cápsidas vacías quiméricas del virus causante de la enfermedad de la bursitis infecciosa (IBDV), su procedimiento de obtención y aplicaciones.  
CSIC/ BIONOSTRA S.A  
Patent#: P200400120, date: 21.01.2004.

**Rodríguez, J.F., Ruíz Castón, J., González de Llano, M.D., Oña Blanco, A.M., Abaitua Elustondo, F., Luque Buzo, D. y Rodríguez Fernández-Alba, J.R.**  
Cápsidas vacías (VLPS(-VLP4)) del virus causante de la enfermedad de la bursitis infecciosa (IBDV) su procedimiento de obtención y aplicaciones.  
CSIC/ BIONOSTRA S.A  
Patent#: P200400121, date: 21.01.2004

**Ruíz Castón, J., Saugar Gómez, I., Luque Buzo, D., Abaitua Elustondo, F., Oña Blanco, A.M., González de Llano, M.D., Rodríguez Aguirre, J.F. y Rodríguez Fernández-Alba, J.R.**  
Title: Procedimiento para la producción en levaduras de cápsidas virales vacías compuestas por proteínas derivadas de pVP2 del virus causante de la enfermedad de la bursitis infecciosa (IBDV).  
CSIC/ BIONOSTRA S.A.  
Patent#: P20041044, date: 30.04.04

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