

Christos Balaskas

Associate Professor of Functional Anatomy, Histology and Embryology of Farm Animals

Animal Science (A.U.A., 1992), M.Sc. (U.C.L., 1993), Ph.D. (U.C.L., 1997)

Head of the Laboratory of Anatomy and Physiology of Farm Animals

Department of Animal Science

School of Animal Biosciences

Agricultural University of Athens

75-86 Iera Odos, 118 55 Athens, Greece

Tel. +30-210-529 4389

e-mail: chbalaskas@aua.gr

The maturation of the gut is a complex biological process, which involves cell proliferation, cell migration, cell recognition and adhesion, cell differentiation and cell death. Signals of chemical nature (growth factors, adhesion molecules, hormones, neurotransmitters), mechanical forces (stretch, muscle contraction), cell-to-cell or tissue-to-tissue interactions (mesenchymal-epithelial interface), and extracellular matrix components promote the growth, differentiation and maturation, in short, the morphogenesis of the gut.

Gut wall consists of mucosa, connective tissue, muscle layers, blood and lymph vessels and nerves. The multiplicity of components suggests the occurrence of structural and functional reciprocal interactions, controlled by extrinsic nerves (sympathetic, parasympathetic and sensory connections), by the intrinsic plexuses, together with endocrine cells that release locally bioactive substances and exogenous factors (microbial flora, luminal content) that play a crucial role in the development of the gut.

This maturation process remains largely unknown for most animals, inclusive of chickens and rabbits. Furthermore, there is little evidence correlating the anatomical and physiological changes that occur in the developing gut mucosa with the intestinal flora and the onset of local defensive mechanisms.

We use light, transmission and scanning electron microscopy, histochemistry, immunohistochemistry and morphometric techniques to reveal the 3-dimensional arrangement of the developing gastrointestinal tract and in particular,

- villus, crypts and intestinal glands architecture,
- blood and lymph vessels network,
- the development of digestive and absorptive capacities (neuro -endocrine cell coding, brush border enzyme activity and distribution),
- the influence of the digestive environment (intestinal flora, chyme synthesis) in the establishment of local specific and non-specific immune and mucin responses.

This arrangement is, however, a glance in a continuously changing structure. To reveal this magnificent plasticity, one must always bear in mind the words of Heraclitus "For ever something is created and changes and nothing remains the same".

Selected publications:

1. **C. Balaskas**, M.J. Saffrey and G. Burnstock. Distribution of NADPH-diaphorase activity in the embryonic chicken gut. *Anatomy and Embryology* 192:239-245 (1995)
2. **C. Balaskas**, M.J. Saffrey and G. Burnstock. Distribution and colocalization of NADPH-diaphorase activity, nitric oxide synthase immunoreactivity and VIP immunoreactivity in the newly-hatched chicken gut. *Anatomical Record* 243:10-18 (1995)
3. **C. Balaskas** and G. Gabella. Laminin immunoreactivity in enteric ganglia of the chick embryo. *Cell and Tissue Research* 289:243-251 (1997)
4. **C. Balaskas**. Cellular Development of the Enteric Nervous System in the Chick Embryo. Thesis submitted for the degree of Doctor of Philosophy (Ph.D.), Department of Anatomy and Developmental Biology, University College London, University of London, U.K., September 1997
5. **C. Balaskas** and G. Gabella. Glial fibrillary acidic protein (GFAP) immunoreactivity in enteric ganglia of the chick embryo. *Brain Research* 804:275-283 (1998)
6. G. Theodoropoulos, S.J. Hicks, A.P. Corfield, B.G. Miller, C.M.O. Kapel, M. Trivizaki, **C. Balaskas**, G. Petrakos and S.D. Carrington. Enteric mucin-related response to experimental infection by *Trichinella spiralis* in conventional vs. SPF pigs. *Experimental Parasitology* 109(2): 63-71 (2005)
7. N. Karakatsouli, K. Tarnaris, **C. Balaskas** and S.E. Papoutsoglou. Gill area and dimensions of gilthead sea bream *Sparus aurata* L. *Journal of Fish Biology* 69: 291-299 (2006)
8. K. C. Mountzouris, **C. Balaskas**, F. Fava, K.M. Tuohy, G.R. Gibson and K. Fegeros. Profiling of composition and metabolic activities of the colonic microflora of growing pigs fed diets supplemented with prebiotic oligosaccharides. *Anaerobe* 12(4): 178-185 (2006)
9. S. Fragou, **C. Balaskas**, K. Fegeros and I. Politis. Effect of vitamin E supplementation on lymphocyte distribution in gut-associated lymphoid tissues obtained from weaned piglets. *Journal of Veterinary Medicine A, Physiology, Pathology, Clinical Medicine* 53(7): 327-333 (2006)
10. J. Ikonopoulou, A. Aranaz, **C. Balaskas**, L. Sechi and M. Gazouli. Outbreak of acute tuberculosis in a goat herd; first report of *Mycobacterium caprae* isolation in Greece. *Online Journal of Veterinary Research* 10(2): 108-115 (2006)
11. J. Ikonopoulou, M. Gazouli, I. Dontas, L. Sechi, J.C. Lucas, **C. Balaskas**, V. Gorgoulis and C. Kittas. The infectivity of sarcoid clinical material and its bacterial content inoculated in CBA mice. *In Vivo* 20(6B): 807-813 (2006).
12. J. Ikonopoulou, **C. Balaskas**, B. Kantzoura, E. Frangiadaki, I. Pavlik, M. Bartos, J.C. Lukas and M. Gazouli. Comparative evaluation of positive tests to *Mycobacterium avium* subsp. *paratuberculosis* in clinically healthy sheep and goats in South-West Greece using molecular techniques, serology and culture. *The Veterinary Journal* 174: 337-343 (2007).
13. B. Kotsampasi, **C. Balaskas**, G. Papadomichelakis and S. Chadio. Reduced Sertoli cell number and altered pituitary responsiveness in male lambs undernourished in utero. *Animal Reproduction Science* 114:135-147 (2009).
14. K. C. Mountzouris, **C. Balaskas**, I. Xanthakos, Tzivinikou A and K. Fegeros. Effects of a multi-species probiotic on biomarkers of competitive exclusion efficacy in broilers challenged with *Salmonella enteritidis*. *British Poultry Science* 50:467-478 (2009).

15. P. Tsirtsikos, A. Kominakis, K. Fegeros, **C. Balaskas** and K. C. Mountzouris. Modulation of intestinal mucin composition and mucosal morphology by dietary phytogenic inclusion level in broilers. *Animal* 6(7):1049-1057 (2012).
16. P. Tsirtsikos, K. Fegeros, **C. Balaskas**, A. Kominakis and K.C. Mountzouris. Dietary probiotic inclusion level modulates intestinal mucin composition and mucosal morphology in broilers. *Poultry Science* 91:1860-1868 (2012).
17. M. Foudoulakis*, **C. Balaskas***, A. Csato, C. Szentes and G. Arapis. Japanese quail acute exposure to methamidophos: experimental design, lethal, sub-lethal effects and cholinesterase biochemical and histochemical expression. *Science of the Total Environment* 450-451:334-347 (2013) *equal contribution
18. **C. Balaskas**. The pancreo-duodenal “connections” of the chicken embryo. *Sustainable Development, Culture, Traditions Journal, Special Volume in Honor of Professor George I. Theodoropoulos*, 8-16 (2019)
19. A. Mataragka, **C. Balaskas**, K. Sotirakoglou and J. Ikonopoulos. Comparative evaluation of the performance of the PCR assays commonly used for the determination of sex in avian species. *Journal of King Saud University – Science* 32:228-234 (2020)
20. S.B. Bougali, N. Karakatsouli, C. Balaskas, K. Petropoulos, D.Trampouli, A. Batzina and P.-P. Laskari. Bile imprint on the parietal peritoneum of gilthead seabream and red seabream: Effects of fasting duration, stress and ice-Storage. *Fishes* 10, 32 (2025), <https://doi.org/10.3390/fishes10010032>
21. A. Mavrommatis, M. Severgnini, P. Cremonesi, P. Kyriakaki, C. Christodoulou, K. Petropoulos, L. Dunière, B. Kotsampasi, B. Castiglioni, C. Balaskas, E. Chevaux and E. Tsiplakou. The impact of probiotic live yeast in a barley grain-based diet on rumen microbial communities, fermentation, and histology of artificially reared lambs. *Animal Feed Science and Technology* 322, 116269 (2025), <https://doi.org/10.1016/j.anifeedsci.2025.116269>