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Characterization of the complement system in a colonial tunicate: C3 complement receptors and opsonic role of C3

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The compound ascidian *Botryllus schlosseri* is a reliable model organism for the study of immunobiology. As an invertebrate, it relies only on innate immunity for its defense. We already demonstrated the presence, in *Botryllus*, of homologues of mammalian C3, Bf, MBL and MASP1, referred to as BsC3, BsBf, BsMBL and BsMASP, respectively. All the complement components identified so far, are expressed by morula cells, the most abundant circulating hemocytes. In mammals, once the complement system is activated, a cascade of reactions occurs resulting in the cleavage of the third complement component (C3) to C3a and C3b, the former exerting a chemotactic activity, the latter acting as opsonin and, ultimately, activating the lytic pathway. The best-known receptor for C3a in mammals is C3aR, whereas CR1 is the receptor able to recognize and bind C3b on the microbial surfaces. Here, we describe, in *B. schlosseri*, new genes showing homology with vertebrate C3aR and CR1, respectively, and studied their transcription in the course of the colonial blastogenetic cycle. In addition, we continued our analysis of the role of C3 in *Botryllus* immunity by studying the modulation of BsC3 transcription during the colonial blastogenetic cycle and the effect of *bsc3* knockdown on immune responses. Results indicate that only morula cells, and no other immunocytes type, are labelled by the antisense probe for BsC3aR, whereas phagocytes and young, undifferentiated cells, known as hemoblasts, are the cells stained by the probe for BsCR1. Both the *bsc3ar* and *bscr1* genes are constitutively transcribed. However, a modulation in the extent of transcription occurs during the colonial blastogenetic cycle as the amount of BsC3aR mRNA abruptly decreased at TO, whereas no differences were observed when EC and MC were compared. This is probably related to the renewing of circulating cells at TO, that are replaced by new, differentiating cells entering the circulation in the same period.