

6 Conclusions and Outlook

Apis mellifera NMDA glutamate receptor subunit R1 (AmNR1) might be involved for the processing of higher order sensory information including visual and olfactory information, and learning and memory due to expression of this receptor transcript in the mushroom body, optic lobe and also in the antennal lobe of the adult bees. The AmNR1 gene is developmentally regulated and may not only be functional in the central nervous system of the adult bees, but it may also play a role in the developing central nervous system since it is highly expressed in the different developmental stages. The expression of AmNR1 protein is correlated with the expression of AmNR1 transcript. However, the AmNR1 protein is expressed at low level in the Kenyon cell dendrites but high level in the axons that increases with age. Age related increase might be correlated with behavioral maturation in the bees. Further, the expression of AmNR1 gene may not be affected by season and/or colony type because no differences were identified with the expression of AmNR1 transcript and protein in the bees that were collected from different seasonal stages and hives. The AmNR1 protein is co-localized with protein discs-large (DLG). These results will allow us to study the contribution of NMDA receptor in the social behaviors as well as learning and memory in the adult bee and their functional involvement in the developing brain neurogenesis by the application of site specific knocking-down experiments (RNA interference) and over expression of AmNR1 protein by plasmid expression system.