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Oxytocin receptor gene is associated with human directed social behaviour in dogs (*Canis familiaris*)

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Dogs' coevolution with humans and their adaptation to the human environment has made them a perfect model species to study human social interactions. Previous research indicates that dogs are eligible models for behavioural genetic research, as well. The oxytocin system has a crucial role in human sociality; various results prove that polymorphisms of the oxytocin receptor gene are related to complex social behaviours in humans. Based on these previous findings, our research investigated associations between certain socio-cognitive skills and eight newly described single nucleotide polymorphisms (SNPs) in the regulatory regions (5' and 3' UTR) of the oxytocin receptor gene in five breeds of dogs (German Shepherds, Border Collies, Beagles, Hungarian Vizslas, Labrador and Golden Retrievers). A total of 280 dogs were tested in a battery consisting of five episodes: Greeting by a stranger, Separation from the Owner, Problem solving, Threatening approach, Hiding. Behavioural variables were grouped into three independent scales with a Principal Component Analysis: Reaction to unfamiliar human, Behaviour during separation from and reunion with the owner, Human-directed gazing during problem solving. Buccal samples were collected, and DNA was isolated using standard protocols. SNPs in the 3' and 5' UTR regions were analyzed by polymerase chain reaction based techniques followed by subsequent electrophoresis analysis. The gene-behaviour association analysis suggests that oxytocin receptor gene polymorphisms have an impact on (i) how dogs react to an unfamiliar person, (ii) how dogs behave during separation from and reunion with the owner, and (iii) whether dogs look at humans for help while solving a problem. Based on all these results, we conclude that the social behaviour of dogs towards humans is related to the oxytocin system, similarly to humans. Furthermore, our research confirms and extends the view that dogs can be used as model animals for behavioural genetic research.