The invention refers to a recombinant human diamine oxidase (DAO) with decreased glycosaminoglycan binding affinity, wherein said DAO comprises at least one amino acid modification in the glycosaminoglycan (GAG) binding domain. The present invention also refers to the use of the DAO in the treatment of a condition associated with excess histamine, specifically in the treatment of chronic allergic diseases, more specifically in the treatment of anaphylaxis, anaphylactic shock, chronic urticaria, acute urticaria, asthma, hay fever, allergic rhinitis, allergic conjunctivitis, histamine intoxication, headache, atopic dermatitis inflammatory diseases, mastocytosis, mast cell activation syndrome (MCAS), pre-eclampsia, hyperemesis gravidarum, pre-term labor, peptic ulcers, acid reflux, pruritus, and sepsis.