ENZYMES FROM THE GUT SYMBIONT *AKKERMANSIA MUCINIPHILA* CATALYSE EFFICIENT REMOVAL OF EXTENDED A AND B BLOOD ANTIGENS

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Akkermansia muciniphila is a mucin degrading specialist and the sole representative of the Verrucomicrobiota phylum in the human gut. Recently we characterised the battery decapping sialidases and fucosidases from this bacterium, which revealed the activity of two α-1,2-fucosidases of glycosidase hydrolase family 95 on H antigens, found as terminal epitopes of mucin *O*-glycans [1]. These finding inspired us to revisit the enzymatic conversion of group A and B red blood cells (RBCs) to the universal donor type O (ECO concept). The genesis of this vision dates more than four decades ago, using a native *exo*-glycosidase from coffee bean, which was followed by the discovery of several more efficient bacterial enzymes [2]. All these studies aimed at removing the canonical textbook A and B antigens, but extended forms of both the A and B antigens are known to be displayed on RBC glyco-lipids.
We harnessed *A. muciniphila* to discover enzymes that efficiently remove both the canonical and all known extended A and B motifs, which led to significant improvement of compatibility with group O plasmas. Our work establishes for the first time the known extended A and B motifs as true antigens associated with the A and B RBC phenotypes [3]. We will present this study with focus on the molecular signatures of the blood antigen removing enzymes.

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