CLAIMS

1. Use of a human recombinant AAT (rhAAT) protein or fragment thereof, expressed in a genetically modified yeast, in the manufacture of a medicament for the treatment and/or prevention of a non-viral disease of the lung associated with inflammation and/or a pathological immune response.

2. The use according to claim 1, wherein the disease of the lung associated with inflammation and/or a pathological immune response is associated with an increased level of inflammatory cytokines, an increased level of one or more transcription factors and/or increased immune cell infiltration in the lung tissue of a subject compared to a healthy subject.

3. The use according to claim 1, wherein the disease of the lung as is asthma.

4. The use according to claim 1, wherein the disease of the lung is acute respiratory distress syndrome (ARDS).

5. The use according to claim 1, wherein the disease of the lung is bronchiolitis obliterans (BO).

6. The use according to claim 5, wherein the bronchiolitis obliterans (BO) is associated with lung transplantation and/or allogenic hematopoietic stem cell transplantation.

7. The use according to claim 1, wherein the rhAAT protein or fragment thereof comprises a sequence according to SEQ ID NO 4, or is encoded by SEQ ID NO 1, 2 or 3, or a sequence with an at least 80% identity thereto.

8. The use according to claim 1, wherein the rhAAT protein or fragment thereof is expressed in a yeast of the family *Pichia*.

9. The use according to claim 1, wherein the rhAAT protein or fragment thereof is expressed in a genetically modified *Pichia pastoris* yeast comprising an exogenous hAAT-encoding nucleotide sequence integrated in the *Pichia pastoris* genome.

10. The use according to claim 1, wherein the the rhAAT protein or fragment thereof comprises post-translational modifications and the post-translation modification is N-glycosylation, O-glycosylation, N-terminal methionine removal, N-acetylation and/or phosphorylation, or any combination thereof.

11. The use according to claim 1, wherein the rhAAT protein or fragment thereof comprises at least one Hex9HexNAc2, Hex10HexNAc2, Hex11HexNAc2, Hex12HexNAc2, Hex13HexNAc2, Hex14HexNAc2, Hex15HexNAc2 and/or Hex16HexNAc2 glycosylation.

12. The use according to claim 1, wherein the rhAAT protein or fragment thereof comprises an amino acid sequence according to SEQ ID NO 4 and at least one N-linked glycosylation at N46, N83 or N247, at least two N-linked glycosylations at N46 and N83, N46 and N247, or N83 und N247, or three N-linked glycosylations at N46, N83 and N247.

13. The use according to claim 1, wherein the rhAAT protein or fragment thereof comprises an amino acid sequence according to SEQ ID NO 4 and

    a. at least one N-linked glycosylation comprising Hex10HexNAc2, Hex11HexNAc2, Hex12HexNAc2, Hex13HexNAc2, Hex14HexNAc2, Hex15HexNAc2 and/or Hex16HexNAc2 at N83, and/or

    b. at least one N-linked glycosylation comprising Hex9HexNAc2, Hex10HexNAc2, Hex11HexNAc2, Hex12HexNAc2, Hex13HexNAc2, Hex14HexNAc2, Hex15HexNAc2 and/or Hex16HexNAc2 at N247.

14. The use according to claim 1, wherein the rhAAT protein or fragment thereof comprises an amino acid sequence according to SEQ ID NO 4 and at least one N-linked glycosylation comprising Hex9HexNAc2, Hex10HexNAc2, Hex11HexNAc2, Hex12HexNAc2, Hex13HexNAc2, and/or Hex14HexNAc2 at N46,

15. The use according to claim 1, wherein the rhAAT protein or fragment thereof is administered by inhalation.

16. The use according to claim 1, wherein the rhAAT protein or fragment thereof is administered as a solution suitable for inhalation, soluble powder suitable for inhalation or dry powder suitable for inhalation.

17. The use according to claim 1, wherein the rhAAT protein or fragment thereof is administered by inhalation of a nebulized solution.

18. Use of a pharmaceutical composition comprising a pharmaceutically acceptable carrier and either the rhAAT protein or fragment thereof according to claim 1 or a protein preparation comprising the rhAAT protein or fragment thereof according to claim 1, in the manufacture of a medicament for the treatment of a non-viral disease of the lung associated with inflammation and/or a pathological immune response.

19. The use according to claim 18, wherein the protein preparation comprises a rhAAT glycoprotein with an amino acid sequence according to SEQ ID NO 4 or fragment thereof and at least one N-linked glycosylation:

    a. at N46 in more than 80% of said glycoproteins in the preparation,

    b. at N83 in more than 80% of said glycoproteins, and/or

    c. at N247 in more than 1% of said glycoproteins.

20. The use according to claim 18, wherein the protein preparation comprises a rhAAT glycoprotein with an amino acid sequence according to SEQ ID NO 4 or fragment thereof and at least one N-linked glycosylation comprising:

    a. Hex9HexNAc2, Hex10HexNAc2, Hex11HexNAc2, Hex12HexNAc2, Hex13HexNAc2, Hex14HexNAc2, and/or Hex15HexNAc2 at N46, wherein said Hex9HexNAc2, Hex10HexNAc2, Hex11HexNAc2, Hex12HexNAc2, Hex13HexNAc2, Hex14HexNAc2, and/or Hex15HexNAc2 at N46 are present in more than 50% of said glycoproteins in the preparation,

b. Hex9HexNAc2, Hex10HexNAc2, Hex11HexNAc2, Hex12HexNAc2, Hex13HexNAc2, Hex14HexNAc2, and/or Hex15HexNAc2 at N83, wherein said Hex9HexNAc2, Hex10HexNAc2, Hex11HexNAc2, Hex12HexNAc2, Hex13HexNAc2, Hex14HexNAc2, and/or Hex15HexNAc2 at N83 are present in more than 60% of said glycoproteins in the preparation, and/or

c. Hex9HexNAc2 and/or Hex10HexNAc2 at N247, wherein said Hex9HexNAc2 and/or Hex10HexNAc2 at N247 are present in more than 1% of said glycoproteins in the preparation.

21. The use according to claim 18, wherein the protein preparation comprises a rhAAT glycoprotein with an amino acid sequence according to SEQ ID NO 4 or fragment thereof and at least one N-linked glycosylation comprising:

a. Hex9HexNAc2, Hex10HexNAc2, Hex11HexNAc2, Hex12HexNAc2, Hex13HexNAc2, Hex14HexNAc2, and/or Hex15HexNAc2 at N46, wherein any one or more of said glycosylations, alone or in combination, is present in 0.1-100% of said glycoprotein in the preparation,

b. Hex9HexNAc2, Hex10HexNAc2, Hex11HexNAc2, Hex12HexNAc2, Hex13HexNAc2, Hex14HexNAc2 and/orHex15HexNAc2 at N83, wherein any one or more of said glycosylations, alone or in combination, is present in 0.1-90% of said glycoproteins in the preparation, and/or

c. Hex9HexNAc2 and/or Hex10HexNAc2 at N247, wherein any one or more of said glycosylations, alone or in combination, is present in 0.1-30% of said glycoproteins in the preparation.