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SHORT COMMUNICATION

Antigenic Relationship between the Human Bronchial Mucus Inhibitor and Plasma Inter-α-Trypsin Inhibitor

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Immunologische Beziehungen zwischen dem Proteaseninhibitor aus Bronchialsekret und dem Inter-α-Trypsininhibitor aus Plasma beim Menschen

Zusammenfassung: Der niedermolekulare und säurestabile Proteaseninhibitor aus menschlichem Bronchialsekret bildet ein Immunpräzipitat mit Antikörpern gegen den Inter-α-Trypsininhibitor des Plasmas. Die Inhibitoren unterscheiden sich jedoch im Molekulargewicht und in ihrer elektrophoretischen Beweglichkeit. Beide gehören zur Gruppe der Argininininhibitoren. Der niedermolekulare Inhibitor scheint die gleichen Antigendeterminanten und das gleiche reaktive Zentrum wie der Inter-α-Trypsininhibitor zu besitzen.

Secretions of the human upper respiratory tract contain a considerable antiproteolytic activity. It is due to two different proteinase inhibitors. About 20% of the inhibitory activity is caused by secerned plasma α-1-antitrypsin and about 80% by a low molecular weight (mol. wt. 14000), acid-stable inhibitor[1–3]. It was possible to isolate the inhibitor from bronchial mucus in pure form[2] by mean of reversible binding to insoluble trypsin resin. On account of the low molecular weight, the inhibitor was not expected to be identical with an inhibitor from plasma. In fact, in immunelectrophoresis using a polyvalent antihumanserum no precipitations were detectable. However, when monovalent antiserum against the inter-α-trypsin inhibitor, was used, a clear precipitation became evident. The figure shows the result of an immunelectrophoretic comparison of the low molecular weight inhibitor and the inter-α-trypsin inhibitor*** from human plasma. Both inhibitors are precipitated by the specific antiserum but in different electrophoretic positions.

Inter-α-trypsin inhibitor ($s_{20,w}$=6.4) is a relatively unstable substance. It is known to dissociate into fragments of $s_{20,w}$=4.4 (Figure: substance in starting position). These fragments can dissociate further to an inactive fragment[4] and an active inhibitor peptide. In immunelectrophoretic analysis of aged solutions of inter-α-trypsin inhibitor, several precipitates are found in various positions, but none in that of mucus inhibitor. Our results could be interpreted by the assumption that the low molecular weight inhibitor is an artefact generated by the action of perchloric acid on the inter-α-trypsin inhibitor during isolation. This possibility can now be excluded by the demonstration that an inhibitor with the same molecular weight is already present in the native mucus.

The antigenic relationship between mucus inhibitor and the inter-α-trypsin inhibitor is unknown, but it might be suggested that the mucus inhibitor is a derivative from inter-α-trypsin inhibitor formed by the ciliated mucous membrane of the upper respiratory tract. Another explanation might be that the inter-α-trypsin inhibitor is the transport form of the mucus inhibitor synthesized and resorbed by mucous membranes.

The mucus inhibitor is not only antigenically related to the inter-α-trypsininhibitor, but the reactive sites are similar also. Both inhibitors are arginine inhibitors, and their antiproteolytic activity is not abolished by acylating[5] all of the α- and ε-aminogroups in the molecule.

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[1] Hochstraßer, K., Haendle, H., Reichert, R. & Werle, E. (1971) *this J.* 352, 954–968.

[2] Hochstraßer, K., Reichert, R., Schwarz, S. & Werle, E. (1972) *this J.* 353, 221–226.

[3] Reichert, R., Hochstraßer, K. & Conradi, G. (1972) *Pneumologie* 147, 13–20.

[4] Heide, K., Heimburger, N. & Haupt, H. (1965) *Clin. Chim. Acta* 11, 82–85.

[5] Fritz, H., Fink, E., Gebhardt, M., Hochstraßer, K. & Werle, E. (1969) *this J.* 350, 933–944.