A Novel Antimicrobial Peptide from Mammalian Tracheal Mucosa*

G. Diamond, Ph.D.; †M. Zasloff, Ph.D.; †H. Eck, B.S.; †M. Bruseur, B.S.; †W. Maloy, Ph.D.; †and C. Bevins, Ph.D. †

Extracts of the bovine tracheal mucosa contain an abundant, novel peptide with potent antimicrobial activity. The 38 amino acid peptide, which we have named tracheal antimicrobial peptide (TAP), was isolated by a combination of size-exclusion, ion-exchange, and reverse-phase chromatographic fractionations using antimicrobial activity as a functional assay. The yield was approximately 2 μg/g of wet mucosa. The complete peptide sequence was determined by direct peptide sequence analysis and from a cloned cDNA. Mass spectral analysis of the isolated peptide was consistent with the sequence and indicated the participation of 6 cysteine residues in the formation of intramolecular disulfide bonds. The size, basic charge, and presence of 3 intramolecular disulfide bonds are similar to, but clearly distinct from the defensins, a well characterized class of antimicrobial peptides from mammalian circulating phagocytic cells. The putative TAP precursor is predicted to be relatively small (64 amino acids), and the mature peptide resides at the extreme carboxy-terminus and is bracketed by a short putative propeptide region and an inframere stop codon. The mRNA encoding this peptide is more abundant in the respiratory mucosa than in whole lung tissue.

The purified peptide had antibacterial activity in vitro against Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, and Pseudomonas aeruginosa. In addition, the peptide was active against Candida albicans, indicating a broad spectrum of activity.

This peptide appears to be, based on structure and activity, a member of a newly emerging group of cysteinerich cationic antimicrobial peptides found in animals, insects, and plants. The isolation of TAP from the mammalian respiratory mucosa may provide new insight into our understanding of host defense of this vital tissue.

*From the †Department of Pediatrics, The Children’s Hospital of Philadelphia, University of Pennsylvania School of Medicine, Philadelphia; and ‡Magainin Sciences, Inc, Plymouth Meeting, Penn.

Initial Characterization of Tektins in Cilia of Respiratory Epithelial Cells*

A. Hastie, Ph.D.; F. Cilizzo, M.D.; L. Evens; M. Krantz, and J. Fish, M.D., F.C.C.P.

The ciliated airway epithelial cell provides essential clearance of airway secretions and inhaled matter through the beating movement of cilia. This predominant cell type of the conducting airways is rendered susceptible by its location to various forms of injury, arising from pollutants, microbes, inflammatory cells, and their media-

*From the Department of Medicine, Division of Pulmonary and Critical Care Medicine, Thomas Jefferson University, Philadelphia.