

CAN SILVER IONS PERMEATE THROUGH A POTASSIUM ION CHANNEL ? – DOUBLE ION TRAP LASER SPECTROSCOPY ON METAL COMPLEXES OF THE PARTIAL PEPTIDE OF A SELECTIVITY FILTER

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We would like to present a challenge of the gas phase ion spectroscopy to ion recognition mechanism in potassium ion channels. Our systematic studies have been reported (see references) and the relation between the ion permeability and conformation of Ac-Tyr-NHMe (a model for GYG peptide) which is a portion of the selectivity filter in the K⁺ channel have been revealed. In this presentation, the permeability of silver ion for the potassium channel is discussed. Silver and silver ions have a long history antimicrobial activity and medical applications. Nevertheless, the activity of Ag⁺ against bacteria, how it enters a cell, has not yet been established. The K⁺ channel, a membrane protein, is a possible route. The addition of a channel inhibitor (4-aminopyridine) to modulate the Ag⁺ uptake could support this view. However, the inhibitor enhances the uptake of Ag⁺, the opposite result. We have applied cold ion trap infrared laser spectroscopy to complexes of Ag⁺ and Ac-Tyr-NHMe (a model for GYG peptide) which is a portion of the selectivity filter in the K⁺ channel to consider the question of permeation. With support from quantum chemical calculations, we have determined the stable conformations of the complex. The conformations strongly suggest that Ag⁺ would not readily permeate the K⁺ channel. The mechanism of the unexpected enhancement by the inhibitor is discussed. References 1) S. Tanabe et al., *JPCL* in press. 2) Y. Suzuki et al., *Bull. Chem. Soc. Jpn.* in press. 3) Y. Suzuki et al., *PCCP*, 24, 20803 (2022). 4) Y. Suzuki et al., *JPCA*, 125, 9609 (2021) (Front Cover). 5) T. Negoro et al., *PCCP*, 23, 12045 (2021) (Inside Back Cover) 6) R. Otsuka et al., *ChemPhysChem*, 21, 712 (2020) (Front Cover) 7) S. Ishiuchi et al., *PCCP*, 21, 561 (2019) (Cover)