

Cortisol analysis from hair of captive chimpanzees: methodological validation and application to social management

Yumi Yamanashi<sup>1,2</sup>, Naruki Morimura<sup>3</sup>, Yusuke Mori<sup>1</sup>, Misato Hayashi<sup>3</sup>, Juri Suzuki<sup>3</sup>  
(Wildlife Research Center, Kyoto University<sup>1</sup>; Japanese Society for Promotion of Science<sup>2</sup>; Primate Research Institute, Kyoto University<sup>3</sup>)

Assessments of long-term stress are important given that prolonged stress can alter animal behaviors. The use of hair cortisol as a marker of long-term stress has been increasing, but there has not been any report on the use of such methods with chimpanzees. The purpose of this study was to establish a methodology for analyzing hair cortisol in captive chimpanzees. First, we removed hair from the arms of nine chimpanzees living in the Kumamoto Sanctuary, Kyoto University (KS) and sampled the regrown hair 3 months later. The aggressive behaviors during the hair growth period were recorded. The result showed that hair cortisol levels were positively correlated with the rates of receiving aggression. Thus, hair cortisol may reflect long-term stress in chimpanzees. Second, we investigated factors affecting hair cortisol concentrations. We cut hair from the arms, sides, and backs of 27 chimpanzees living at the KS and the Primate Research Institute, Kyoto University. The results revealed that cortisol varied based on source body part, hair whiteness and institutions. Therefore, we recommend that hair should be collected from the same body part and that white hair should be avoided. Based on the results, we discuss the possibilities to apply for social management.