

## **The insertion of different-species homeobox genes in *Macaca mulatta* by lysogenic viral mechanics**

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Homeobox genes are responsible for the proper development of an animal's body plan during embryonic stages. Previous research has proven that the modification of the organization of homeobox (HOX) genes within an organism during embryonic development can result in obvious anatomical modification in viable individuals. Existing research focuses on altering the preexisting genome of an organism during development, however whether or not the HOX genes from a distantly related species could successfully be integrated into a model organism's adult genome has been largely unknown and unresearched. Under the guiding hand of Kier, our research first identified a viable organism to extract HOX genes from based on the organism's accessibility and taxonomic proximity to *Macaca mulatta*, our host species. The selected organism became *Canis lupus familiaris* "Beagle". HOX genes from *C. familiaris* were isolated and extracted by the use of CAS-9 and relevant guide RNA from three locations of an individual after dispatch; from the marrow of the thoracic vertebrae, the lumbar vertebrae, and tissue from the corpus callosum. As a means to deliver the *C. familiaris* genes into the *M. mulatta* genome, a retrovirus capable of undergoing latency through the lysogenic cycle was developed and made competent to integrate *C. familiaris* genes within its genome. These viruses were injected directly into six living *M. mulatta* specimens. After a monitored period of three weeks, four specimens were deceased. The two living specimens (Patient F and Patient C) displayed obvious physiological, anatomical, and behavioral changes that align with the expected results of the insertion of *C. familiaris* HOX genes. Both living patients developed full-coverage light-colored fur thicker than that of the typical *M. mulatta* individual, and also exhibited gradual elongation of the muzzle area by a measure of ~31.5 (31.496) millimeters. Both patients became far less tolerant of routine medical checks and became especially aggravated during feedings, where they

began to prefer an obligatory carnivorous diet. After our research was concluded, Patient F was culled. Patient C was sustained for the intent of use in further research. All modifications performed on these research individuals are thought to be irreversible.

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