New Research Investigates How Diseases Spread in Primates

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A new international study has investigated how diseases are shared among species of primates with a view to predicting what diseases may emerge in humans in the future. The findings aim to help in the fight against these diseases by enabling scientists to develop treatments before outbreaks occur. The findings are published online this week in the journal *Ecology Letters*.

Emerging infectious diseases are diseases that have only recently appeared in humans, such as SARS and HIV/AIDS. These diseases often have devastating consequences because people lack natural immunity to the disease, and it takes time for scientists to develop effective treatments and vaccines. Around 60% of emerging diseases come from animals. For example, the global AIDS pandemic likely originated through hunting and butchering of wild African primates.

Researchers at Trinity College Dublin, Harvard University and Georg-August-Universität Göttingen, found that humans share more diseases with baboons, macaques and lemurs than expected. They also confirmed that humans share most disease agents or pathogens with our closest primate relatives the chimpanzees and gorillas. We share far fewer than expected with our other close relative the orangutan. This challenges previous research suggesting that humans are most at risk of contracting diseases from our closest primate relatives, and face little risk of contracting diseases from our more distant relatives. Instead future disease threats are likely to come from primates that have the most contact with humans.

The authors used a large database of primate diseases and state-of-the-art statistical methods to investigate how many pathogens or disease agents humans share with different kinds of primates. Previous research indicates that the number of pathogens two species will share is related to how closely-related they are. For example, we expect that two species of mice will share more pathogens than a mouse and a cat. In humans and primates this means that humans should share most pathogens with our closest primate relatives the Great Apes, e.g., chimpanzees, gorillas and orangutans, followed by Old World monkeys, e.g., baboons and macaques, then New World monkeys, e.g., capuchin monkeys, and finally we should share least pathogens with species like lemurs. However, the authors instead found that humans share far more pathogens than expected with Old World monkeys and lemurs, and far fewer pathogens than expected with orangutans. This is an important result because it suggests that we should not just expect future human diseases to come from chimpanzees and gorillas; we should also be concerned about the diseases of baboons, macaques and even lemurs.

Dr Natalie Cooper, Assistant Professor in the School of Natural Sciences at Trinity College Dublin and lead author of the study, was initially surprised by the result. "Most people assume that we share more diseases with our closest primate relatives because we should have inherited these diseases from our ancestors. However, on reflection there are many reasons why this might not be the case. For example, humans are likely to have more contact with Old World monkeys like baboons than orangutans, because orangutans are rare and live in trees, whereas Old World monkey species are more widespread and terrestrial." These findings suggest that the rate and intensity of pathogen contacts is a better predictor of pathogen sharing among species than relatedness alone, which may explain why more pathogens of humans are shared with rodents and domestic animals than with wild primates.

Professor Charles Nunn, one of the authors of the study, is also

interested in these sampling issues. "One really important result from this work was that we found some major gaps in our knowledge of primate parasites," said Professor Nunn. "This is worrying, because we know more about primates than any other group of mammals. Also, as the human population continues to expand, we're likely to have even more contact with wildlife. So if we want to be able to predict future disease risks in humans, we really need to find out much more about wildlife diseases".

Provided by Trinity College Dublin