PLOS Science Wednesday: Hi Reddit, we are Lisa Jones-Engel, Stacey Schultz-Cherry, and Christopher Small. We published a study in PLOS Pathogens demonstrating new evidence of the role of primates in th

PLOSScienceWednesday [1] and r/Science AMAs[1]

[1]Affiliation not available

April 17, 2023

Abstract

Hi Reddit, My name is Lisa Jones-Engel and I am a Senior Research Scientist at the University of Washington. For nearly two decades my research team has focused on the infectious agents that are transmitted at the increasingly porous human-primate interface in Asia. And my name is Stacey Schultz-Cherry and I am a Full Member (Professor) at St Jude Children's Research Hospital where my research focuses on the pathogenesis of influenza virus and enteric viruses, like Astroviruses, especially in high-risk populations. My name is Erik Karlsson and I am a Postdoctoral Research Associate at St Jude Children's Research Hospital where my research focuses on host factors, especially nutrition, that affect the pathogenesis and evolution of influenza virus and enteric viruses. My name is Christopher Small and I am the Head Data Scientist at pol.is a startup applying data visualization and machine learning to making sense of large scale conversations. I also do distributed systems and web app development consulting as ThoughtNode Software. Before all that, I worked with Erick Matsen at Fred Hutch Cancer Research Center, studying metagenomics and molecular viral epidemiology. Astroviruses are leading causes of diarrhea in children under the age of 2, immune-compromised populations and the elderly. You can get them from infected people but also through contaminated food and water. They also appear to be causing encephalitis in high-risk populations. Although we knew that Astroviruses were found in lots of different birds and animals, we never thought human viruses could infect animals or vice versa. We thought infections were species-specific (i.e. only human viruses could infect humans). That changed in 2009 when we began finding viruses in humans that were genetically more similar to animal viruses. That's where our recent publication titled "Non-Human Primates Harbor Diverse Mammalian and Avian Astroviruses Including Those Associated with Human Infections" in PLOS Pathogens provided important new data. For the study, we sampled 879 urban, temple, captive and wild primates in Bangladesh and Cambodia. We found that 8% of primates were infected with diverse mammalian and avian Astroviruses, including those previously only known to infect humans. Clearly this exemplifies One Health and how infectious diseases of humans can impact animals we contact and potentially vice versa. We will be answering your questions about primates and Astroviruses at 1pm ET – Ask Us Anything!

the WINNOWER

REDDIT

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PLOSSCIENCEWEDNESDAY R/SCIENCE

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READ REVIEWS

WRITE A REVIEW

CORRESPONDENCE:

DATE RECEIVED:
April 14, 2016

DOI:
10.15200/winn.146054.48278

ARCHIVED:
April 13, 2016

Hi, I wonder if scientists have ever found signatures of astroviruses in human DNA?

acidacetylsalicylic

Stacey:No but I'm not sure anyone has ever looked

You suggest in your paper that while bats are a known reservoir for a variety of astroviruses, what infects humans tends to be more genetically related to astroviruses found in NHP. Given the recent

CITATION: PLOSScienceWednesday , r/Science , PLOS Science Wednesday: Hi Reddit, we are Lisa Jones-Engel, Stacey Schultz-Cherry, and Christopher Small. We published a study in PLOS Pathogens demonstrating new evidence of the role of primates in th, *The Winnower* 3:e146054.48278 , 2016 , DOI: 10.15200/winn.146054.48278

ebola outbreak and discussions of bats as the reservoir, how does your research impact that analysis? Do you think NHP are a more likely source of the recurrent outbreaks?

firedrops

(Lisa): There is no evidence to suggest that NHP are a reservoir for the ebola virus. Mortality in NHP populations that have been exposed to ebola is very high. We have yet to find NHP in Africa who are asymptomatic carriers of ebola.

When you found human viruses in other animals, did you also find evidence that there was some sort of disease process present? Is it possible that the human viruses might not affect other animals?

YepYepYepYepYepUhHuh

Stacey: Astroviruses can be associated with asymptomatic infections even in humans so its not surprising to find virus but no clinical disease. Disease seems to be age-dependent in some species

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YepYepYepYepYepUhHuh

(Lisa):I have collected thousands of fecal samples from free-ranging primates and one of the most astonishing things is that you rarely see a monkey with diarrhea. In our study most of the primate fecal samples were collected immediately after the free-ranging monkey "deposited" them, so we do not have additional measures of their health state to determine whether their infection with astroviruses is associated with disease. However, none of the fecal samples collected in this study came from a primate exhibiting diarrhea.

Hi Lisa! This is awesome you are doing an AMA. I also studied in Bangladesh with you during the same Fulbright year! Your research has been quite interesting and I wish we'd could have seen a final talk before you left the country.

My question: have you found any evidence in these native regions that shows an evolution of viruses between these native human populations that works closely with the primates? Is there a tendency for virulence to decrease or increase as a result of close contact and potential back and forth infection? Thanks!

dontmakemepoop

(Lisa): A great question and one that we are currently applying to NIH for funding in order to sort out! We have some preliminary data that indicates that groups of humans that have for centuries trapped, trained and integrated monkeys into all aspects of their daily life are not persistently infected with enzootic primate viruses. We hope to find out whether this is an innate or adaptive immune response. While the humans that live with these monkeys may be protected from primate pathogens, the monkey mortality in these groups-- likely from exposure to human pathogens-- is quite high.

I read that Drugs affecting clathrin-mediated endocytosis, endosome acidification, and actin filament polymerization, **as well as those that reduce the presence of cholesterol in the cell membrane** decreased the infectivity of the virus.

I never realized that "Molecule for molecule, cholesterol can make up nearly half of the cell membrane."

Is this cholesterol effect in increasing the infectivity of the virus just a matter of membrane fluidity?

Also, this caught my attention as a Review of Mechanisms of Action and Efficacy of Statins against Influenza.

Might it also affect AstroViruses

gordonjames62

Stacey: We know that positive strand RNA viruses, like astrovirus, require host cellular membranes to form viral replication bodies. Literally, these types of viruses "hijack" surround themselves with the cell membranes so they can produce progeny virus. Paul Ahlquist's group at the University of Wisconsin has done beautiful work on this. One could hypothesize that any drug that impacts the cell membrane could impact viral replication

I noticed in your paper that you make frequent mention of AstVs in bat and

Bats are known to harbor a diversity of AstV species; although these viruses are unique to the bat host and haven't been found in other species to date

This may be a bit out of your range of expertise, but what is it about bats that make them such good hosts to such a wide range of AstVs? Thanks.

EllieMayC

Stacey: Very recent work by Lin-Fa Wang's group suggest that bats constitutively type I interferons; a potent antiviral pathway. This unique IFN system may explain the ability of bats to coexist with viruses.

Hi all- what is your best piece of advice for a 1st year grad student in microbiology aiming towards a career in infectious disease?

BKenobi316

Stacey: so many ways to answer that. Research career? Public health career? Feel free to email me and we can discuss off-line. Key thing is to get great training

Hi all- what is your best piece of advice for a 1st year grad student in microbiology aiming towards a career in infectious disease?

BKenobi316

(Erik): I concur with Dr. Schultz-Cherry. So many ways to answer that depending on where you want to position yourself in the field of Infectious Disease. I would say the most influential things in my career have been amazing training opportunities as well as supportive, innovative mentors.

Aside from not eating monkey poo, what are the implications of this research outside the scientific community? Are there concerns around the keeping of NHPs, etc?

karmaceutical

Lisa: There are so many reasons not to keep NHPs as pets! The potential for cross-species infectious disease transmission is certainly one of them. The impact that the pet trade has on primate conservation is another.
The other thing to consider is that NHP that are used as biomedical models are generally not screened for these (and many other) viruses.