Which denomination of money contains the most amount of germs?

Edward Ponder
Drew Middle School
2-17-20

Research Paper

With my experiment, I am trying to determine which denomination of money contains the most bacteria. I predicted that the $2 bill would have the fewest bacteria because it would be handled less than other bills. I chose this topic to determine how dirty money really is. A real-world application of this is to show the reasoning behind health department regulations that food handlers at restaurants must wash their hands after touching money prior to preparing food.

My research determined that money is dirtier than I originally thought. There are many factors that contribute to this. On average, a $1 or $5 dollar bill changes hand 110 times per year. Also, the average $1 dollar bill is in circulation for 22 months. The average $100 dollar bill is in circulation for 15 years. The fibrous surface of the bills allows crevices for bacteria to attach and multiply quickly. Because money is one of the most frequently handled objects, bacteria are rapidly transferred to the money. The longer the money is in circulation and the more it is used, the more likely that it will become contaminated. Also, most people keep their money in a wallet which provides a warm breeding ground for the bacteria to grow. Bacteria can live on most surfaces for at least 48 hours. Types of bacteria that can be found on money include E.col and MRSA. E.coli can cause bloody diarrhea, urinary tract infections and sometimes kidney failure. MRSA can cause blood and skin infections that can be deadly. Fortunately, the porous surface of the bills is good at holding on to the germs that it is carrying, so that many of the germs do not transfer to your hands. Also, our skin provides a good barrier to bacteria. One way to reduce the transmission of bacteria from money is to wash your hands after touching it.

I used several materials for my experiment. The first thing I used was one bill of each denomination that I obtained from the bank. I also obtained a $1 dollar bill from the bank that was new and had come from the Federal Reserve Bank so that few people would have touched this bill. I used sterile swabs and prepared agar plates for transferring and growing the bacteria. I also used a small plastic bin and heating pad to make an incubator for the agar plates.

My procedure followed several steps. First, I used a separate sterile swab to rub each bill and then rubbed the swab on the corresponding agar plate. Next, I stored the covered agar plates upside down inside the plastic bin. I placed a heating pad over the plastic bin and used a thermometer to maintain the temperature at 85 degrees. I checked the plates each day and took pictures to record the growth. I waited for 7 days for the bacterial colonies to fully grow. Lastly, I counted each colony of bacteria and recorded the data.

In my project, my dependent variable was the number of bacterial colonies that grew on the agar plates. My independent variable was the denomination. My control was the $1 bill that was obtained from the Federal Reserve Bank and had not previously been circulated. The control had no colonies. The dirtiest was the $1 bill which had too many colonies to count. The cleanest was the $50 bill which had no colonies.

In conclusion, money is very dirty. The lower denominations, as predicted, contained more bacteria than the higher denominations most likely because they were handled more

frequently. You definitely want to wash your hands after touching $1 bills because they are very dirty. Even the higher denominations contained at least some bacteria. Most of the bills had at least 1 colony which shows that all are at least a little bit dirty if they have been in circulation for some time. I had predicted that the $2 dollar bill would contain fewer bacteria because this denomination was not as common, but in my experiment, the $50 dollar bill actually contained fewer bacteria. My hypothesis was incorrect because the $50 was the cleanest.

I enjoyed this project. I would recommend it to others because it teaches you how dirty money is. If I could change anything, I would swab two different bills of each denomination so that the results would possibly be more accurate.

Works Cited

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3765964/

https://www.jpsr.pharmainfo.in/Documents/Volumes/vol9Issue02/jpsr09021711.pdf

https://www.cbsnews.com/news/dirty-money-your-cash-is-home-to-thousands-of-bacteria/

https://www.scientificamerican.com/article/dirty-money/