Clinical Infectious Diseases: Open Access

Editorial Open Access

'Hurting Antibiotics' - A Cautionary Tale to Save Human Lives

Pushpanathan Muthuirulan[1,2*]

[1]National Institutes of Child Health and Human Development, National Institutes of Health, Bethesda, Maryland 20892, USA
[2]Harvard University, Cambridge, MA, 02138, USA

Editorial

Antibiotics are among the most frequently prescribed drugs in modern medicines that effectively fights against microbial infections. Since being first discovered in 1928, till date antibiotics are undoubtedly saving countless of human lives from the burden of infectious diseases. In today's busy world, when peoples are feeling sick, even it's a mild cold that makes people's life more stressful tempting them to get the best possible treatments for instant relief. In the present scenario, '*The best treatment*' means making the same-day appointment, consulting doctor and leaving the doctor's clinic with a bag full of antibiotics. Certainly, antibiotics have extraordinary benefits that could save human lives, but more believably their continuous uses are extremely dangerous to human lives. Ease access of antibiotics to public and their medication effectiveness have addicted peoples to misuse antibiotics that prompted sleeping pathogenic microbes to wake up and rule the world in the form of '*antibiotic resistance*'. The success of antibiotic has been more impressive; however, the excitement has been frightful by the fact of emerging problem of antibiotic resistance. According to World Health Organization (WHO), antibiotic resistant bacteria are estimated to cause 700,000 deaths every year. If no appropriate steps are taken on time, they are expected to kill 10 million people annually by 2050.

Antibiotic resistance is the story that won't go away and it is the fastest growing health concerns to humans worldwide, threatening our ability to treat common infections. For instance, researchers have found for the first time a person in the United States carrying a bacterium (*Escherichia coli*) resistant to antibiotics of last resort that stokes fear on antibiotics across the world [1]. Now comes a question, is it safe taking antibiotic? –The answer to this question is YES, antibiotics are generally considered safe. However, there are numerous dark sides in using antibiotics (Figure 1). If these lifesaving medicines are used when they are not truly needed, or taken at incorrect dosage can actually put people at greater health risk. The wise use of antibiotics following precise direction on doctor's prescription or advice from healthcare professionals is highly warranted to preserve the lifesaving properties of antibiotics.

While it's good to be aware of mistakes we've made. Human body harbors trillions upon trillions of microbes! We treat all microbes in our body equally. Researchers have discovered that human body contains both beneficial and harmful microbes, and maintaining a proper microbial balance is vital for human health. Believe it or not, without beneficial microbes in our body, we probably won't be alive today. Scientific evidences have shown that majority of beneficial microbes in human body serves as a 'probiotics', which boost immunity and offers health benefits to humans [2,3]. One of unfortunate side effects of antibiotic is that it can destroy most of microbes in the body, including beneficial microbes, eventually weakening our immune system and making pathogenic microbes more adaptive ones and difficult-to-treat.

Despite the problem of antibiotic resistance, the antibiotic medication to humans have been linked to increased risk of brain dysfunction, sudden heart deaths, lung and liver disease, kidney failure, impaired eye vision, damage to intestinal barrier and cancers (Figure 1). This shows that every time if we swallow antibiotics, we intend to kill most of our beneficial microbes and unknowingly invite more serious health-related complications. Therefore, antibiotics should be used with the utmost care and most preferably to be used only for diagnosed infections following precise prescription from doctors.

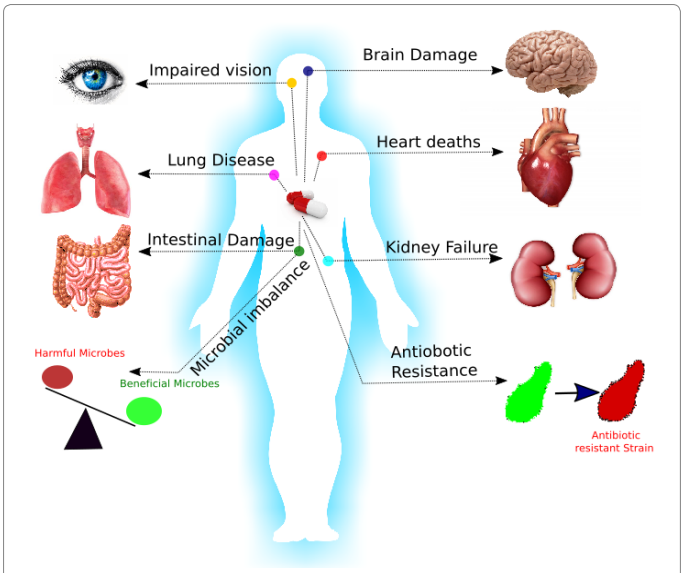

Figure 1: Dark side of antibiotics. Antibiotic medication in humans have been linked with increased risk of brain dysfunction, heart deaths, lung and liver disease, kidney failure, impaired eye vision, damage to intestinal barrier and microbial imbalance.

The most oblivious way to tackle antibiotic resistance is to discover new antibiotics [4]. Numerous initiatives have been implemented in discovering new antibiotics. In recent years, metagenomics approaches have provided access to the untapped reservoir of genetic resources from natural environments and it has made great progress in novel antibiotic discovery [5-8]. Therefore, implementation of pipelines based on metagenome will increase the likelihood of future antibiotic discoveries for rebuilding our antibiotic arsenal.

***Corresponding author:** Pushpanathan Muthuirulan, National Institutes of Child Health and Human Development, National Institutes of Health, Bethesda, Maryland 20892, USA, Tel: E-mail: pushpanathan31@gmail.com

Received June 05, 2018; **Accepted** June 27, 2018; **Published** July 04, 2018

Citation: Muthuirulan P (2018) 'Hurting Antibiotics' - A Cautionary Tale to Save Human Lives. Clin Infect Dis 2: e102.

Recent advances in development of genome editing technologies have tremendous potential to tackle microbial resistance and infection-related mortality in humans. The most powerful genome editing tool based on a bacterial CRISPR associated protein 9 nuclease (Cas9) provides continuous excitement to precisely manipulate genomes of infectious agents, which brings in new hope to scientists across the world to perform accurate and high throughput investigation of gene functions (or) pathways associated with microbial infections [9-11]. CRISPR/Cas9 technology represents a novel form of antimicrobial therapy that offers one of the most promising platforms to specifically target gene(s) in the pathogen genome that encodes factors mediating antibiotics resistance. Therefore, use of CRISPR-Cas9 system to manipulate vital part of pathogen genome would ultimately prevent resistant microbes from causing deadly infections. As this technology become simpler, it can be combined with other existing antimicrobial strategies for successful eradication of antibiotic resistant bugs from causing infections to humans. Thus, wise use of antibiotics and rebuilding our antibiotic arsenal by discovering new antibiotics could possibly protect the endangered humans from becoming extinct.

References

1. Kim S, Lieberman TD, Kishony R (2014) Alternating antibiotic treatments constrain evolutionary paths to multidrug resistance. Proc Natl Acad Sci 111: 14494-14499.
2. Langdon A, Crook N, Dantas G (2016) The effects of antibiotics on the microbiome throughout development and alternative approaches for therapeutic modulation. Genome medicine 8: 39.
3. Protect Your Microbiome to Stay Healthy and Disease-Free Life. EC Microbiology 3: 482-484.
4. Muthuirulan P (2016) Chasing new drugs against infectious diseases: a herculean task. J Clin Case Rep 6: 2.
5. Adu-Oppong B, Gasparrini AJ, Dantas G (2017) Genomic and functional techniques to mine the microbiome for novel antimicrobials and antimicrobial resistance genes. Ann N Y Acad Sci 1388: 42-58.
6. Lewis K (2013) Platforms for antibiotic discovery. Nat Rev Drug Discov 12: 371-387.
7. Pushpanathan M, Rajendhran J, Jayashree S, Sundarakrishnan B, Jayachandran S, et al. (2012) Identification of a novel antifungal peptide with chitin-binding property from marine metagenome. Protein Pept Lett 19: 1289-1296.
8. Muthuirulan P (2016) Metagenome-Massive Reservoir of Antifungal Peptides to Treat Emerging Infectious Diseases. Proteomics Bioinformatics 1: 5-6.
9. Bikard D, Euler CW, Jiang W, Nussenzweig PM, Goldberg GW, et al. (2014) Exploiting CRISPR-Cas nucleases to produce sequence-specific antimicrobials. Nature biotechnology 32: 1146-1150.
10. Muthuirulan P (2017) CRISPR-Cas9: Promising platform for prospective antimicrobial therapy. Adv Tech Clin Microbiol.
11. Muthuirulan P, Gururajan V (2017) CRISPR Inspires New Hope to Disease Sufferers. Journal of Molecular Microbiology.