by **Tayo Fasuan** | ***September 14, 2014***

Microorganisms cause diseases. That is perhaps the oldest news ever heard. What might be perhaps ‘new’ news is that most microbes are as old as man himself, and according to the theory of evolution, even older than man. The first living creature is an amoeba-like organism, and from that unicellular being, other organisms eventually evolve.

This makes me wonder why some people are surprised that drugs are not available to cure or treat most deadly diseases. They even called to question the integrity of pharmaceutical companies when the drugs produced against some diseases cease to work after some times. What they don’t know is that the answer to their questions is right under the phrase “most microbes are as old as man himself, or older”.

Now, when someone is older than you, it is usually assumed that the fellow would be smarter

than you, right? I know it is not in all cases, but that is the general consensus, okay. Let us now change the characters in the above scenario. When something (like a microbe), is older than not only you, but your ancestor as well, what do you expect? Definitely, some infinite wisdom and intelligence would be on display, right? Meaning no matter how you smart you are, it will find a way to outsmart you.

Isn’t this the story of our continue struggle to find curative drugs against diseases and the relentless agents? Be it bacteria, fungi, protozoa or viruses, it is the same old stories circulated in new forms. No matter what you throw at them, they have continuously proved themselves to be smarter, stronger, persistent, crazier, and deadlier.

Maybe if we know a little about why and how they turn out this way, we would at least find peace in the knowledge that it isn’t the fault of the drugs companies (though sometimes it is!), but in the ability of these little guys themselves (plus the patient’s fault!). Some of the abilities of the microbes are innate and residual within them, while others are acquired from due to continuous interaction with humans.

What’s more? Some of these little guys have become so shrewd they can even transfer this ability to others who don’t have it? It makes you ask: really?

Anyway, here are nine reasons why your drugs won’t work.

9. They’ve drug-inactivating substances

Whenever I watch those guys who caught live snakes on those animal channels when I was young, I thought they were versions of Clark Kent who couldn’t be killed. Even Superman had this weakness for kryptonite, but not these guys. It was when I grew up that I knew those guys already had anti-venom in their systems which would neutralise those snakes’ venom.

Some microbes have some anti-drugs substances within them which would alter and neutralise some drugs used in attacking them. These are called drug-inactivating enzymes. They add the “in” as a prefix to the “effectiveness” of these drugs, and make the docs plus

the drugs companies look very bad and dubious.

Even when the pharmaceutical guys have to return to the lab to get new ones, these organisms would still be waiting for them with daring faces saying, “Bring it on, stupid”. However, the outcome usually ends up being unfavourable to them anyway, because they don’t know that humans can be mean when dared.

8. They change the drug’s target

Drugs are designed to identify and attack specific targets in the disease-causing organisms, rendering the target useless to perform its functions, and eventually terminating the life of the little guys. You’ve got to give it to those drugs companies; they are good at being creatively destructive.

There are endless points of target they have designed drugs to attack. The targets range from cell walls and membranes (the organism ‘skin’), their protein-production machineries (remember no living thing can survive without its proteins), their ability to produce offspring (isn’t that cruel?) and their ability to digest some food (now, that’s cool since they are feeding on us).

However, some microbes have developed the ability to circumvent all these viciousness against their kinds by simply making decoys of these target sites. They can simply change the appearance of that target so that it won’t be recognisable again, or simply produce some substances that are look-alike of the targets. Once the drug molecule binds to the fake target, it is rendered useless.

Aren’t you impressed? I would have called it beautiful if not that I am affected negatively. But that is just one hell of street-smartness.

7. They prevent entry of the drug

Let’s imagine an assassin, sent out with a mission of eliminating all crime bosses and

kingpins in the state. After the initial easy success with the first few, others will notice a pattern and they will shore up their defence and security, hiring more bodyguards and surround themselves with thugs and gangsters to protect them, because they know they’ve been marked for death.

Same goes for microbes and the assassin-like drugs produced against them. After the initial ease of eliminating some of the organisms due to easy accessibility to them, the others learn quickly, and bring in more proteins to fill in the pores in their cell walls and membranes. They are called ‘porin’ proteins, named after the word ‘pores’.

These proteins block the ease of entrance of the attacking drugs, making it less permissive and preventing the drugs from attacking the targeted mafia ‘Capone’ within the cell. Of course, this is provided the target itself is not the cell walls or membranes of the organism.

Who says microbes don’t think or act like the mafias?

6. They’ve pumps and flushers

This is a little like the above scenarios except the ones described here look like bouncers while the above are more like bodyguards or gangsters. I’m fascinated with *The Godfather.*

Here the assassin has already gained entrance and has started shooting like John Wayne or Neo of *The Matrix*, killing every target at sight. Let us suppose the only weapon at the disposal of the target mafia headquarter is a large aquarium the size of a building, they would simply shoot it down to flush the assassin away. Bad analogue? Well, let’s try another one.

Suppose you ingest a bug or something-worse-than-bug. You can opt to take a laxative to flush your gut out and remove the bug or something-worse-than-bug before you start feeling queasy or green about the gills. Better analogue, right? I got you.

So, some bacteria have what we call efflux pumps which flush out bad things out of their

systems, especially drugs, which they employ to prevent targeting drugs from attacking their intended targets. What makes this flushing system really bothersome is the ability of some of the microbes to evolve and increase the power and number of the pumps, enabling the organisms to withstand attacks from many drugs.

What more can I say? If you can destroy it, you flush it!

5. They acquire resistance genes from others

As said initially at the introduction, the ability to resist a drug attack can be gotten from those who had been there, done that. These fellas have within them, either innate or acquired genes that code for drug resistance. If they have the chance of transferring these genes to any recipient, then it’s ‘Bingo!’ for everyone.

Transferring of these genes can be lateral, where a mama microbe gives rise to baby microbes and transfer the genes along. Baby microbes grow up with a natural instinct to look down on the resisted drugs like they are nothing, just like lion cubs are raised to view all animals as sources of meat. Transferring of resistance genes can also be horizontal, where a microbe gets the ability to be drug-resistant badass from another drug-resistant badass pal after being bullied by the drug without respite.

The latter scenario usually involves the transfer of an organelle found in most microbes which is notorious for carrying multi-drug resistant genes. This genetic store-house is called R-plasmid, and its origin is still a subject of debate among scientists. It is usually being transferred through conjugation, which is a form of sexual intercourse among microbes. I can hear you ask, “Are you kidding me? Microbes have sex?!” Well, they do.

Acquisition of this R-plasmid usually results into an organism being resistant to many different drugs at once. Unbelievable, but it’s true. Still not scared? Okay. A single organism can spread this ability to many other organisms of the same or unrelated strains, species and even genera. It is that bad. Now you should be scared.

4. They undergo spontaneous mutation

Under a drug attack, one or more of the attacked microbes can suddenly acquire an ability to repel the drug’s effect. This is usually at the molecular level where just sudden minute changes in the genes of the microbe are enough for the microbe to acquire all abilities discussed earlier.

They can start producing more pumps and flushers; they can start modifying the target sites; and they can start producing more drug-inactivating enzymes and porin proteins. It’s going to be a blast!

Most times, these mutations could be as a result of repeated and steady usage of the drug or the indiscriminate abuse of drugs which our generation is now known for. Nowadays, we self-medicate like there is no tomorrow, just taking in pills, tablets, capsules and syrups like all the goods are in them.

If a drug has multiple target sites, then lady luck is smiling down on us all, because the microbe will find it difficult to mutate and change all those target sites of the drug, though microbes like *Helicobacter pylori*, a notorious cause of gastric cancer, has been known to do this.

However, if the drug being used only has one target site, then the pharmaceutical guys have to go back to the labs. There are no two ways about it. They need to reformulate that drug or come up with another one, a task as easy as jumping across the Grand Canyon or climbing Mount Everest.

3. The patient’s got no patience for dosage

This can be rephrased into something like “Once the symptoms is gone, drug usage is done”. Here, the fault lies with the sick fellow who is given a particular dosage of drugs to complete, but doesn’t or wouldn’t complete it, because he or she doesn’t like them. I mean, come on, who likes taking drugs when you aren’t ‘sick’ anymore? What is the point of finishing that

recommended dosage when the symptoms are gone?

You have to finish the recommended dosage of drug because you don’t want the docs and drug companies to be called names, and more importantly, because whatever was causing that illness wasn’t dead when you stopped using those drugs. That is why we have dosages. The survivors will later come back more reinforced and adapted than when they first attacked you.

Hey, this isn’t the World Wars I and II where the victors sign peace treaties with the vanquished and everybody goes home happy, or at least relaxed. No. This is your typical Afghanistan or Iraq war where the terrorists keep coming back at you with more suicide bombs and a suicidal determination to inflict more damages because they might have mutated.

You really need to crush those guys once and for all by finishing that recommended dosage the doc gave you. Or at least sign a peace treaty with them *after* you’ve conquered them by finishing that dosage first! Who says treating some diseases isn’t like modern day wars?

2. Patient’s Fear of Drugs Combo

There are some circumstances you can’t control no matter how obedient or adherent you are to drug usage manual. Sometimes, the little guys are just too smart and/or endowed to make your drugs usage looks like a harmless splash of water on the face. This is where drug combination comes in. Ever heard of it?

Sometimes, it is recommended you hit the disease-causing miniatures with more than just one missile of drug during this altercation. This is called drug combination. It is fast. It is effective. It is synergistic. It really works. But it is usually very not nice. The side effects that usually come with it often make somebody wants to puke. Literarily.

But hey! You want to get well, don’t you? So what is wrong with having some occasional moments of nauseous feelings, dizziness, vomiting, and insomnia? Alright, that’s scary. You

need to ask your physician about possible side effects before using any drug combo, okay.

Hey, drugs combination is not that bad because most drugs being combined are not even as toxic as those used in life-threatening diseases. So what is the big deal? You’re not having a life-threatening sickness, are you? Good. Because if you do have it, be ready to be bombarded with all kind of experimentation drugs combination therapies which will make you ‘sicker’ than you were.

Drugs companies are becoming wayward

This is not unusual anymore, as facts are now emerging about drugs companies not caring about the people like before. Various drug efficacy experiments carried out have shown a reduction in the treatment ability of the same drugs produced by the same companies over the years. So you shouldn’t be surprised if they are not working like before.

Well, you may be thinking that why would pharmaceutical companies do such a thing. The answer is simple. They have earned your trust, and it’s now time to break it without you knowing about it. Like every company out there, they want to make large profit with minimal expenditure and input.

Cases abound of incomplete drug trials, hiding of reports data from regulators, sublime bribing of doctors (not surprised at this!), FDA in USA and NAFDAC in Nigeria (well, that’s not new either) and outright lies in their adverts. They have even resorted to subtle harassment and intimidation of anybody or groups in their paths. It’s like an jungle out there in the name of drug production.

But don’t hate them. Hate the profit they are trying to make. If the drugs aren’t working, you might as well point that accusing finger at the doctors as well as pharmaceutical guys. You can follow that swiftly with the middle finger as well for good measure.

What to do about this? Off the record, use the same type of drug for the same ailment produced by different companies. It’s not as if you’ve signed a loyalty agreement with any of

them, have you? Nobody said taking GSK or PharmaDana drugs have to be a lifetime gig. Even if you are having loyalty guilt, you can get over it now since they’ve betrayed you.

Tit-for-tat. Oh yeah.

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