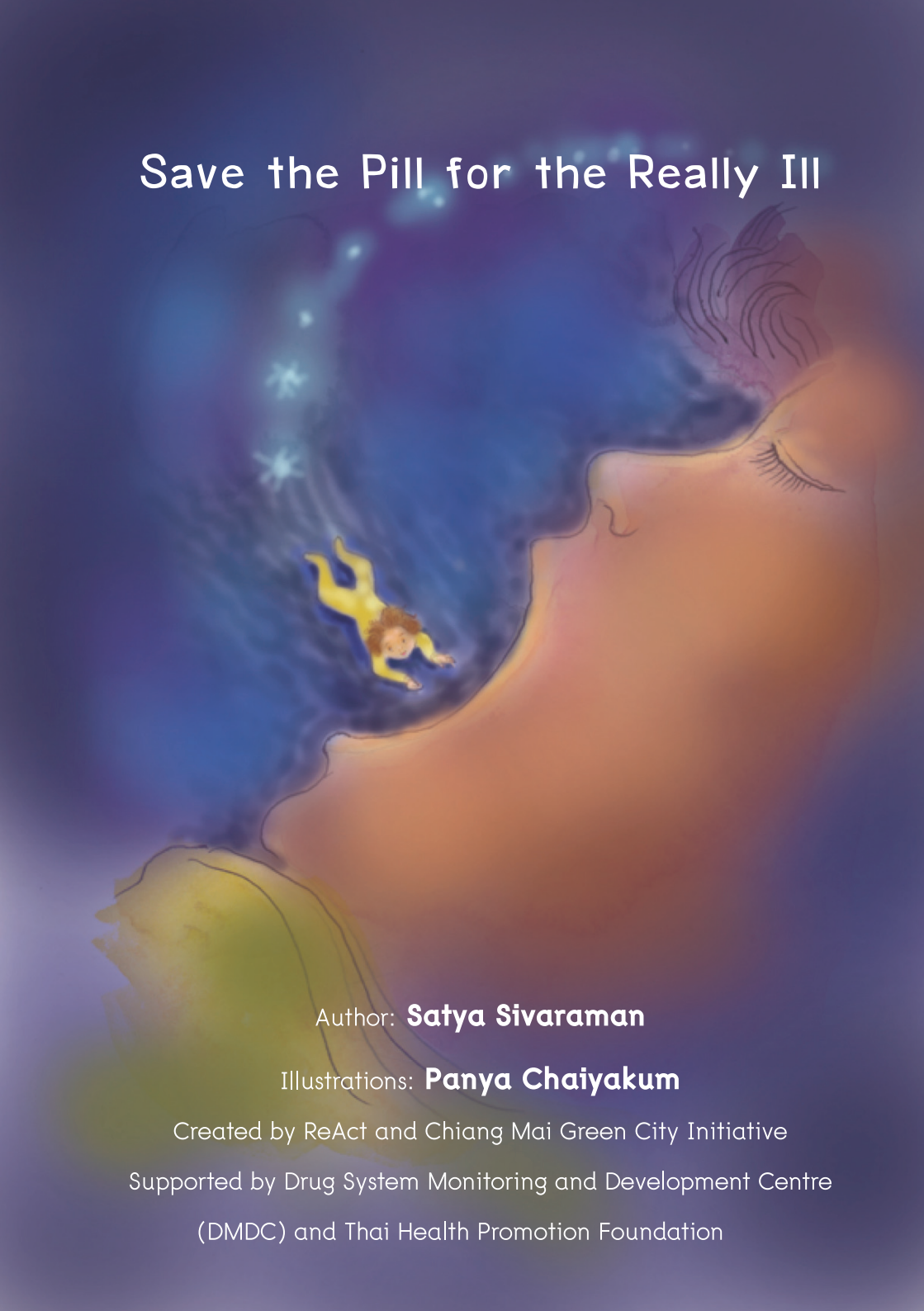
Save the Pill for the Really Ill



Author: **Satya Sivaraman**

Illustrations: **Panya Chaiyakum**

Created by ReAct and Chiang Mai Green City Initiative

Supported by Drug System Monitoring and Development Centre (DMDC) and Thai Health Promotion Foundation

Acknowledgment and Note

This booklet is part of the 'Dancing with the Bacteria' series of publications aimed at raising public awareness about antibiotic resistance, prevention of infectious diseases, nutrition, food safety and medicine.

The contents of the booklet are an outcome of discussions on these themes at several workshops held in Chiang Mai, Thailand in February and July 2015. The workshops were organised by ReAct along with the Drug System Monitoring and Development Centre (DMDC), Sustainable Alternative Development Association (SADA) and Chiang Mai Green City Initiative.

The 'Dancing with the Bacteria' concept focuses on three sets of activities, all of which are closely related to the microbial world. These include promotion of organic food and farming practices, understanding the link between food/nutrition and health and the rational use of medicine.

Many thanks are due to the academics, health professionals, organic farmers, communicators, environment and food safety activists who have contributed to the content of these publications. Special thanks are due to ReAct for providing financial support towards the production of these booklets.

Introduction

Every time they go to the doctor with a medical ailment people expect to be given some medicines to take home for consumption . The pressure of such expectation is often so high on doctors that they end up giving patients some drug or the other, even when there is no real need.

These could be in the form of tablets, syrups, powder, capsules or gels. Sometimes the doctor may give you the medicine through an injection if necessary. The medicine is accompanied by instructions on how many times or when it should be taken every day and sometimes with the dosage of the drug also clearly spelt out.

Like many other aspects of modern healthcare, drugs too are a bit of a mystery for many people, who nevertheless take them with complete trust in both the doctor and the pharmaceutical company that produces them. How are modern drugs made?How are they tested and cleared for safe public use? How is their cost determined? Can they also be dangerous to human health?There are many such questions that people think of but do not find answers for easily, due to lack of popular, easily understandable information.

Adding to their confusion is the fact that in many countries around the world the same drug is sold under many different names and in different kinds of packaging aimed at wooing the customer to buy the product. For example, Paracetamol, the commonly used medicine for fever and pain is sold in some markets under 90 different names by drug manufacturers.

In many countries medicine is also sold in pharmacies without prescriptions, even some that can lead to death if taken wrongly. The consequences of ignorance about modern medicines and how to use them can have impact on not only individuals but also entire communities and indeed the entire world.

One good example of this is how the use and abuse of antibiotics — considered to be the cornerstone of most modern medical procedures, particularly surgery- has led to increasing failure of treatment due to bacterial resistance.

While antibiotics, discovered around 70 years ago, have revolutionised medical care by helping cure previously untreatable infections, today the globe is facing the threat of not being able to overcome even very common infections due to antibiotic resistance. This has led to what experts have described as a possible 'post-antibiotic era', where anybody with infectious diseases,

particularly the critically ill or those who have undergone major surgeries, will not survive due to the ineffectiveness of all known, existing antibiotics.

Today, there is a worldwide campaign against needless use of antibiotics, carried out by international organizations, ministries of health and civil society groups. For this to be successful, members of the public will have to understand the fundamental principles behind how drugs work and the consequences of misusing them.

This manual is a very basic introduction to modern medicines, in particular antibiotics, what precautions to take while consuming them and understanding both their benefits and shortcomings. Given the vast and technically complex nature of the subject this is not an exhaustive description of the problem or its solutions and only a gentle appetizer on the theme of safety of medicines.

It is hoped readers will be inspired to learn more through various publicly available resources or in consultation with medical professionals and healthworkers. Some day, such knowledge can be useful to them to save their own lives or that of their loved ones.

Aroon's father Sam was terribly agitated. The seven year old daughter of one of his colleagues at office had accidentally swallowed a few of her father's sleeping pills. She had taken them, thinking they were 'sweets' but luckily the parents got to know soon after and had rushed her to the hospital.The child was now out of danger after doctors flushed her stomach clean.

"How can any adult leave such potentially dangerous medicines lying around the house where children can reach them?" said Sam, a bit red in the face and shaking with anger.

"What are sleeping pills?" asked Aroon, as he tied his shoelaces, getting ready to go to school.

"They are drugs that help people who have difficulty in sleeping at night. They are supposed to be sold by pharmacies only when the customer can produce a doctor's prescription. Often people use them without knowing that in larger doses they can result in death" said Sam.

"Oh! I thought all medicines were safe for human beings to take. How can something that is meant to cure you be harmful?" asked Aroon.

"I am not a medical expert but I know that in larger doses any cure can become poison. Many people do not understand this simple point very well resulting in needless tragedies all the time" said Sam fuming away.

"Now, run off or you will be late for the school bus" said Ann to Aroon, helping carry his school bag to the door and seeing him off.

Sam turned to Aroon and asked her whether she could help him organise all the various medicines they had in the house, when both of them returned from their offices.

"I cannot criticise my colleague for being careless if I don't practice what I preach" said Sam.

Ann agreed and that evening both of them set out to find all the medicines in the house. To their surprise and embarassment

they found tablets, pills and syrups of various kinds lying around in the most improbable places — on top of the refrigerator, inside coat pockets, in the drawer of the writing desk and in the kitchen.

"I have no idea how these antibiotic tablets got here" said Sam, shaking his head in disbelief after discovering them in Aroon's cabinet for toys.

That night Sam went to sleep thinking about the traumatic experience of his colleague's daughter. He dozed off quite soon, tired as he was with all the cleaning up he undertook at home with Ann, but soon enough he had the strangest dream of his entire life.

In his dream, Sam found himself in a drug store where he was trying to buy some antibiotics for Aroon, who had a bad cough and cold. As he reached out to pay for the medicine another hand butted in and snatched away the shiny, strip of pills he was about to get.

"Do you have a prescription for the medicine you are buying?" asked a voice from behind him.

Sam turned around to see an elderly man, bow-tied, bespectacled, and wearing a long white coat — as if he had just stepped out of a scientist's research lab somewhere.

"Sorry, for being rude and taking away your medicine but you should really think twice before you buy antibiotics" he said.

"Who are you? And what do you know about antibiotics anyway?" said Sam stammering when he spoke, a bit surprised but also annoyed.

"My name is Dr Alexander Fleming and I discovered penicillin - the first antibiotic back in 1928" said the man.

"Oh! My apologies. Pleased to meet you Dr Fleming. Of course I know who you are! " said Sam, a bit embarassed now.

"Never mind about the apologies. The point is that I am a bit tired about people all over the world misusing my precious discovery. They have saved countless lives over the last seven

decades but don't seem to work anymore" said Dr Fleming, walking with Sam to a nearby park to continue the conversation.

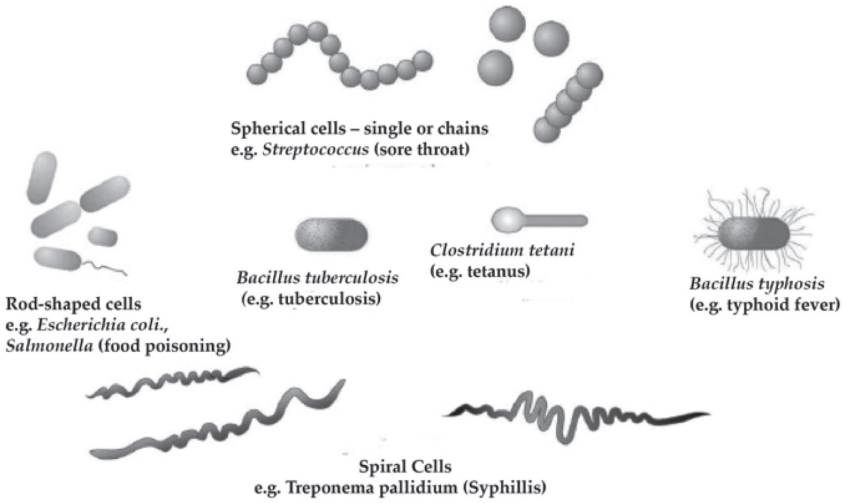
"What do you mean by 'misusing'? " asked Sam.

"Everyone is popping antibiotics as if they were candies, without considering the issue of safety to their own bodies besides contributing to antibiotic resistance that makes these drugs ineffective" said Dr Fleming. *"At the very least one should have a doctor's prescription before buying the drug — this kind of self -medication should stop"*

"Well, every time I take my son to the doctor for his cold, he prescribes antibiotics. I got a bit lazy this time and decided not to see him and buy it myself from the pharmacy" explained Sam, sheepishly as they sat down on a bench in the park.

"Well, your doctor is also wrong to recommend antibiotics for a cough and cold, which are caused by virus and not bacteria. Antibiotics are useless for viral diseases and if you overuse them they will not be effective when you really need it for a severe bacterial infection" said Dr Fleming.

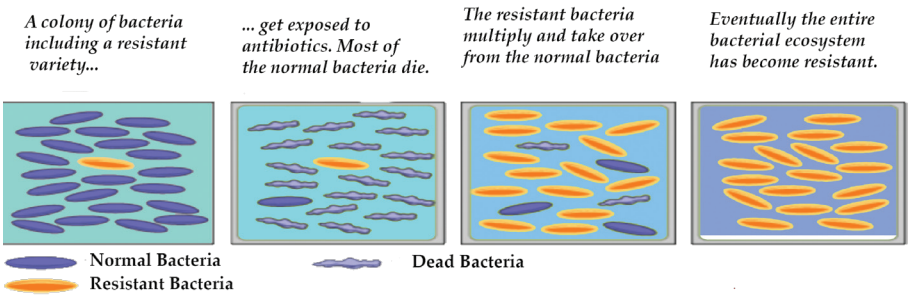
What is the difference between a bacteria and a virus? Bacteria are single-celled, microorganisms that can be either "good" (beneficial) or "bad" (harmful) for the health of plants, humans, and other animals. A virus has no cell structure and



requires a living host to survive. Bacteria are alive, while viruses are considered to be nonliving.

"How exactly are antibiotics made? I mean what is inside those pills and how does it help or harm anyone?" asked Sam, now thoroughly enjoying this special conversation and getting into the subject.

"To understand that you will have to come with me to an antibiotic production facility" said Dr Fleming, grasping Sam's hand and transporting him through space and time. Soon enough they found themselves inside a large factory setting full of vats of brewing liquids, pipes connecting them to various containers and people dressed like chemists running around carrying out various tasks.



"They produce penicillin here, the first modern antibiotic that was discovered by me" said Dr Fleming. 'Of course, the ancient Chinese and Egyptians had knowledge of antibiotic-like substances too which they used for treating infections', he added quickly.

"So what is penicillin made out of?" asked Sam, holding his nose at the overpowering smell emanating from the bubbling, fermented substance in the vats.

"You have to know that almost all antibiotics are found in nature and produced by bacteria or other microorganisms. For example, penicillin is made from a fungi called Penicillium" said Dr Fleming.

He continued, *"The problems is they are not normally available in the quantities necessary for large-scale production. So, a fermentation process was developed, that involves isolating a desired microorganism, ensuring it grows in large numbers, refin-*

ing and isolating the final antibiotic product".

Sam marveled at the idea of one kind of bacteria producing the substances needed to counter other bacteria that caused infections potentially fatal to human beings.

"So what exactly happens to the harmful bacteria when you use an antibiotic against them?" he asked.

Dr Fleming now adopted the sober look of a college professor and said: *"Different antibiotics have different modes of action: Bacteria are living organisms made up of just one cell and some antibitiotics, like penicillin, work by destroying cell walls. Some others, like tetracyline, work against bacteria by preventing their ability to make the proteins necessary for their growth or survival. Yet others disrupt the normal processes within the cells or genes of the bacteria and prevent their ability to multiply in large numbers".*

Antibiotics are mainly active against bacteria and not against viruses. Examples of bacterial infections include, sepsis (blood-stream infections), urinary tract infections, strep throat and bacterial pneumonia. Antibiotics do not cure infections caused by viruses, like colds, viral flu or measles.

The smell inside the penicillin production facilityw was getting too much for Sam and he gasped for breath. Sensing his discomfort

Dr Fleming led him out of the factory to get some fresh air.

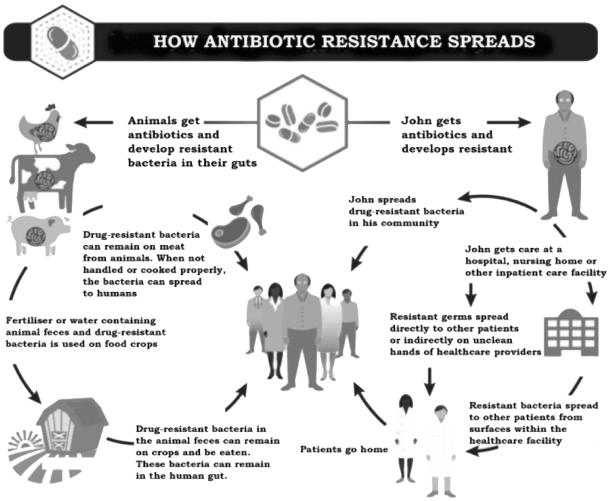
"If people knew how to prevent infectious diseases and look after their health well there would be no need for antibiotics at all. Unfortunately infections do happen all the time and antibiotics are needed to treat people and often in order to save their lives" he said.

"You mentioned something called 'antibiotic resistance', what exactly is that?" asked Sam, feeling better in the cold air outside.

"There are millions of different species of bacteria on our planet. Out of these some are harmful to human beings. Bacteria mutate all the time and even within these individual species of 'bad' bacteriathere are many varieties. Antibiotic resistance happens when some of these bacterial varieties are able to withstand the attack from antibiotics, multiply in numbers and replace the ones that get destroyed easily" said Dr Fleming.

"This sounds like the Theory of Evolution at work. I mean, it seems to be almost like the way all forms of life on Earth evolved over thousands of years, through the mechanism of 'survival of the fittest'," said Sam.

"Yes, you are right. Except, that in this case you must remember that bacteria evolve very fast and in modern times it is we



Simply using antibiotics creates resistance. These drugs should be used only for treating infections.

human beings who are driving this evolution of resistant bacteria through use and misuse of antibiotics. We are producing, consuming and spreading antibiotics in quantities, which has never been done before in the history of the planet" he said.

"What happens if antibiotics stop working" asked Sam.

Dr Fleming had a grim look on his face as he said, *"People will die of even very simple bacterial infections — the kind you get due to tetanus, cholera, typhoid, diptheria. No surgeries, like heart operations or organ transplants, will be possible without antibiotics as every time the human body is cut open it is vulnerable to bacterial infections".*

"Wow! These are serious consequences and the future could be very bleak without antibiotics" said Sam, becoming thoughtful.

Dr Fleming and Sam walked in silence for a while towards a coffee bar nearby, both lost in thought about a post-antibiotic era and what the world would look like. Dr Fleming ordered some coffee to drink while Sam, feeling hungry, wanted to order a hamburger to eat.

In Thailand, the misuse of antibiotics has serious effects on health. In 2010, antibiotic resistance caused at least 3.2 million extra hospitalization days and 38,481 deaths in the country.

Dr Fleming had a smile on his face as he watched Sam bite into the burger. Sam noticed and raised his eyebrows as if asking him *"what's so funny?"*

"It is not funny at all really. I suppose you have no idea that the meat that you are eating also has antibiotics in it" said Dr Fleming.

Sam spluttered, spilling some of the burger in his mouth on the table. *"What?"* he exclaimed, his face turning ashen.

"Oh! I am sorry to have disturbed your meal but the fact is that many farm animals are given large doses of antibiotics, even when they are not sick, to make them grow bigger and put on weight. This can induce antibiotic resistance in the bacteria inside these farm animals, which in turn can be passed on to people through their meat" said Dr Fleming.

"Yeow! I did not know that! So what are we supposed to do, stop eating?" said Sam angrily.

"Well, it is an important problem and there are no easy solutions. Some countries have banned the use of antibiotics as growth boosters for cattle and pork but others have argued there is not enough evidence to show they are harmful to humans" said Dr Fleming. 'It is a controversial subject".

Sam stopped eating his burger and clutched his head as if in some pain.

"Antibiotics also find their way into our food chain also because of pollution of water bodies by factories making these medicines or the way people throw their expired drugs in the garbage from where it goes into the soil and groundwater" said Dr Fleming.

The lack of access to antibiotics, is a key factor in the death of 800,000 under-five children due to pneumonia globally every year. At the same time, worrying resistance trends are also seen among bacteria causing pneumonia.

"This problem of antibiotic resistanace seems to be part of a larger trend of misuse of drugs and chemical substances in general?" asked Sam, as they exited from the coffee bar leaving behind half a plate of uneaten hamburger.

"While it is governments and policy makers who have to bring the right laws, implement and monitor them, there is really no substitute for public awareness," said Dr Fleming.

"That is going to be a difficult task because people are either intimidated by the technical nature of the subject or are too busy to bother about this even though in many cases it can be a life or death issue" said Sam.

"Well, people should be told or at least learn on their own that all drugs are to be taken with great caution and can both cure or harm the human body. They are not something to be played around with" said Dr Fleming.

"Ideally, it is good nutrition and food that is the best medicine . But people seem to treating medicine as food, going by the amounts they consume for every small problem!" said Sam.

"You are a wise guy Sam. For the welfare of your child and your family as also society at large you should learn more about safe use of medicine and spread the message far and wide" said Dr Fleming, taking Sam's hand once again in his own and gripping them tightly.

"Are you planning to leave me alone and go away?" asked Sam, sensing this was a goodbye moment.

"Don't worry. I will be back in your dreams again whenever

you really need me" said Dr Fleming, disappearing slowly, till there was nothing left, except for his shadow. Eventually that too faded off leaving Sam staring at blank space.

"Goodbye Dr Fleming. And thanks for the visit" muttered Sam.

In the morning, as the sun shone through the window on his face Sam woke up wincing at the bright light. Rubbing his eyes he thought, it will be yet another day of tiring travel to work, dealing with his boss and meeting deadlines.

Suddenly, he remembered the dream he had with Dr Fleming. He had a new purpose in life now, that of spreadingknowledge about safe use of medicine and saving as many lives as he could.