

The pen is mightier...



The Young Science Communicators competition, organised by the South African Agency for Science and Technology Advancement (SAASTA), provides a platform for young people studying science to share stories about their work and develop their communication skills. More than 200 entries were submitted for the most recent round of the competition, which included five categories – article, open, indigenous language, video and audio.

Here *Quest* features the winner and runner-up of the article category.

WINNER Spilling the ‘salt’ on a shaky situation

By Michél Strauss



It needs more salt! A common phrase uttered around the dining table of most. For what harm lies in an extra pinch of salt here or there?

Cardiovascular disease! A damaged heart and blood vessels! The mere thought of tackling a leading cause of non-transmittable disease-related deaths, not only in Africa, but globally, seems overwhelming. It would appear that one needs a big solution for a big problem.

However, despite medical advances allowing for more effective pharmacological approaches to decrease cardiovascular disease, it remains a stumbling block in areas where poverty or limited access to health care prevails.

For thousands of years salt, an ionic compound comprised of sodium and chloride, has been used as a preservative and seasoning agent in food. While accessibility to processed foods has contributed to an increase in dietary salt intake, the sodium content of several staple foods, including bread, cereals and margarine, has also been identified as being excessively high. Yet despite the already high sodium content of processed foods, many of us still have the habit of adding extra salt at the table or during cooking. This leads to the question of how many South Africans are informed about the salt content of their food, and also about the health risks associated with something as small as our habitual salt use.

Therefore more attention has been brought to achievable health strategies that will be beneficial to all – including diverse and far-reaching communities. A big solution starts with a change in small habits.

Cardiovascular risk: rubbing salt into the wound

Scary statistics from 2010 indicated that almost 1.65 million cardiovascular disease-related deaths, globally, were attributed to a high salt diet. But how does that extra pinch of salt influence your cardiovascular health? And how much is too much?

Both sodium and chloride, which make up salt, play essential roles in the regulation of various physiological systems, from cellular to kidney and heart function. The current recommendation from the World Health Organisation (WHO) is less than 5 grams of salt per day. The global salt intake is, however, almost double this amount. In South Africa the daily salt intake is approximately 8.5 grams per day.

The most widely described risk associated with excessive salt intake is high blood pressure, also known as



Omari Bernard

TYPICAL NUTRITIONAL INFORMATION		
Typical Nutritional Information (as packed)	Per 100 g	Per (2.5 g) Serving
Energy (kJ)	1302	32
Protein (g)	3.4	< 0.1
Carbohydrate (g)	19	< 1
of which Total Sugar (g)	0.3	< 0.1
Total Fat (g)	25.4	0.6
of which Saturated Fat (g)	18.5	0.5
Dietary Fibre (g)	0.5	< 0.1
Total Sodium (mg)	17206	430

hypertension. From a pathophysiological point of view, this is resultant of an increase in blood volume (water retention following high salt intake) that increases the pressure in your blood vessels. This also increases the amount of blood that returns to your heart and will be pumped through your circulation – therefore increasing your heart’s work rate. Amazingly, our bodies are equipped to maintain a healthy environment via the inter-regulation of several physiological systems to once again lower this pressure and your heart’s work rate. At some point, however, these systems become dysfunctional and the protective mechanisms are lost – increasing the load on your cardiovascular system. Additionally, salt may cause blood vessels to become stiff – thereby contributing to high blood pressure. Intriguing new evidence even suggests that salt affects the gut bacteria that may play a role in hypertension development.

South Africa on the forefront: be part of the solution

With the alarmingly high salt intake and the undeniable cardiovascular risks, it is unsurprising that global leaders from the United Nations and the WHO acknowledged salt reduction as a priority. Few countries, including South Africa (the first African country), have implemented mandatory sodium reduction legislation, lowering the sodium content of staple foods in an effort to reduce daily salt intake.

Interestingly, in South Africa a 0.85 gram salt reduction could prevent approximately 7 400 strokes and heart attacks per year. Thus, South Africa is on the forefront when it comes to taking on a more sustainable solution to improve the national burden of hypertension and cardiovascular disease, of not only the wealthy but all South Africans. Taking into consideration all of the above, our habits still remain in our hands, and it is up to us to make the cautious decision with regards to our salt use and cardiovascular health.

A little food for thought: think twice before adding that extra pinch of salt.



Michél Strauss is currently completing her PhD degree in physiology at North-West University. Her research is centred on gaining a better understanding of the development of cardiovascular disease, with the focus on black South African populations. Her research forms part of the African-PREDICT study, which aims to identify and highlight early cardiovascular risk factors in the youth, to assist in the implementation of

more successful prevention strategies. It was meeting the participants in the study, and seeing how some of them were unaware of how their lifestyle choices could influence their health, that motivated her to write this article.

RUNNER-UP

Superbugs: the end of an antibiotic era?

By Yashini Naidoo



Growing up, I never understood the compulsion my mum had with washing her hands – at home in the kitchen, after the bathroom, out in public restrooms. Why did she insist that I do it? Her response: “Germs, they will make you sick”. Germs, some better known as bacteria, are microorganisms that exist in their millions in every environment. They outnumber every other kind of life form. Many are useful but some are dangerous, especially those that cause disease. Before the 20th century, infectious diseases were the main cause of mortality worldwide. Aggressive bacteria that were reproducing at alarming rates led to serious illness and death.

Antibiotics, introduced in the early 1940s, changed the world by saving countless lives. The period from 1950 to 1960 was considered the ‘Golden Age’ of antibiotics, as many of them used today were discovered back then. The success of antibiotics by the end of the 1960s was so impressive that clinicians believed that the battle against bacterial infections was won.





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Soon after the clinical introduction of antibiotics, though, antibiotic-resistant bacterial strains began to surface. Antibiotic resistance threatened to turn back the clock by spreading at an alarming rate. Bacteria demonstrate resistance to antibiotics in many complex ways, but mostly from the overuse, abuse and a lack of enforced regulation of antibiotics. In the first decade of the 21st century, antibiotic resistance became a fast-growing problem, with the front-runners being 'superbugs'. Superbugs are strains of bacteria that are resistant to several antibiotics, making them difficult to treat.

How has this problem translated in South Africa? We have a very high HIV/AIDS burden and, added to that, a high prevalence of risk factors for other communicable diseases such as TB. This results in a high occurrence of infectious diseases, triggering the extensive use of antibiotics. The result: an increase in resistance.

The overuse of antibiotics propagates the spread of antibiotic contaminants in the environment, specifically in our water. One of the biggest problems South Africans face currently is the availability of and accessibility to clean water. Many communities in SA only have access to water that is unprotected and unsafe for consumption. Around 26% of the sewage in SA is inadequately treated before being discharged into rivers and streams, causing a major threat to communities accessing this water. Studies from Stellenbosch University and the Medical Research Council have reported a massive increase of pharmaceuticals in surface waters. Among the many pharmaceutical classes found, antibiotics were present in large amounts.

Scientific studies suggest that approximately 75–90% of antibiotics enter sewage systems and water resources. This is not just from human consumption. Antibiotics are used in livestock in the treatment and prevention of disease and to promote growth in healthy animals. Wastewater treatments do facilitate the breakdown of these compounds, but the toxicological effects of these

compounds are not fully understood.

Simply put, we are not sure how this affects people drinking contaminated surface water from lakes, dams and rivers and how or if this accelerates the dissemination of antibiotic resistance. The recent water shortage in the country has the potential to exacerbate the problem because drought situations encourage fewer hygiene practices in favour of saving water. Less handwashing increases the transmission of bacterial infections like *E. coli* diarrheal disease. The treatment of infection results in the use and overuse of antibiotics which perpetuates this unending spiral of resistance.

What can we do to help the burden of antibiotic resistance? One of the biggest problems we face is the lack of awareness. The World Health Organisation lists a few simple ways to help reduce the spread of resistance. For instance, do not demand antibiotics when visiting the doctor because antibiotics cannot be used for viral infections like influenza. Be certain to finish the course of antibiotics prescribed to you. Be sure to take antibiotics only when they are prescribed by a doctor and, finally, do not share antibiotics with others.

Every November is World Antibiotics Awareness Week, encouraging good antibiotic practices, and this starts with us. Furthermore, there is unprecedented importance in this statement: "wash your hands".



Joel Wright



Yashini Naidoo is a PhD student at the University of Pretoria. She is investigating antibiotic resistance in Namibian Desert Soil as part of a global effort to inform and assist the One Health concept in antimicrobial resistance. She would like readers to recognise the impact of improper use and overuse of antibiotics, and be aware of how we can all help to alleviate this burden.

The winning entries of the other categories of the competition can be viewed at: <https://www.saasta.ac.za/competitions/young-science-communicators-competitions/>.