

Gene editing: a molecular miracle

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Humans grow and develop based on the instructions contained in our genetic material. A normal human cell should contain exactly 46 chromosomes.

Chromosomes contain smaller units of genetic material called DNA inside the nucleus. DNA is a sequence of letters (A, T, C and G) that spell out the genetic code. The DNA is organised like words and sentences called genes.

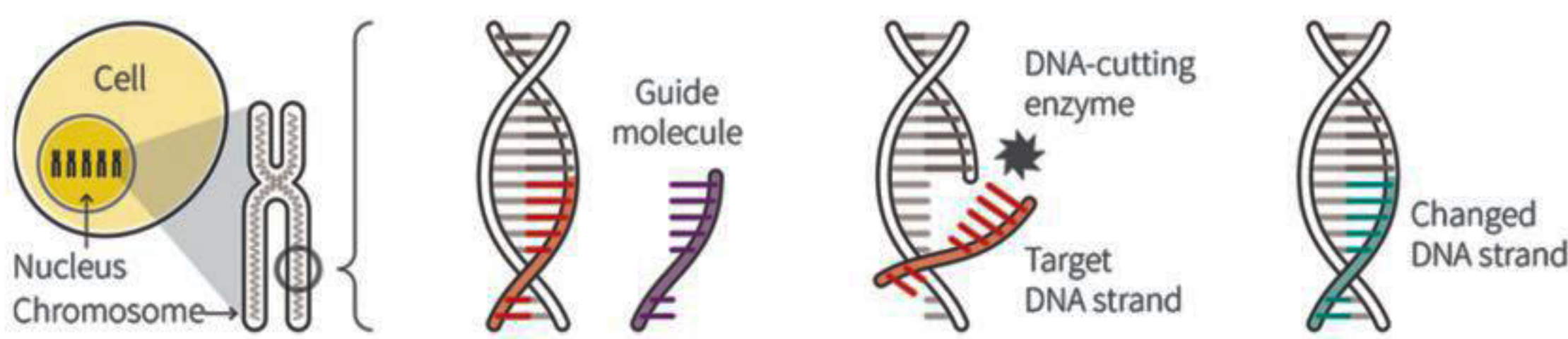
Humans have approximately 25,000 functional genes and each one influences a part of development and unique functions. These genes usually come in pairs. One copy is inherited from our mother and another from our father. A change in the spelling of a DNA sequence or the gene is called a mutation. Every person's DNA contains mutations which are usually harmless. However, some mutations are responsible for causing specific disease.

Genetic disorder
A genetic disorder is a genetic problem caused by one or more abnormalities in the genome. Most genetic disorders are quite rare and affect one person in every several thousands or millions. Genetic disorders may be hereditary, passed down from the parents' genes. In other genetic disorders, defects may be caused by new mutations or changes to the DNA. In such cases, the defect will only be passed down if it occurs in the germ line.

Gene editing

A DNA editing technique, called CRISPR/Cas9, works like a biological version of a word-processing programme's "find and replace" function.

HOW THE TECHNIQUE WORKS



A cell is transfected with an enzyme complex containing:

- Guide molecule
- DNA-cutting enzyme

A specially designed synthetic guide molecule finds the target DNA strand.

An enzyme cuts off the target DNA strand.

The amended DNA strand repairs itself.

What is gene editing?

Genome editing, or genome engineering is a type of genetic engineering in which DNA is inserted, deleted, modified or replaced in the genome of a living organism for the betterment of human health. The characteristics of all living organisms are determined by their genetic material, or DNA. Genes are segments of DNA which provide the code for particular functions or characteristics.

Normally, when one strand of DNA is cut or damaged, it is

repaired by enzymes which use the information in the other strand as a template. Gene editing uses this process but provides new repair information to change the DNA strand. By editing genes, it is possible to make changes to organisms, such as changing the version of a gene from one that causes disease to one that does not.

A technique called Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) has enabled scientists increasing the speed, ease and accuracy of

gene editing in a greater extent. It has created a buzz in the global healthcare industry. The invention of CRISPR-Cas9 gene editing tools is one of the greatest scientific revolutions of this generation. Accordingly, this system has the potential to be employed to change each gene from all 23 pairs of human chromosomes with unprecedented accuracy, without inducing undesired mutations.

How is gene editing being used in healthcare?
Among the approximately 25,000

identified genes in the human genome, there are mutations in over 3,000 that have been linked to disease. Gene editing tools can now potentially be used to replace faulty or disease causing genes. Gene editing in the early stage embryo potentially allows those modifications to be passed on to future generations. Researchers have used CRISPR in human embryos to repair a gene defect that would cause a potentially deadly heart defect; modify genes responsible for β -thalassaemia, a potentially fatal blood disorder; and to modify genes in immune cells to develop increased HIV resistance.

Gene editing technology plays a great role other than non-human health applications too such as agriculture and plant genomics in enhancing nutrient efficiency, improving drought resistance and extending shelf life of food crops etc. In a sense the technology has emerged with the great blessing for the human health and wellness.

It is obvious that the technology may have downside too. Working on embryo may affect future generations, their characteristics, and behaviour patterns without their consent. Thus it must be pin pointed in the guideline containing ethical issue as the priority.

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HAVE A NICE DAY

My country — my health care



Healthcare in 1980

- Healthcare delivery was dominated by public hospitals
- Service standards were generally poor
- Physicians were tied to security of public system
- Innovation was slow

- Private hospitals were in their infancy
- Served mostly middle and upper class clientele
- Mostly part-time physicians from public hospitals run the industry
- Few modern technologies came to Dhaka for medical care

Healthcare in 2011

- Doctors and patients — neither side of the coin is satisfied
- Many have lost confidence in locally available services and allied health care
- People are going abroad — especially to India, Thailand and Singapore in increasing numbers to get treatment

- Pressing need to better address the health rights of those who have less, especially the 'middle class'

Healthcare in 2018

- Health inequalities are increasing
- Public vs. non-public sector — challenges ahead
- Quality of care needs accreditation
- ICU, CCU and post-operative need monitoring by a private expert cell
- People are going abroad; it is increasing again
- Private health care services created *medical poverty*
- Proper human resource constraints are prevailing
- There is no planning towards biomedical century and further advancement

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HEALTH bulletin



Should I order imaging to evaluate breast pain?

In a retrospective study, almost all diagnostic imaging for breast pain was negative.

Breast pain is common but the cause is not always clear, producing anxiety over the possibility of underlying malignancy. Although breast cancer is not associated with breast pain, many patients are referred for diagnostic imaging (usually with negative results). Researchers at MD Anderson Cancer Centre reported imaging findings for 799 patients who presented with breast pain at three community-based breast imaging centres in 2014.

The initial imaging modality was breast ultrasound for women younger than 30 and digital mammography (sometimes with tomosynthesis) for those aged \geq 30 who had not had a mammogram within the last 6 months. Breast MRI was performed only when ordered by the referring physician. Most patients presented for diagnostic imaging; of these, 95% had negative findings and 5% had positive (but benign) findings.

Only one patient had an incidental breast cancer, which was contralateral and detected with tomosynthesis. The cost of breast imaging was \$87,322 in women 40 or younger and \$152,732 in older women.

Rohingyas continue to be vulnerable: WHO

STAR HEALTH REPORT

In the past year concerted efforts by the Bangladesh Government, the World Health Organisation (WHO) and health partners have helped save thousands of lives, and prevented and rapidly curtailed deadly disease outbreaks among the nearly one million Rohingya refugees, who despite these efforts remain vulnerable even today with their evolving health needs, and severe funding crunch threatening continuity of life saving health services in their camps.

"Unprecedented efforts have been made in the last year and in the most challenging conditions. Deadly diseases such as cholera have been prevented, and measles and diphtheria curtailed rapidly with quick roll-out and scale-up of health services and mass vaccination campaigns. It is remarkable that not only has the mortality rate among the Rohingyas remained lower than expected in an emergency of such a scale, it has also reduced significantly in the last six months", said Dr Poonam Khetrpal Singh, Regional Director, WHO South-East Asia, commending the Government of Bangladesh and health partners' work on the ground.

The arrival of nearly 700,000 Rohingyas in Cox's Bazar beginning 25 August 2017 was one of the largest ever population influxes over such a short span of time. Women,



children and the elderly arrived with injuries, low immunisation coverage, high rates of malnutrition, in need of reproductive health care and psycho-social support, and at risk of deadly disease outbreaks. In response, WHO, with the Ministry of Health and Family Welfare, Bangladesh coordinated emergency health services provided by the nearly 107 health partners on the ground, to ensure access to essential services for the Rohingyas across the area they settled in mega and small camps, and many with their host communities.

In the last year, 155 health posts have been established, each catering to around 7,700 people. In addition, 60 primary health care facilities covering 20,000 people each, and 11 secondary care facilities being accessed by nearly 115,000 people each have also been established. With generous support from KSR relief, 86 staff has been added to the workforce of the Cox's Bazar

district hospital, the only facility providing referral services to the vulnerable population and the host community.

Coordinating monsoon contingency plan, preparedness and response for acute watery diarrhea, and diphtheria outbreak, WHO has delivered nearly 175 tons of medicines and supplies and pre-positioned emergency supplies in three locations for the monsoon and cyclone season. WHO has distributed water filters prioritising health posts and centres and households with pregnant women.

Despite these efforts, challenges remain. Floods and landslides in the ongoing monsoon season continue to displace people and affect the functioning of health facilities. The Rohingya population is reluctant to access sexual and reproductive health services, and as a result 70% of births are still taking place outside of health facilities.

The biggest challenge is the need to further scale up services to meet the complex, evolving and long term health needs of this highly vulnerable population amidst a funding shortfall that also threatens to undo the gains and progress made so far.

WHO has appealed for US\$ 16.5 million for its continued support to the Rohingya response, which is part of the US\$ 113.1 million being sought by all health partners together under the Joint Response Plan until March 2019.

Promoting health, far and wide, in the 21st century

WHO is working with Google to share health advice through new and innovative platforms

STAR HEALTH REPORT

The World Health Organisation (WHO) is demonstrating developing advice for better public health, and sharing this with all people in numerous ways. In 2018 WHO launched a global action plan on physical activity to help make more people active for a healthier world. WHO is also leading the global agenda on digital health. At the 71st World Health Assembly, governments recognised the potential of digital technologies to improve public health, promote universal health coverage and advance the Sustainable Development Goals (SDG).

In bringing both streams together, WHO is working with Google to share health advice through new and innovative platforms. This is part of WHO's broader ambition to work closely with the digital world to promote and protect the health of all people.

Through the Google Fit app, WHO is looking to reach more people with its recommendations on physical activity, and showing why moving more is good for health.

For improved health, WHO recommends that adults, aged 18-64, should each week do at least 150 minutes of moderate-intensity, or 75 minutes of vigorous-intensity, aerobic physical activity, or an equivalent combination of both.

Being physically active — from walking to work to cycling to school — can benefit health in many ways, from preventing hypertension, overweight and obesity, to improving mental health and overall well-being and quality of life.



'Snapchat Dysmorphia': Seeking Selfie Perfection

The days of wanting to look like a celebrity are over, say plastic surgeons around the world. Now, more and more people want to look like themselves a phone edited version of themselves, that is.

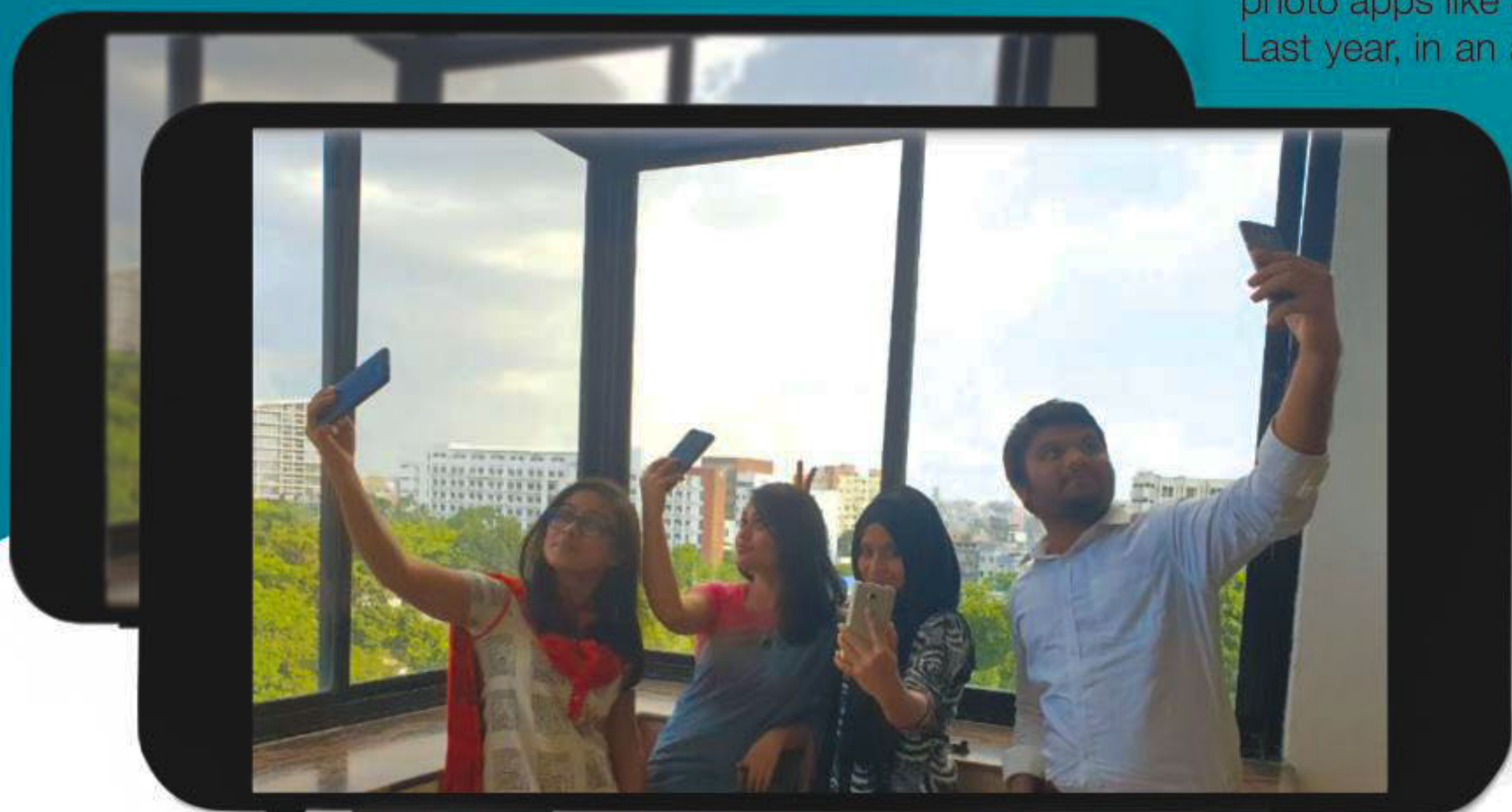
The number of people taking selfies has skyrocketed in recent years. In 2016, Google Photos announced that its 200 million users had posted 24 billion selfies to the app. As of this month, the "selfie" hashtag on Instagram has more than 355 million posts. And with the inclusion of front-facing cameras on smartphones that come with photo apps like Snapchat, Instagram and Facetune, users now have Photoshop like power at their fingertips.

Last year, in an annual survey, plastic surgeons reported that 55% of their patients said their main reason for getting surgery was to make themselves look better in selfies.

According to a recent editorial in the medical journal JAMA, researchers at Boston University School of Medicine's dermatology department report that people go to plastic surgeons requesting "fuller lips, bigger eyes or a thinner nose" that they see in photo filters. The trend, called "Snapchat dysmorphia," was first identified in 2015 and is now raising alarm among some plastic surgeons.

WebMD Article

Reviewed by Brunilda Nazario, MD on August 10, 2018



In Search of Excellence