CRISPR TO TARGET CANCER
CRISPR, the genome editing technique, is being used to edit genes involved in the immune system to recognize and ultimately attack cancer cells by a group of scientists, led by Dr Carl June, at the University of Pennsylvania.

Previous studies, using different techniques, have attempted to modify T-cells and boost the immune system but have failed in certain areas. This study hopes to solve these problems.

The plan to date is to recruit 18 patients, with three types of cancer (myeloma, sarcoma or melanoma), who have stopped responding to existing treatment. The trial will run for 2 years at three centers in the US.

The researchers will remove T-cells from the patients and, using a harmless virus to deliver the CRISPR machinery into the cells, perform three gene edits on them. The first edit will insert a gene for a protein called the NY-ESO-1 receptor. This protein gives T-cells the power to better recognize and target cancerous cells. Unfortunately, T-cells have two native proteins that interfere with this process, so the second edit will remove these inhibitors so that the inserted protein will be more effective. The third edit gives T-cells staying power by removing a gene that allows cancer cells to recognize the immune cell and prevent the cancer from shutting off the attack.

The trial is designed to test whether CRISPR is safe to use in humans, rather than its effectiveness for treating cancer per se. Proving safety is the first regulatory step to overcome before a treatment can be tested for efficacy.

Although gene editing has previously been used for cell-based cancer therapies, this trial is ground-breaking in that it will simultaneously modify three different genes, something that’s been difficult to pull off.

‘UNCOMFORTABLE HAIR’ GENES DISCOVERED
A study performed by Prof. Regina Betz et al. (2016) at the University of Bonn, Germany has been published in The American Journal of Human Genetics.

Uncombable hair syndrome (UHS) is a condition whereby the hair shaft is abnormally shaped, resulting in frizzy, dry, and disorderly hair that cannot be controlled with brushing. UHS is said to be extremely rare with only 100 cases reported worldwide.

The researchers sequenced the genomes of 11 affected children and compared them with large national databases, in order to identify any gene mutations that might be associated with UHS.

The team pinpointed mutations in three genes that are involved in hair shaft formation: PADI3, TGM3, and TCHH.

Now we can finally blame bad hair days on our genes!

Compiled by: Nerissa Wendy Bloch
THE MOSQUITO CHALLENGE

A preprint of an article titled “Overcoming evolved resistance to population-suppressing homing-based gene drives” was recently published.

The premise behind gene drive technologies is to increase the prevalence of a particular genetic alteration in a population so that that alteration is passed down to almost all offspring. With the promise of genome editing technologies such as CRISPR/Cas9, it might be possible to reduce or eradicate disease vectors, thereby reducing disease.

In this article, the authors report the use CRISPR/Cas9 system as a potential tool to suppress Anopheles gambiae which is the primary vector for malaria in Africa. In an African context where approximately 438,000 malaria-related deaths were reported in 2015, employing this genomic editing strategy to kill the female mosquitoes could drastically reduce the burden of disease and the associated mortality rates.

Although these mosquitoes are harmful to human life, they do play a role in the environment. Therefore, it is important that when such genome editing strategies are implemented, it is known that they will not have long-term dire consequences on the ecosystem.

NEWBORN SCREENING

In recent years, the BabySeq project has raised multiple conversations to address the issue of performing genomic sequencing on infants. The project aims to enroll 480 infants; half of whom are healthy and the other half with congenital abnormalities. Subsequently, the infants’ genomes will be sequenced.

Although the researchers plan to report only risk factors for newborn and childhood disorders, it is very well known that genomic sequencing will reveal a lot of data which could potentially include alleles associated with adult-onset disorders.

It is a good idea to be aware of childhood risks and to look out for symptoms at early stages but what about the risk for adult-onset disorders? Will this information be withheld by the researchers or will the parents be informed? If so, does this not infringe on the child’s autonomy to make their own decisions about their health?

Although there are multiple benefits to newborn genomic screening, this could also open a whole Pandora’s Box.

Are the families ready?

Compiled by: Reabetswe Pitere
1. What is your current area of research?

I am looking at polymorphisms within two genes: *FCGR3A* and *FCGR3B* that may confer susceptibility to Systemic Lupus Erythematosus in the Black South African population.

2. What is your background and how did you become interested in your field of research?

I completed my BSc in Genetics, Microbiology and Zoology and then proceeded to do my Honours in Human Genetics. I have always been interested in autoimmune diseases and their complex etiologies. During my Honours year I was lucky enough to have Dr Jacqueline Frost as my supervisor. Her research interest is in another autoimmune disease, Systemic Sclerosis and since then I have been hooked 😊

3. What piece of advice would you give to somebody beginning their career in human genetics?

Be passionate and don't doubt your capabilities!

4. Do you know any science jokes you can share?

*Do you know why the geneticist went to dental school?*

*He was looking for an oral high gene.*

5. What would your superpower be?

Talking to animals!
1. **What is your current area of research?**
   My current research focus is the inheritance of breast cancer in the black South African population.

2. **What is your background and how did you become interested in your field of research?**
   I have always been interested in cancer genetics and thus pursued it for my MSc study. As a result of the epidemiological transition, cancer has become a huge burden worldwide and there is currently little information pertaining to its inheritance in African countries. I therefore decided that this is the field I would like to make a difference in through my research.

3. **What piece of advice would you give to somebody beginning their career in human genetics?**
   Although it gets very, very frustrating when things keep failing, it is fulfilling to know that your research contribution will one day make a difference in someone's life. People in the health sciences field are superheroes without capes 😊

4. **Do you have any secret talents?**
   I think I am a great cook

5. **How do you like to relax?**
   Watch series, eat junk food and read books
6. Do you know any science jokes you can share?

Patiently hoping for a Degree
Protein has Degraded
Paid half what I Deserve
Professorship? hah! Dream on!
Please hire. Desperate.
Pipetting hand Disease
Probably heavily in Debt
Parents have Doubts
Pound head on Desk
Potential heavy Drinker
Permanent head Damage