Introduction

Hello fellow SASHG’ers

Apologies, this newsletter was meant to come out at the end of 2017 and it’s already March! A quarter of the year is practically done, and here’s hoping the next few months progress more slowly! 😊

On page 2 of this edition of the SASHG newsletter, the outgoing Chair, Dr Zané Lombard provides a brief overview of her committee’s achievements during the past two years. And on page 3, we introduce you to the nine members of the committee for the period August 2017 to ~ July 2019.

On pages 4-5, Dr. Engela Honey summarizes the salient points of an NHI meeting which she attended in September 2017.

A brief overview of some exciting findings in human molecular genetics, including the use of artificial intelligence (AI) technology to sift through large amounts of next-generation sequencing data, is provided on pages 6-7.

On page 8, we applaud the achievements of some of our members and on page 9, we highlight the recent publication on analyses of 24 South African whole genomes by the Southern African Human Genome Programme, with a link to the data access policy.

On pages 10-12, the chair of the organizing committee of the past congress in Durban, Prof. Colleen Aldous provides a summary of the congress in August 2017. Also, on page 12, the chair of the upcoming congress, Dr. Craig Kinnear provides some details on the congress in 2019.

Finally, on page 13, we introduce a survey (please click on the link and complete) as we are keen to assess the needs of our members. For your convenience we also provide some details on relevant congresses in 2018 as well as their Abstract deadlines.

Enjoy and please feel free to drop me a line if you have any comments or criticisms 😊

Regards
Soraya Bardien
(sbardien@sun.ac.za)
A word from the outgoing SASHG Chair
- Dr. Zané Lombard

It’s been a privilege and an honour to serve as the SASHG Chair for two years. Though it felt like the time went by in a blink of an eye, the committee achieved a lot in our two-year session. Here are some highlights from the 2015-2017 period:

- Our engagement with Discovery was prudent and timely, given their launch of their direct to consumer exome test. This interaction culminated in an opinion piece published in the South African Medical journal summarizing the pertinent considerations linked to this topic, and several engagements (both in person and over email) with the Discovery team. Discovery presented at our Biennial Congress, and we hope to continue this affiliation in the future.

- We rebranded SASHG by launching a new logo and revamping the website (screenshot shown below). The goal was to make the website more accessible to our members, as well as the community, to provide useful information in an easily accessible format and to increase the communication channels through which the SASHG committee can be reached.

- We launched monthly newsletters to the SASHG community. This was an excellent initiative, driven by the Young Researchers Forum (YRF), and was well received by the members.

- We participated in several national and international matters. These included hosting a workshop in conjunction with The Academy of Science of South Africa (ASSAf) on the topic of ethics in genetics and contributing to the American Society of Human Genetics (ASHG) policy on genetic engineering.

- We funded several member activities, including a registrar training workshop in Bloemfontein, as well as contributing towards travel, accommodation and registration costs for 26 SASHG student members to attend the Biennial Congress in Durban.

- Our SASHG conference committee (led by Prof Colleen Aldous) hosted an exceptional congress in August last year, with stellar international and local presentations.
Introducing the new committee 2017 to 2019

Soraya Bardien - Chair  
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Associate professor,  
Division of Molecular Biology and Human Genetics,  
Stellenbosch University  
**Research interests:**  
Genetic causes and disease mechanisms underlying Parkinson’s disease

Careni Spencer  
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Medical geneticist,  
Division of Human genetics,  
University of the Witwatersrand/National Health Laboratory Service  
**Research interests:**  
Skeletal dysplasias, dysmorphology and developmental disorders

Craig Kinnear  
gkin@sun.ac.za  
Specialist scientist,  
Division of Molecular Biology and Human Genetics,  
Stellenbosch University  
**Research interests:**  
Genes involved in increased susceptibility or resistance to tuberculosis and primary immunodeficiencies

Gordon Wayne Towers  
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Associate professor,  
North-West University.  
**Research interests:**  
Genetic epidemiology of non-communicable disease and the ethical, legal and social implications (ELSI) of genetic and genomic research

Lisa Roberts  
lisa.roberts@uct.ac.za  
Senior scientific officer,  
Division of Human Genetics,  
University of Cape Town  
**Research interests:**  
Genetics of inherited retinal disorders

Nadia Carstens  
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Medical scientist,  
Division of Human Genetics,  
National Health Laboratory Service,  
University of Witwatersrand  
**Research interests:**  
Next-generation sequencing technology to investigate the genetics of monogenic developmental disorders

Noelene Kinsley  
noelene@geneticcounselling.co.za  
Genetic counsellor,  
Private practice, Co-founder of GC Network.  
**Research interests:**  
Growth and establishment of the genetic counselling profession in South Africa

Tina Marie Wessels  
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Senior lecturer,  
Division of Human Genetics,  
University of Cape Town  
**Research interests:**  
Different aspects of genetic counselling

Zane Lombard - Treasurer  
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Senior researcher,  
Division of Human Genetics,  
National Health Laboratory Service,  
University of Witwatersrand  
**Research interests:**  
Bioinformatics, complex traits and developmental disorders
The NHI is becoming a reality now that the NHI Final White Paper has been published in the Government Gazette which will eventually become an official Government Policy. The altruistic motive of such a policy is appreciated as it will provide good quality, affordable health care to all South Africans irrespective of socio-economic status.

It states that there is an appreciation of the current challenges in offering services such as a quadruple burden of disease (HIV/AIDS, maternal, neonatal and child mortality and morbidity, non-communicable diseases as well as violence and trauma), social determinants of health and problems in the health systems. Problems in leadership and governance, challenges in service delivery and workforce as well as the availability of medical products and technologies associated with weak purchasing and financing systems result in health care financing challenges. The ultimate effect is 'punishing' the poor. It is not only a problem in the public sector but also spills over into the private sector with escalating medical scheme costs, more stringent benefit design and the creation of private medical aids (PMBs) which cause out of pocket payments for members and a fee for service in the private sector.

The key features of the NHI will be universal coverage for all South Africans. The fund will be publicly financed and administrated. There will be financial risk protection with a single payer and purchaser and mandatory prepayment for the user of a voluntary comprehensive health care service. Funding will be provided by the formation of a National Health Insurance Fund (NHIF) which will become an autonomous public entity under the administration of a NHI board that will report directly to the Minister of Health who then will have to report to Parliament.

Coverage will be universal and all South African citizens, long term residents as well as refugees, asylum seekers and illegal immigrants will be covered. Vulnerable groups will be prioritized. Service coverage will include primary, secondary, tertiary as well as quaternary care. The benefit will be that medicine and supplies must be available and private retail pharmacies will order products from a list of nationally agreed pharmaceutical products at a capitated administration fee. There will be an inventory for pharmaceutical products, medical supplies and devices to choose from. Pathology will be packaged at a primary care level (essential laboratory list) and will be ordered for specified clinical indications and no routine tests will be available. There will be provision for patient transport based on need. The medical care will be free at point of care.

Service providers will include primary care providers, specialists and hospitals. The primary care providers will be gate keepers and will be the point of entry into the system. Payment will be uniformed and performance will be measured at all levels. Providers will be in the private and public sector and will have to be certified and accredited and thereafter contracted by the NHIF based on need.

The estimated budget (2010 prices) required by 2026 is R256b and will be pooled from general revenue allocations (remote tax credits and the removal of government subsidies to medical aid schemes); payroll tax (2%); surcharge on personal income (2%) and pooling of the road accident and compensation funds.

Cost control will be implemented by price setting and electronic health records on the supply side, gatekeeping and encouragement of healthy lifestyle on the demand side, generic substitution, stringent pricing and reimbursement on public management and financing reforms and linkage to other social security reforms such as the road accident fund and compensation funds. Medical schemes will give complementary cover and will be also voluntary. Civil servant schemes will be merged into the Government Employees Medical Scheme (GEMS) and benefit options will be reduced so that there is only one benefit per scheme.
Full implementation is aimed at 2026. This will be preceded by 3 phases: Phase 1 was a pilot which has been completed. Phase 2 (2017 – 2021) will include legislative reforms and implementation structures and phase 3 (2022 – 2026) will be mandatory prepayment and contracting of private providers.

The implementation will make use of different structures and committees who will consist of different stake holders, for example, a National tertiary health services committee, a Ministerial advisory committee on health care benefits for NHI, a National health pricing advisory committee etc.

They will each provide a specific service such as:

1. National health pricing advisory committee will make recommendations for pricing and reimbursement of health care services etc.
2. Ministerial advisory committee on health care benefits for NHI will design a comprehensive set of benefits, set norms and standards for health care service delivery, draw up treatment guidelines and protocols, etc.
3. Ministerial advisory committee on health technology assessment (HTA) for NHI will advise on the appropriate use, selection and pricing of health technology which includes organizational structure for HTA, skill and training requirements, etc.
4. National advisory committee on consolidation of financing arrangements: e.g. Consolidate funding streams into 5 funding arrangements: Unemployed; Informal sector; Formal sector employment (bigger business); Formal sector employment (SMEs); and Civil servants.

Medical schemes will undergo a complete reform starting with a consolidation of risk pools (Jan 2018) followed by a single service benefit framework, price regulation of health services and removal of diagnosis based pricing (April 2018). Co-payment and balance billing will be implemented Jan 2019. In Jan 2020 governance and non-health care issues as well as the start of reserves and solvency frameworks will be implemented.

The proposal seems possible but there are numerous challenges such as the total reform of a health care system over a very short period of time as this will have impact on the private and public sector, and also funding is a big challenge (contributors far less than users of the NHI).

The implementation will be very challenging and some of the deadlines have already not been kept. Many details are still outstanding and the real financial implications are unknown. The timelines are also very optimistic according to Ms. Prins-van den Berg.

Bottom line: This is a reality and every person in the health sector as well as the public will be affected. It is therefore important to prepare, participate and to plan accordingly.

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Please contact Dr Honey if you would like a copy of the slides.
Some exciting advances in human genetics

The new genetics of intelligence

Abstract: Intelligence — the ability to learn, reason and solve problems — is at the forefront of behavioural genetic research. Intelligence is highly heritable and predicts important educational, occupational and health outcomes better than any other trait. Recent genome-wide association studies have successfully identified inherited genome sequence differences that account for 20% of the 50% heritability of intelligence. These findings open new avenues for research into the causes and consequences of intelligence using genome-wide polygenic scores that aggregate the effects of thousands of genetic variants.

Polygenic scores for intelligence can bring the powerful construct of intelligence to any research in the life sciences without having to assess intelligence through the use of tests.

Shared molecular neuropathology across major psychiatric disorders parallels polygenic overlap

Abstract: The predisposition to neuropsychiatric disease involves a complex, polygenic, and pleiotropic genetic architecture. However, little is known about how genetic variants impart brain dysfunction or pathology. We used transcriptomic profiling as a quantitative readout of molecular brain-based phenotypes across five major psychiatric disorders—autism, schizophrenia, bipolar disorder, depression, and alcoholism—compared with matched controls. We identified patterns of shared and distinct gene-expression perturbations across these conditions. The degree of sharing of transcriptional dysregulation is related to polygenic (single-nucleotide polymorphism–based) overlap across disorders, suggesting a substantial causal genetic component. This comprehensive systems-level view of the neurobiological architecture of major neuropsychiatric illness demonstrates pathways of molecular convergence and specificity.

Cerebral organoids derived from Sandhoff disease induced pluripotent stem cells exhibit impaired neurodifferentiation

Abstract: Sandhoff disease, one of the GM2 gangliosidoses, is a lysosomal storage disorder characterized by the absence of beta-hexosaminidase A and B activity and the concomitant lysosomal accumulation of its substrate, GM2 ganglioside. It features catastrophic neurodegeneration and death in early childhood. How the lysosomal accumulation of ganglioside might affect the early development of the nervous system is not understood. Recently, cerebral organoids derived from induced pluripotent stem (iPS) cells have illuminated early developmental events altered by disease processes. To
develop an early neurodevelopmental model of Sandhoff disease, we first generated iPS cells from the fibroblasts of an infantile Sandhoff disease patient, then corrected one of the mutant HEXB alleles in those iPS cells with CRISPR/Cas9 genome-editing technology, thereby creating isogenic controls. Next, we used the parental Sandhoff disease iPS cells and isogenic HEXB-corrected iPS cell clones to generate cerebral organoids that modeled the first trimester of neurodevelopment. The Sandhoff disease organoids but not the HEXB-corrected organoids accumulated GM2 ganglioside, and exhibited increased size and cellular proliferation compared with the HEXB-corrected organoids. Whole-transcriptome analysis demonstrated that development was impaired in the Sandhoff disease organoids, suggesting that alterations in neuronal differentiation may occur during early development in the GM2 gangliosidoses.

Provides proof of principle in a human model system that gene therapy may be beneficial for children with Sandhoff disease.

Artificial intelligence in neurodegenerative disease research: use of IBM Watson to identify additional RNA-binding proteins altered in amyotrophic lateral sclerosis.


Abstract: Amyotrophic lateral sclerosis (ALS) is a devastating neurodegenerative disease with no effective treatments. Numerous RNA-binding proteins (RBPs) have been shown to be altered in ALS, with mutations in 11 RBPs causing familial forms of the disease, and 6 more RBPs showing abnormal expression/distribution in ALS albeit without any known mutations. RBP dysregulation is widely accepted as a contributing factor in ALS pathobiology. There are at least 1542 RBPs in the human genome; therefore, other unidentified RBPs may also be linked to the pathogenesis of ALS. We used IBM Watson® to sieve through all RBPs in the genome and identify new RBPs linked to ALS (ALS-RBPs). IBM Watson extracted features from published literature to create semantic similarities and identify new connections between entities of interest. IBM Watson analyzed all published abstracts of previously known ALS-RBPs, and applied that text-based knowledge to all RBPs in the genome, ranking them by semantic similarity to the known set. We then validated the Watson top-ten-ranked RBPs at the protein and RNA levels in tissues from ALS and non-neurological disease controls, as well as in patient-derived induced pluripotent stem cells. 5 RBPs previously unlinked to ALS, hnRNPU, Syncrip, RBMS3, Caprin-1 and NUPL2, showed significant alterations in ALS compared to controls. Overall, we successfully used IBM Watson to help identify additional RBPs altered in ALS, highlighting the use of artificial intelligence tools to accelerate scientific discovery in ALS and possibly other complex neurological disorders.
Achievements and research highlights of some of our members

**Hadassa Goldfein**  
*(School of Molecular and Cell Biology, University of Witwatersrand, Johannesburg)*

Hadassa graduated with an MSc in Genetics in December 2017.

She also won the best poster prize at the African Society of Human Genetics conference in Egypt in November 2017, for her poster entitled: “HLA-DPB1 and cytokine gene variation affects HBV vaccine response in South Africans”.

**Melinda Barkhuizen**  
*(North-West University)*

Melinda obtained her PhD on the 4th of December 2017 through a joint degree between North-West University and Maastricht University in the Netherlands. Her thesis is entitled: ‘Genetic and perinatal risk factors for movement disorders’, which she completed under the supervision of Prof. Anne Grobler (NWU), Prof.dr. Harry Steinbusch (UM), Prof.dr. Boris Kramer (UM) and Dr. Danilo Gavilanes (UM).

She recently started a postdoc at the Department of Neurology at the University of California San Francisco in the USA where she is looking at resilience to ageing in the Dubal lab.

http://profiles.ucsf.edu/melinda.barkhuizen

**Lisa Roberts**  
*(Division of Human Genetics, University of Cape Town)*

Lisa graduated with a PhD in July 2017 and was promoted to Senior Scientific Officer.

She was awarded the ‘Paul Holden Foundation Award’ for the best presentation at the 5th Course in Eye Genetics (organised by the European school of Genetic Medicine and the European society for Human Genetics) in September.

Also, she was selected as the winner of UCT’s Health Sciences Faculty’s ‘Best Publication Award’ in the category “Early Career Award, Basic Laboratory Sciences” for her publication entitled: “Molecular diagnosis of inherited retinal diseases in indigenous African populations by whole-exome sequencing” in the journal Investigative Ophthalmology and Visual Science 57(14):6374-81.

Our hearty congratulations to all on these achievements!
Recent publication by the SA Human Genome Programme

Whole-genome sequencing for an enhanced understanding of genetic variation among South Africans


NATURE COMMUNICATIONS 2017, 8:2062 doi: 10.1038/s41467-017-00663-9

Abstract

The Southern African Human Genome Programme is a national initiative that aspires to unlock the unique genetic character of southern African populations for a better understanding of human genetic diversity. In this pilot study the Southern African Human Genome Programme characterizes the genomes of 24 individuals (8 Coloured and 16 black south-eastern Bantu-speakers) using deep whole-genome sequencing. A total of ~16 million unique variants are identified. Despite the shallow time depth since divergence between the two main south-eastern Bantu-speaking groups (Nguni and Sotho-Tswana), principal component analysis and structure analysis reveal significant (p < 10−6) differentiation, and FST analysis identifies regions with high divergence. The Coloured individuals show evidence of varying proportions of admixture with Khoesan, Bantu-speakers, Europeans, and populations from the Indian sub-continent. Whole-genome sequencing data reveal extensive genomic diversity, increasing our understanding of the complex and region-specific history of African populations and highlighting its potential impact on biomedical research and genetic susceptibility to disease.

Please request access to the data via:
Summary on the SASHG Biennial Congress 2017

13-16 August 2017, Durban, South Africa

The theme, ‘Ubuntu Genetics: Why we do what we do’, was focused on the patients and communities affected by congenital disorders and genetic conditions we serve as clinicians and researchers

By Prof Colleen Aldous

Merely thinking about hosting a prestigious conference such as the biennial SASHG on is enough to create a physiological crisis with palpitations and sweaty palms. But we know we are all part of a greater whole and have a duty to contribute to the society. The provincial circuit of conferences has been traditional since the inception of the society and we all need to take our turn. The consequence of this moving of the conference around the country is that everyone gets to express their own service and research priorities with regard to the theme of the conference. This is reward enough and takes any drudgery out of the process of organizing a conference and turns it into an exciting adventure.

The turn for KwaZulu-Natal came after many years of not being able to commit to the task. Genetics in KwaZulu-Natal has always been a small endeavor and reduced even further after we lost two of our stalwarts, Prof Bill Winship and Sr Lin Wilson. We had however, built up enough in our own context over the last years, focusing of provision of services to our community, to have enough confidence to showcase our thoughts in the theme Ubuntu Genetics: why we do what we do.

The most important factor to have in place when starting to plan a conference we found, was having a good conference organizer as a partner. They were experienced and provided the logistical support and new entertaining ideas that we as academics didn't have time or the experience to think about. They had a
specialized role to fulfil that the academics could not hope to fulfil. They freed us up to think about the academic content and focus of the conference. It was a delight working with the Savetcon team in 2016 and 2017.

There were many highlights to running the conference last year; before, during and after the dates of the conference. Our first highlight was the gasp of awe from the audience when we first presented our logo at the 2015 conference in Pretoria. At that point we knew we were providing a theme that the society could identify with. However, to me one of the greatest overall highlights however was the coming together of team members to work towards the same purpose with the same joy and enthusiasm. The teamwork extended from between the LOC members to the scientific committee members to the conference organizer and ultimately, at the conference, of all the delegates. As the LOC we were aware that the success of the conference was due to us all being on the same page at all these levels.

Organizing a conference is not a walk in the park. It takes effort and time. However, the process is one that can be enjoyed and is very rewarding.

Prof Colleen Aldous
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Quotes on the SASHG congress from travel grant recipients:

Phillip Venter (MSc student, NWU)
The SASHG’s Ubuntu: Genetics conference at the Southern Sun Elangeni and Maharani hotel was a wonderful “first conference” experience for me as a first year master student. The diverse presentations given broadened my mind to the wide world that genetics has to offer. I found the key note presentations at the beginning of each talk inspiring and I learnt a lot from the different presenting techniques. The Indian evening and gala dinner were tastefully arranged and I enjoyed it thoroughly. I will always remember the call to stand together as a genetics community and I count myself lucky to be amongst their numbers.

Keleabetswe Mpye (Postdoctoral Research Fellow, UCT)
As a first-time SASHG participant, I had little to no expectations but I was wowed by the plenary presentations and the overall organisation of the congress. I interacted with various researchers from across the country and discussed our projects and future plans. This helped me see how far I have come and how long I still have to go to get to where I would like to see myself as researcher. The rapid talks made it possible for more researchers to share their work, I commend the committee for that. I thoroughly enjoyed the well-organised evening events too.
Boiketlo Sebate (MSc student, SU)

For the most part of my short-lived academic career I’ve worked in “isolation”. Outside of my research group and the division we form a part of, my interactions with the genetics community has been largely limited to reading the literature. This all changed for me at the 17th Biennial Congress of the Southern African Society for Human Genetics, my very first conference. Attending this conference was an investment into my future as a researcher. It brought me up to date with the latest findings in the field of genetics in the South African context. Furthermore, the feedback I received on my presentation gave my research a refreshed perspective. Most importantly, it provided the rare opportunity to start building a scientific network that could possibly one day lead to collaborations, exchange opportunities or appointments.

Liesl Hendry (recent PhD graduate, Wits)

This year’s theme of ‘Ubuntu Genetics’ was particularly clever, relevant and special and “embraced” the whole conference really well from start to finish. I was impressed by the high standard of the presentations and, as such, the high standard of the research and work being carried out across the country. The inclusion of the 5 and 8 minute presentations this year, although somewhat challenging to prepare, made for a really interesting and, in my opinion, positive change to the structure of the sessions. When presenters kept to time, the rapid fire presentations were specifically impactful as the work had to be delivered in a “punchy” and interesting way. As someone coming from a scientific/research background, I always look forward to the more clinical talks and was once again really in awe of the work being done in clinical settings, while being made aware of the challenges faced. I also realised again how important the research is that we do and the importance of all working together. As much as a conference is about the presentations and networking, I also measure a conference by the organisation, venue, food and social events – all of which impressed me! The Sunday evening conference opening was really special, the Indian evening and dressing up was lots of fun and the gala dinner was quite an experience eating amongst the sea life! Overall, the 17th biennial congress by the sea was a really enjoyable few days – thank you to all who were involved in organising it.

Date for 2019 SASHG congress

On behalf of the SASHG 2019 local organizing committee (LOC) and Stellenbosch University, I am pleased to announce that the 18th Biennial Congress of the Southern African Society for Human Genetics (SASHG 2019) will be held from 10-13th August 2019 in Cape Town. We will be communicating details about the venue and the theme of the conference at a later stage.

Planning is in full swing and the SASHG 2019 LOC hopes to see many of our society members at the conference, so please save the date.

Dr. Craig Kinnear
2019 LOC (Chairperson)
SASHG survey

We are keen to know how you view the SASHG Society. What are we doing right and what should we do differently? An 18-question online survey has been compiled and we kindly request that you click on this link: https://s.surveyplanet.com/S1fnuedDz

Thank you in advance for your participation!

SAVE THESE DATES – Upcoming conferences:

The American Society of Human Genetics annual meeting will take place on 16-20 October 2018 in San Diego, California. Abstracts deadline: 7 June 2018

The European Human Genetics Conference in conjunction with the European Meeting on Psychosocial Aspects of Genetics will take place on 16-19 June 2018 in Milan, Italy. Abstracts deadline: CLOSED

The next joint South African Genetics Society and South African Society for Bioinformatic conference will take place at Golden Gate Resort in the Free State, on 16-18 October 2018. Abstracts deadline: 6 July 2018

The 11th conference of the African Society of Human Genetics will be held at the Radisson Blu Hotel and Convention Centre in Kigali, Rwanda on 19-21 September 2018. Abstracts deadline: To be announced

The Human Heredity and Health in Africa (H3Africa) Consortium will be holding their 12th Consortium Meeting from the 17th to 19th September 2018. There will also be a joint AfSHG/H3Africa program for Wednesday 19th September 2018.