

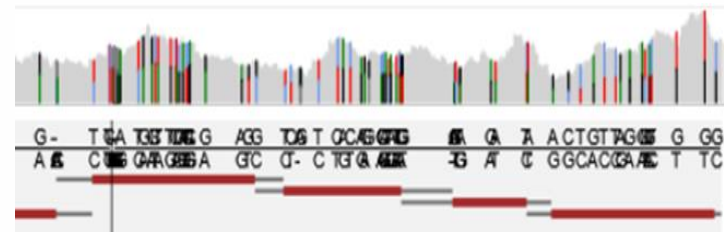


# New Developments and Innovation in the Transplant Diagnostic Services

offered at the South African National Blood Service (SANBS)



28<sup>th</sup> SATS & 5<sup>th</sup> SATiBA Congress  
6 – 8 September 2019  
Krystal Beach Hotel, Gordons Bay



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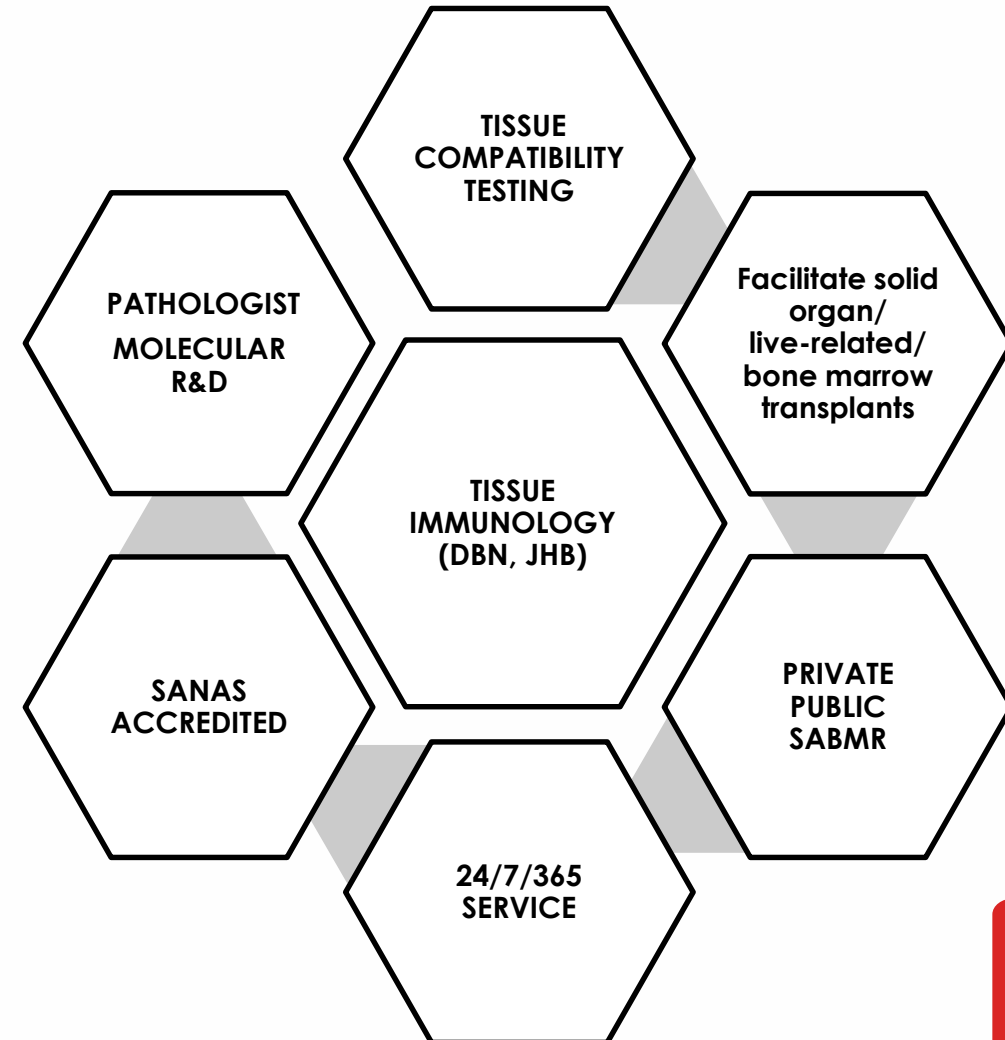
# BACKGROUND

## VISION

“The Cornerstone of Healthcare in South Africa, through the Gift of Life”

## SCOPE OF TESTS

- HLA typing
- HLA antibody
- CDC crossmatch
- Virtual crossmatch
- HLA next generation sequencing (NGS)
- ABO typing

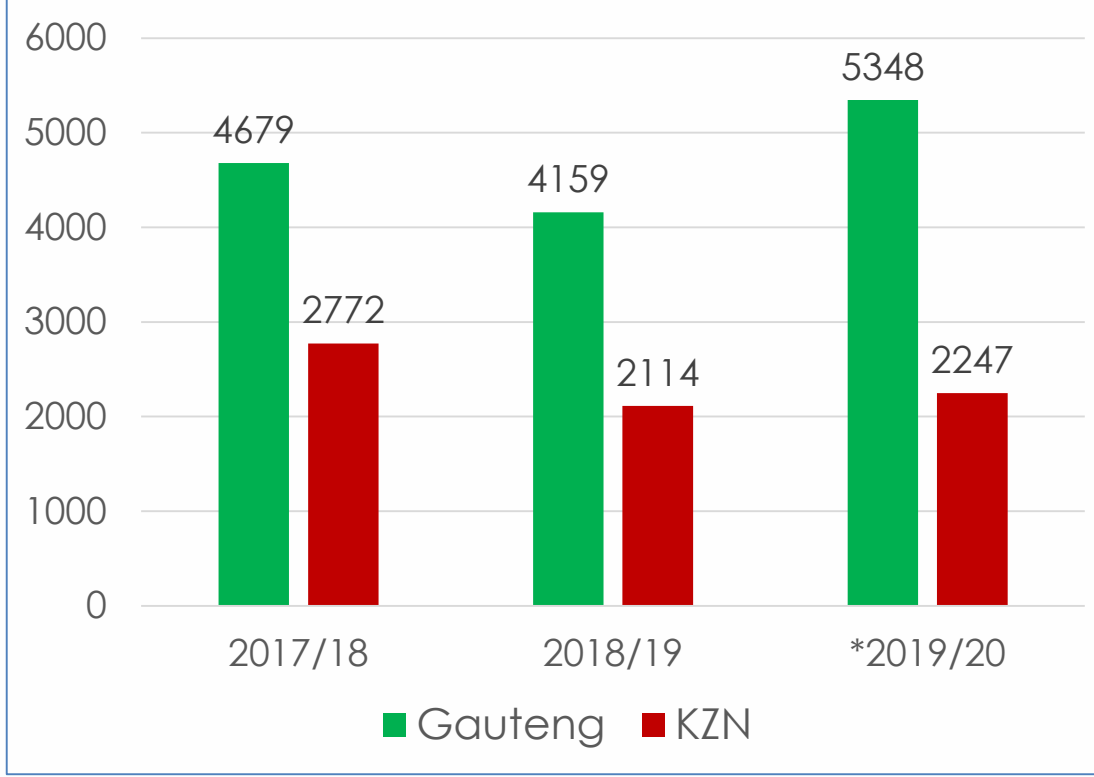




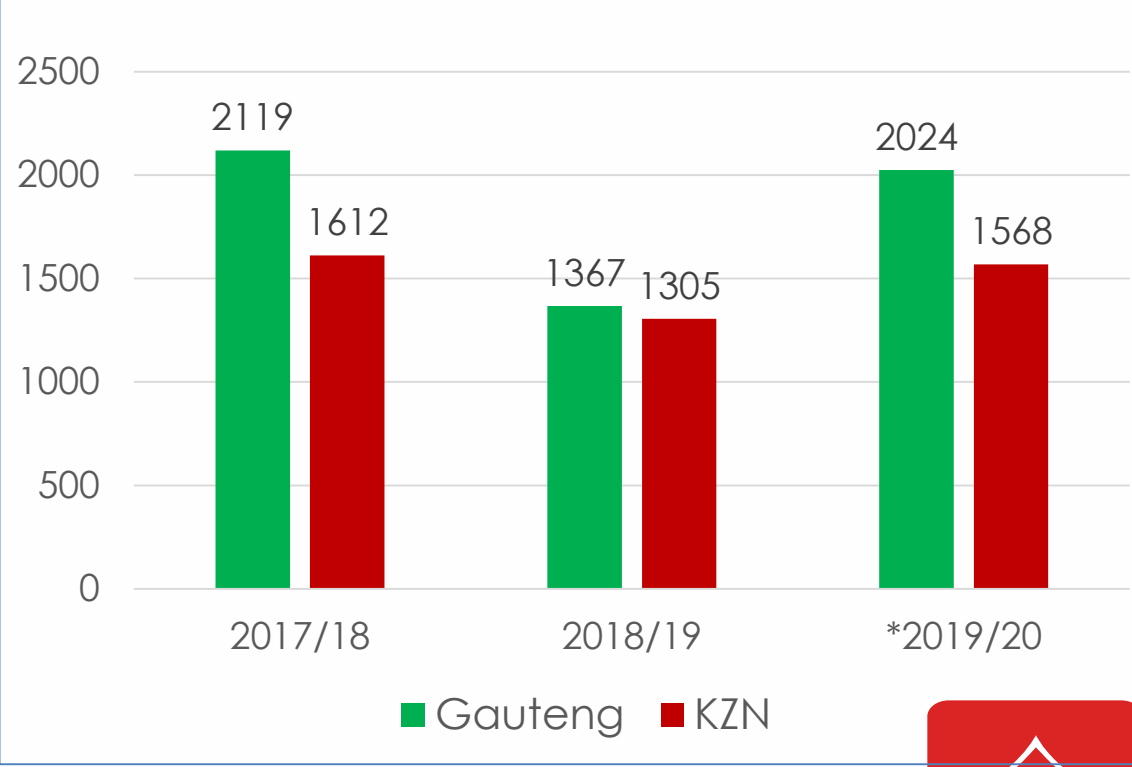
# INTRODUCTION

To provide a descriptive overview of assay improvements and innovative new testing platforms implemented in the Tissue Immunology Laboratories in the past 18 months

**Figure 1: HLA Typing Tests (all loci)**



**Figure 2: HLA Antibody Tests**



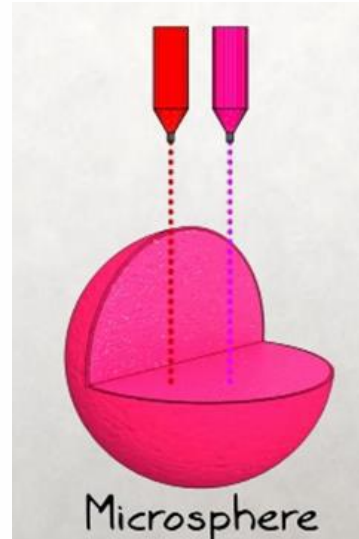
\*2019/2020 – projected stats for 12 months based on recent 4 months





# Luminex Instrument – 1<sup>st</sup> line HLA Typing

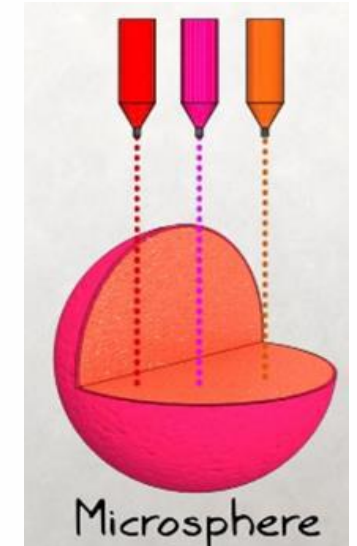
## LX100/200



### xMAP Technology

- 100 Bead Region Map
- Uses a Red 638 nm laser
- Uses two dyes
- Reads Two Different Emission Wavelengths
  - 1.Red
  - 2.Infrared

## NEW!!! FlexMap3D (FM3D)



### xMAP Technology

- 1000 Bead Map Region (500 beads used to date)
- Uses a Red 638 nm laser
- Has a third internal dye
- Reads Three Different Emission Wavelengths
  - 1.Red
  - 2.Infrared &
  - 3.Extended Infrared Dye

*FM3D – allows for a more extensive allele coverage, providing a higher definition HLA result with shorter HLA allele strings and a reduction in HLA ambiguities*



# LABXpress – Automation for Luminex Assays

- Fully automates the HLA antibody assays, reducing hands-on time from 8hrs – 3 hrs.
- Automates the HLA typing assay from pre- amplification, reducing hands-on time from 4hrs – 2 hrs.
- High throughput testing capability - 8 x 96-well trays in one run.
- Reduced consumables, no disposable tips required due to a 8-channel head
- Consistent results obtained, no technologist variation







# HLA NEXT GENERATION SEQUENCING (NGS)

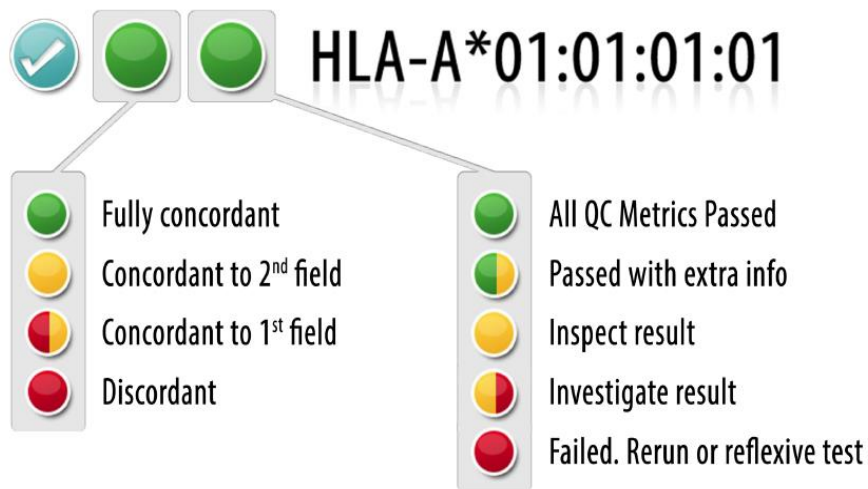
## HLA High Resolution Typing





# HLA NGS continued...

- Moved to an improved assay
- Loci coverage has increased from 5 loci to 11 loci (HLA-A, B, C, DRB1/3/4/5, DQA1, DQB1, DPA1, DPB1)
- Reduced turnaround time from 4 to 3 days.
- HLA Twin Analysis Software
  - **Dual algorithm** genotyping software – consensus genotyping and statistical genotyping



<https://www.omixon.com/products/holotype-hla/>

Omixon HLA Twin

HLA Typing | Result of 27 analyses

Analysis name(s): 20150727AC-0804155-3\_53\_L001\_R1\_001\_2015-09-09\_13-09-55\_6759187-0430155-1\_51\_L001\_R1...

Allele	HLA-A	HLA-B	HLA-C	HLA-DPB1	HLA-DQA1	HLA-DQB1
9_13-09-55 Allele 1	HLA-A*02:01:01:02L	HLA-B*18:01:01:02	HLA-C*07:01:01:01	HLA-DPB1*04:01:01:01	HLA-DQA1*01:02:01:01	HLA-DQB1*03:01:01:03
9_13-09-55 Allele 2	HLA-A*03:01:01:01	HLA-B*18:01:01:02	HLA-C*07:01:01:01	HLA-DPB1*04:01:01:01	HLA-DQA1*05:05:01:01	HLA-DQB1*06:02:01:01
2-07-18 Allele 1	HLA-A*32:01:01:01	HLA-B*14:01:01:01	HLA-C*04:01:01:01	HLA-DPB1*03:01:01:01	HLA-DQA1*01:02:01:04	HLA-DQB1*02:02:01:01
2-07-18 Allele 2	HLA-A*68:02:01:01	HLA-B*53:01:01:01	HLA-C*08:02:01:02	HLA-DPB1*104:01:01:01	HLA-DQA1*02:01:01:01	HLA-DQB1*06:04:01:01
2-18-57 Allele 1	HLA-A*02:02:01:01	HLA-B*38:01:01:01	HLA-C*07:01:01:01	HLA-DPB1*105:01:01:01	HLA-DQA1*01:03:01:02	HLA-DQB1*03:03:02:01
2-18-57 Allele 2	HLA-A*26:01:01:01	HLA-B*49:01:01:01	HLA-C*12:03:01:01	HLA-DPB1*124:01:01:01	HLA-DQA1*02:01:01:01	HLA-DQB1*06:03:01:01
0-03-46 Allele 1	HLA-A*11:01:01:01	HLA-B*44:02:01:01	HLA-C*05:01:01:02	HLA-DPB1*01:01:01:01	HLA-DQA1*02:01:01:01	HLA-DQB1*02:02:01:01
0-03-46 Allele 2	HLA-A*68:01:02:02	HLA-B*44:02:01:03	HLA-C*07:04:01:01	HLA-DPB1*04:01:01:01	HLA-DQA1*03:03:01:01	HLA-DQB1*03:01:01:01
9-11-15 Allele 1	HLA-A*11:01:01:01	HLA-B*44:02:01:01	HLA-C*05:01:01:02	HLA-DPB1*01:01:01:01	HLA-DQA1*02:01:01:01	HLA-DQB1*02:02:01:01
9-11-15 Allele 2	HLA-A*68:01:02:02	HLA-B*44:02:01:03	HLA-C*07:04:01:01	HLA-DPB1*04:01:01:02	HLA-DQA1*03:03:01:01	HLA-DQB1*03:01:01:01
2-46-59 Allele 1	HLA-A*02:01:01:02L	HLA-B*38:01:01:01	HLA-C*07:01:01:01	HLA-DPB1*124:01:01:01	HLA-DQA1*01:03:01:02	HLA-DQB1*02:02:01:01
2-46-59 Allele 2	HLA-A*02:01:01:01	HLA-B*49:01:01:01	HLA-C*12:03:01:01	HLA-DPB1*141:01:01:01	HLA-DQA1*02:01:01:01	HLA-DQB1*06:03:01:01
3:00-34 Allele 1	HLA-A*01:01:01:01	HLA-B*07:02:01:01	HLA-C*06:02:01:01	HLA-DPB1*04:01:01:01	HLA-DQA1*03:03:01:01	



# Monotype ABO NGS kit

- ABO donor/recipient compatibility is important for transplant – serology tests
- Introduced ABO NGS that is performed on the Illumina MiSEQ sequencer
- To resolve complex ABO serology cases including post stem transplant where the patient takes on the donors ABO group resulting in initial difficult serological determination of ABO group



**Monotype ABO**



**Holotype HLA**

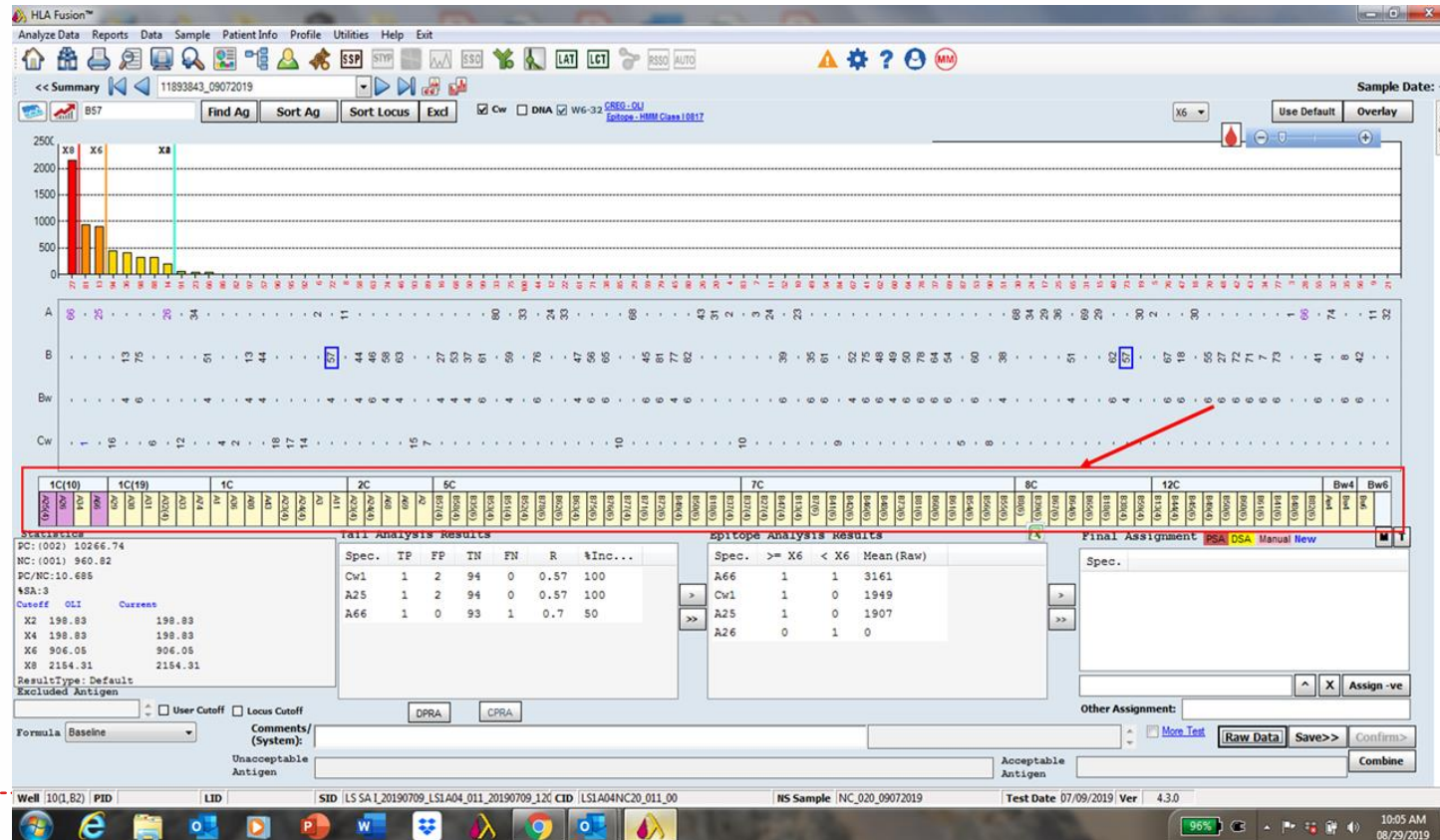


**Illumina MiSeq  
reagents**



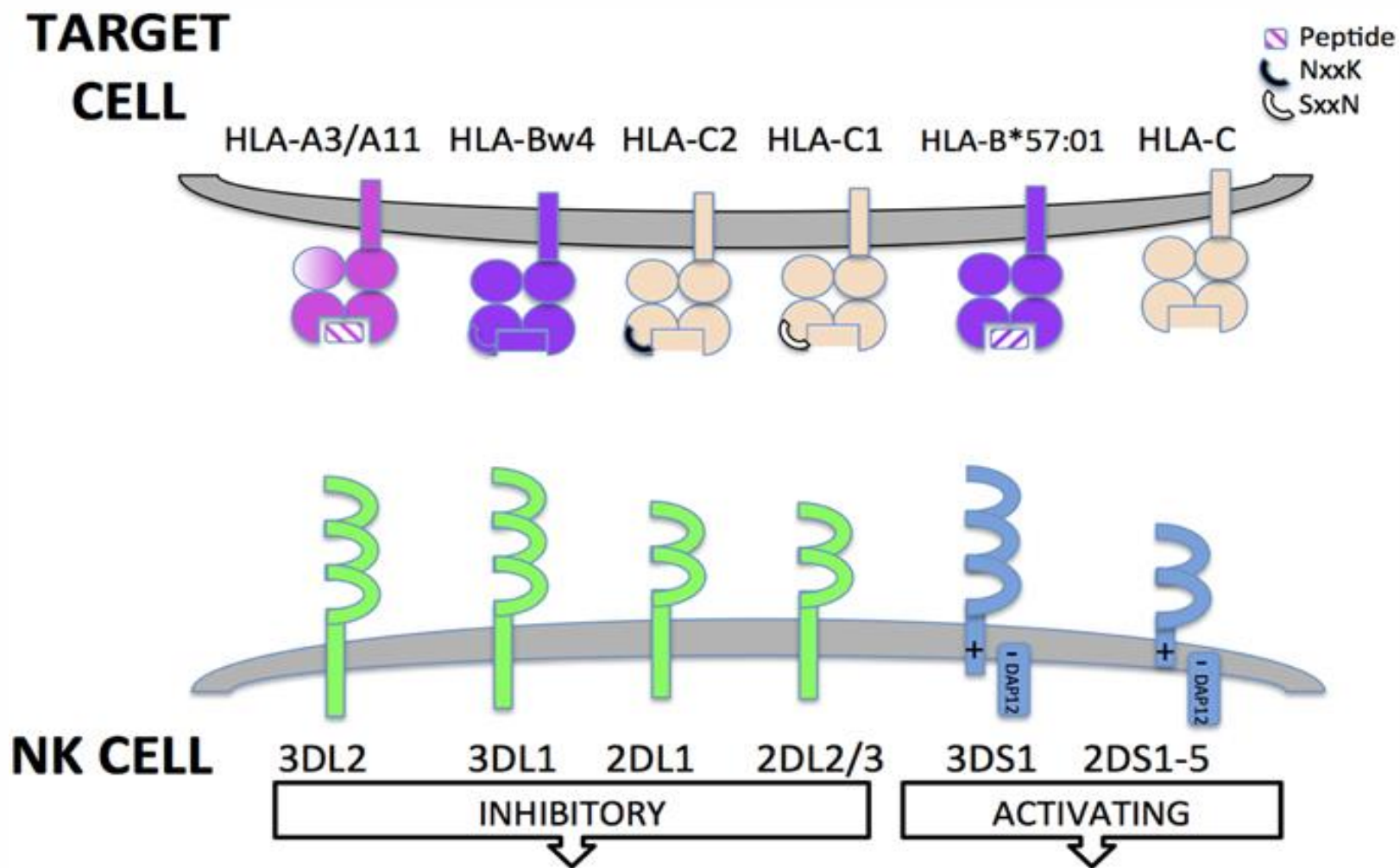
# Other New Assays to assist in Transplant Diagnostics

- **C1q Screen** - used to detect a subset of clinically relevant complement fixing antibodies that are associated with antibody-mediated rejection and graft failure.
- **CREG** (cross reactive epitope groups) **Analysis** – analysis tool to assist find suitable compatible donor/recipient matches.





# KIR Typing





# And then there is more to come...

- Molecular hub - housing all our molecular processes and offer a center of excellence for HLA and ABO NGS
- Preparation for EFl accreditation
- Flow Crossmatch
- KIR-HLA outcomes in bone marrow transplants and HIV outcomes
- New state-of-art, environmentally friendly laboratory premises being designed and will be based in Mount Edgecombe, Durban



# Acknowledgements

- LISA (Lagitre South Africa) – Gianfranco Gianella, Malegola, Albert, Ugene
- Nina Lauterbach, Efi Melista – Omixon team for use of slides and webinars, technical support
- Donald/Dr Silke/Oliver – Inqaba Biotechnical Industries
- Testing/Analysis/Interpretation team – Angeline Moonsamy, Lavendri Govender
- Support team – Dr Ute Jentch - Lead Consultant, Kuben Vather
- Tissue Immunology laboratory, CK staff, Derrick Nelson, Shelagh Kavonic
- Innotrain/Haemotec – Morne Toms, Innotrain product specialists (KIR typing), slides, literature

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*Thank you*