



High throughput immune repertoire analysis by next-generation sequencing and bioinformatics provides qualitative and quantitative molecular information on antigen-specific responses.

Context

- To understand antibody responses to infection and vaccination so as to help design better vaccines.
- Use antigen-specific antibodies to home in on critical components of antigens for use in vaccine development.
- Add to the immunogenetic knowledge on African bovine breeds.
- Developed the technology on East Coast Fever (ECF) experimental vaccine studies.

Our innovative approach

- To apply high throughput sequencing technology to characterize the quality of antibody response to immunization.
- Developed a novel strategy to capture the unusually long antibodies found only in bovines that could have broadly neutralizing capacity.
- Established pipeline for bioinformatics analysis on ILRI's high performance computer.



POVERTY REDUCTION, LIVELIHOODS & JOBS

Discovery of antigen-specific bovine antibodies through next-generation sequencing



RESEARCH
PROGRAM ON
Livestock

LIVESTOCK HEALTH

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Outputs

- Antibody repertoires of > 30 cows sequenced, including several from indigenous African breeds such as Ankole, Ndama and Boran.
- Antibody repertoire characteristics of African breeds differ from those of exotic breeds.
- Putative antigen-specific antibodies identified against an ECF vaccine candidate.
- Novel alleles for immunoglobulin genes identified in African bovine breeds.

Future steps

- Recombinant antigen-specific antibodies will be synthesized and tested for neutralizing activity.
- This technology can be applied to study immune responses to other diseases of cattle, other ruminants as well as humans.
- Antibody-based therapeutics can be developed from the sequence of protective antibodies.
- Scaling is possible through automation of the analysis pipeline.

Partners

University of Toronto



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