

Chemical evolution to select for protective epitopes against biologic tick transmission of *Anaplasma marginale*

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Background

- Ixodid ticks transmit pathogens to people and animals.
- These ectoparasites are important livestock pests that transmit etiologic agents of four of the five major vector-borne diseases of cattle, worldwide. Infections transmitted from ticks to people are zoonotic.
- Tick-borne pathogens of people also infect companion animals.
- Host immunity to ticks is an alternative approach to tick-borne disease control.
- An experimental tick-transmission model system was recently used to compare transmission of *Anaplasma marginale* to cattle immunized with different tick-derived antigen preparations.
 - Evidence of infection was not observed among any of the cattle immunized with one of these preparations.
- The overall objective of this project is to identify tick molecules uniquely reactive to antisera collected from protected hosts.

Rationale

Epitopes uniquely reactive to protective IgG will be candidates for further testing to elicit protection from the biologic transmission of *A. marginale* and related pathogens by tick vectors.

Hypothesis

Antisera of cattle immunized with tick antigens are reactive to M13 phage displaying random peptide epitopes.

Aim

To preclear a random phage display library (1×10^{13} PFU) of epitopes reactive to antisera from immunized cattle that were not protected from biologic transmission of *A. marginale*

Approach

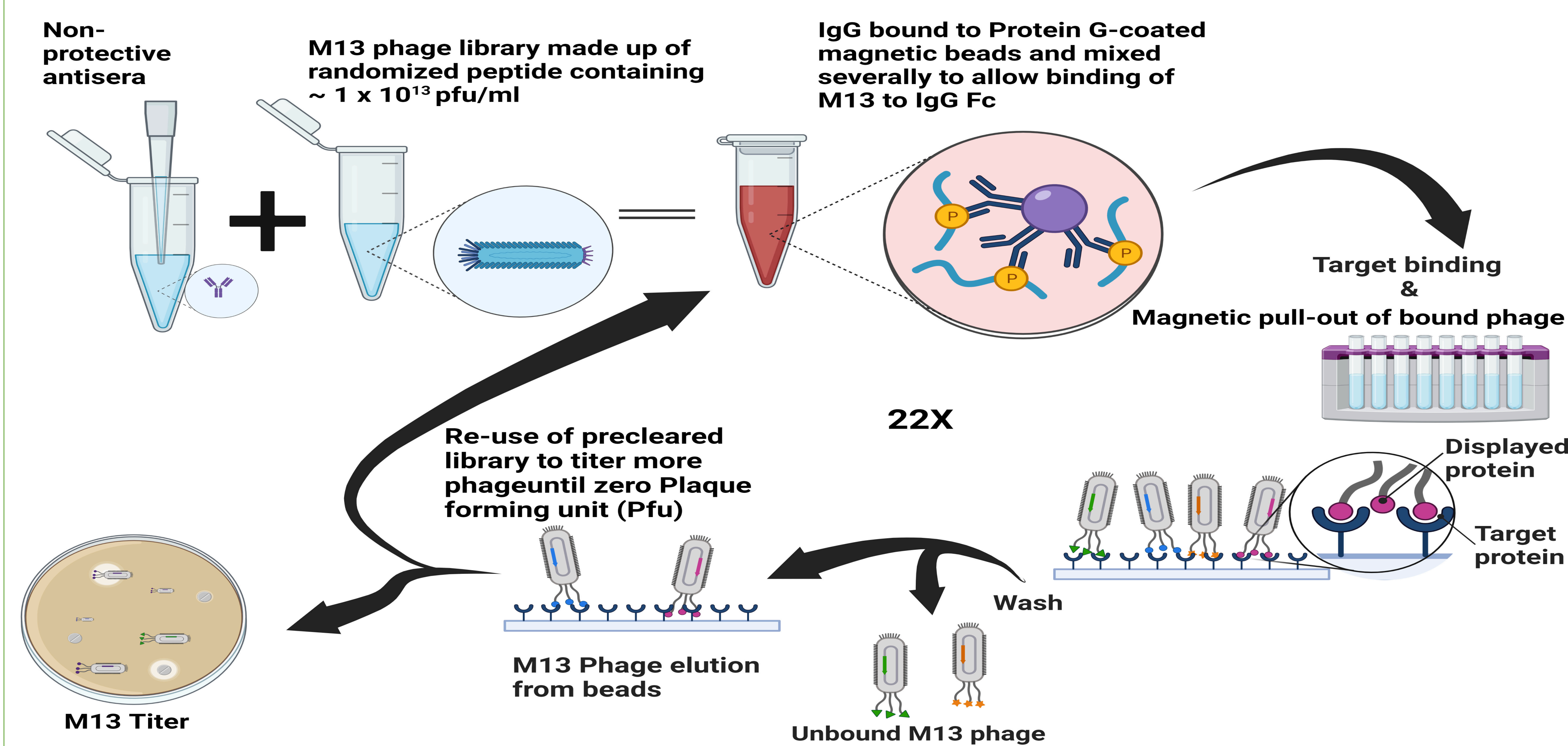
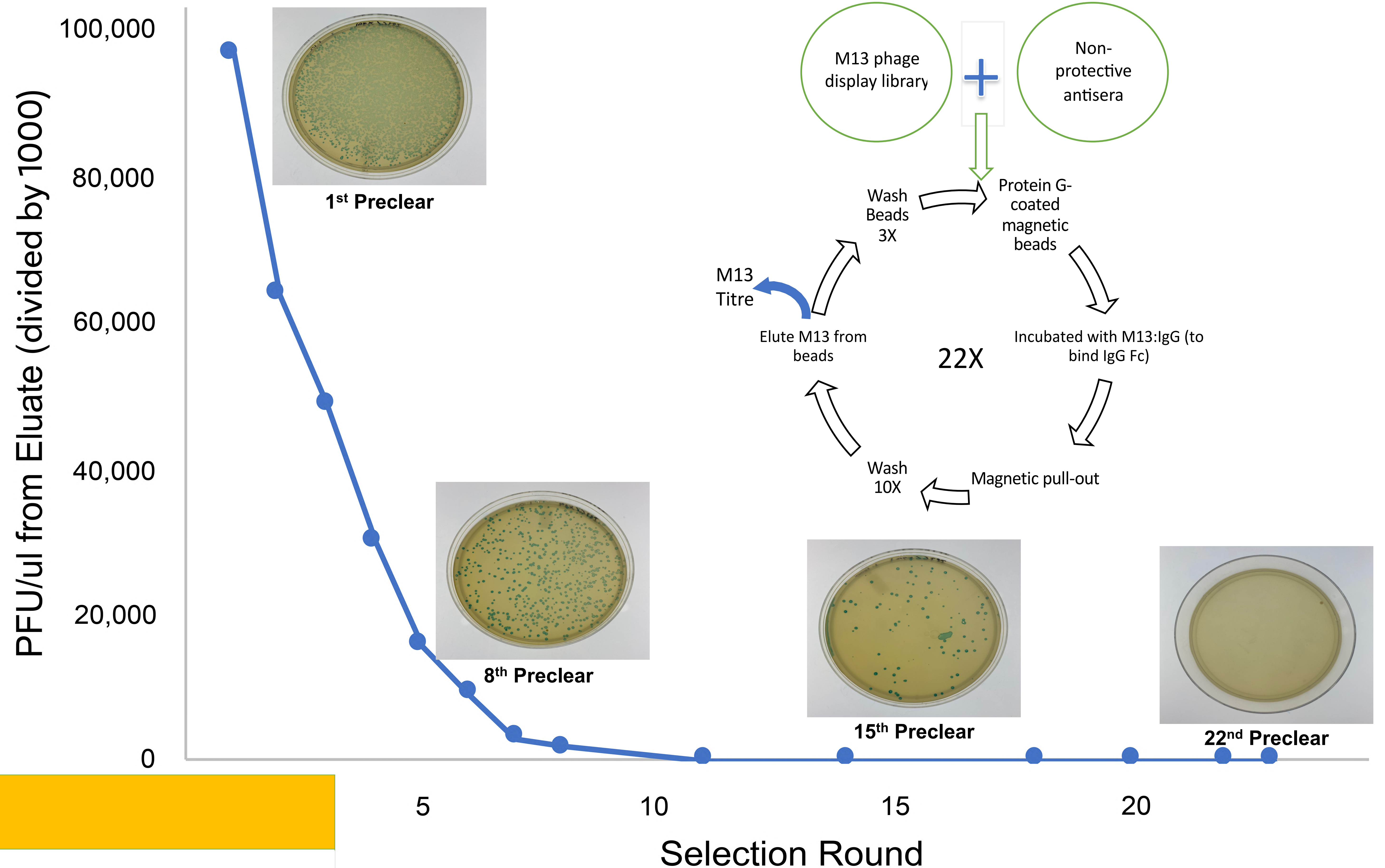


Figure 1
Pictorial depiction of the methodology used for the negative selection of phage library with non-protective antisera.

Results

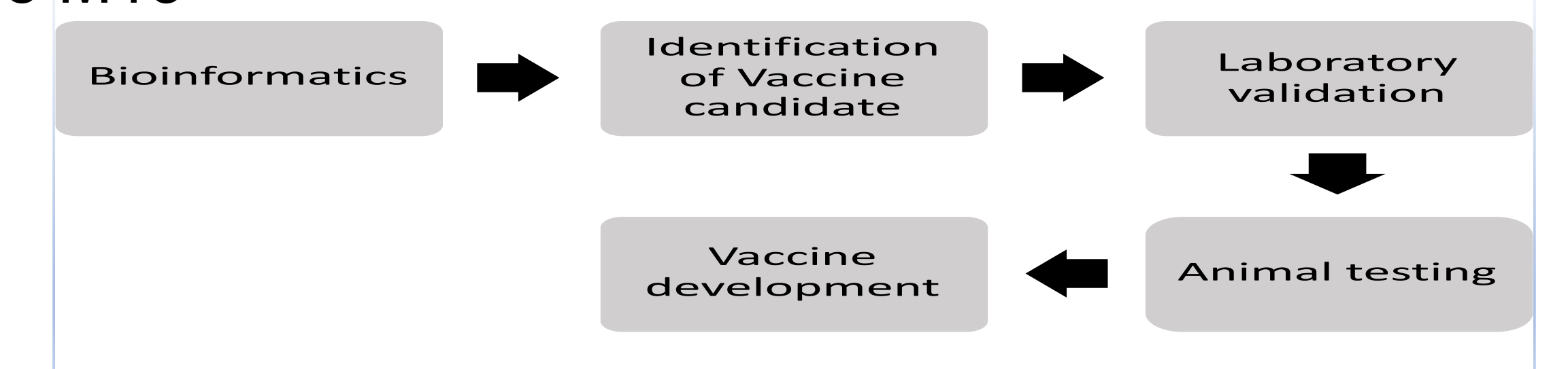


Conclusions

- This random phage display library contained epitopes reactive to immunoglobulin from unprotected hosts.
- Reduced numbers of PFUs were eluted with each round of selection for non-protective immunoglobulin-M13 complexes.
- Selective preclearing of this library may help in removal of phages reactive with non-protective immunoglobulin, reducing cross-reactivity of unprotective epitopes during positive selection with protective immunoglobulin.

Future Directions

- Selection of M13 reactive to IgG from protected hosts by positive selection of precleared library
- Identify common peptide motifs in reactive M13
- Computational analysis
- Laboratory validation



References

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- Minjauw, B., and A. McLeod. 2003. Tick-borne diseases and poverty. The impact of ticks and tick-borne diseases on the livelihood of small scale and marginal livestock owners in India and eastern and southern Africa.

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