



Stability of nanolipoprotein particles (NLPs) at different temperatures and complex media

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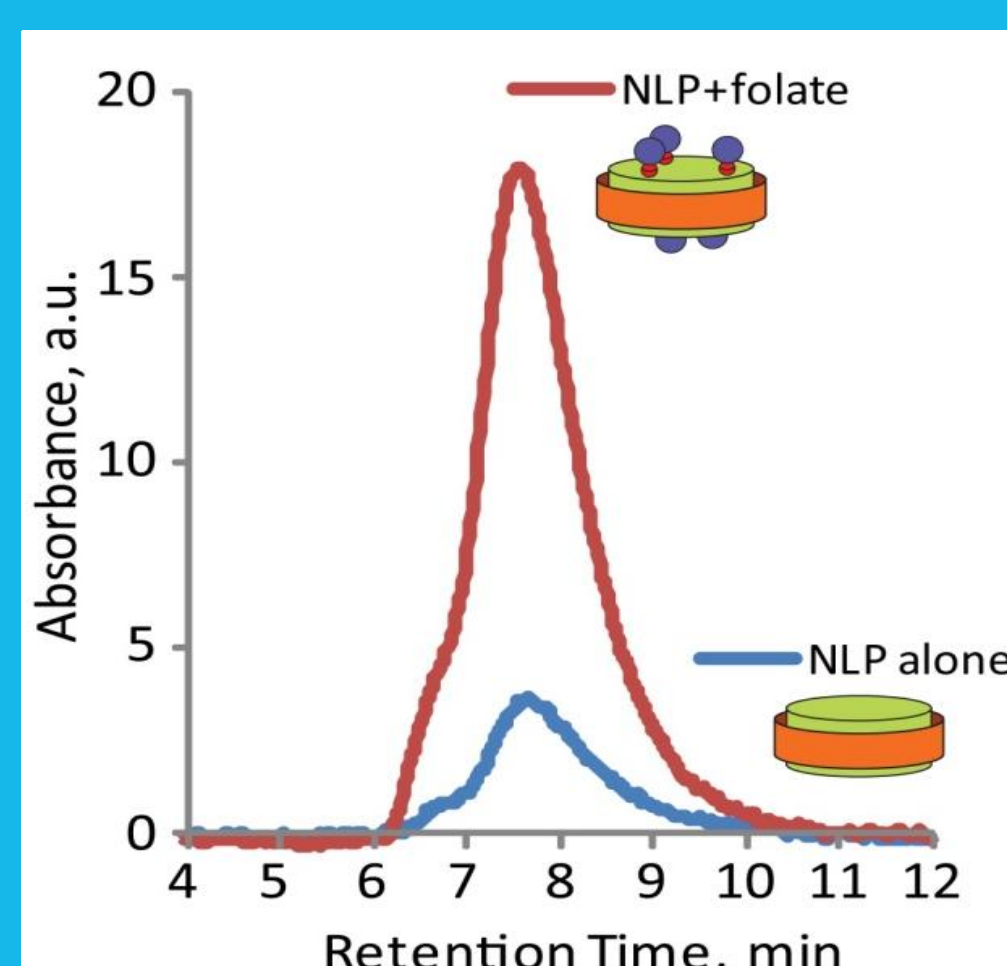
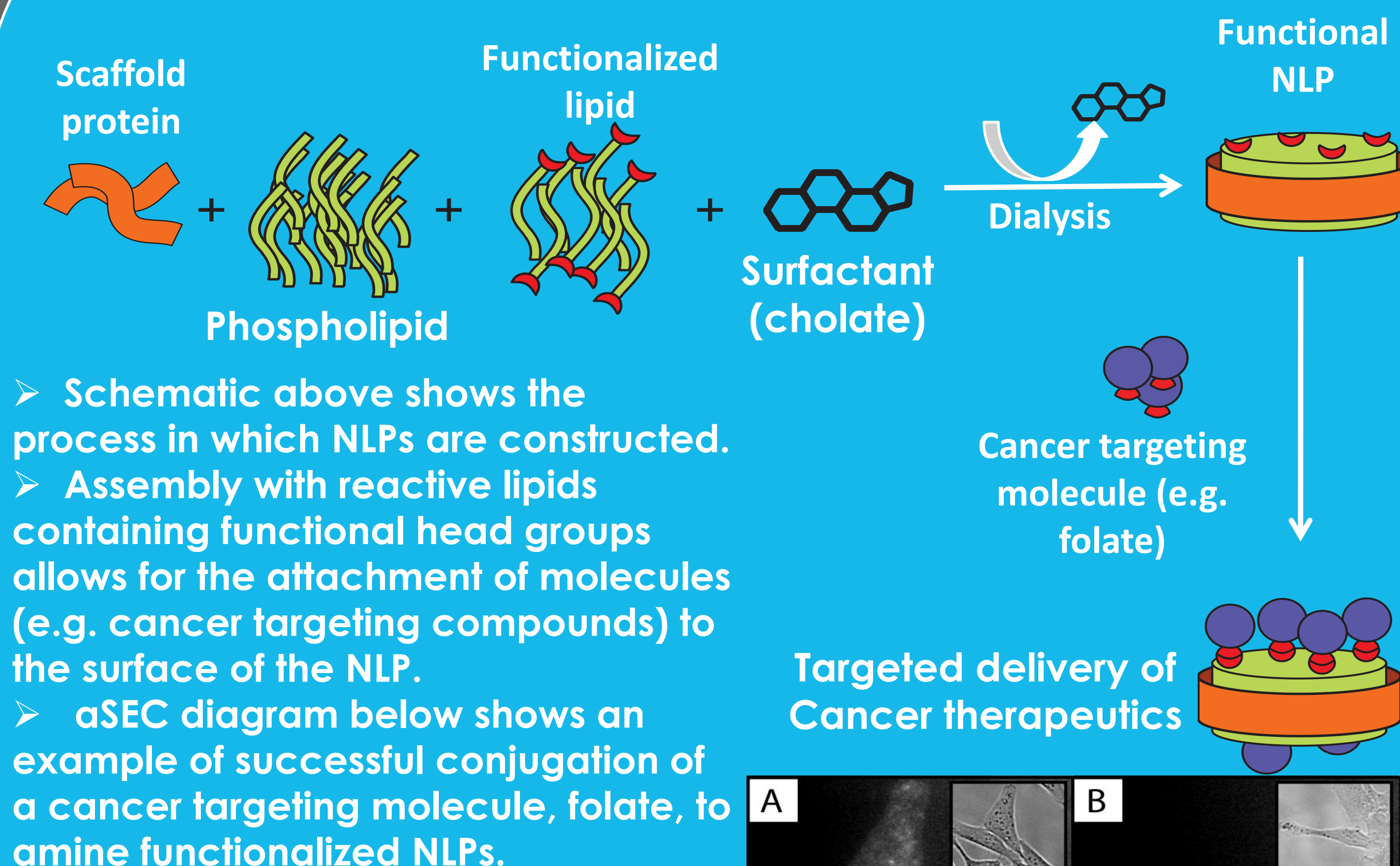


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Introduction:

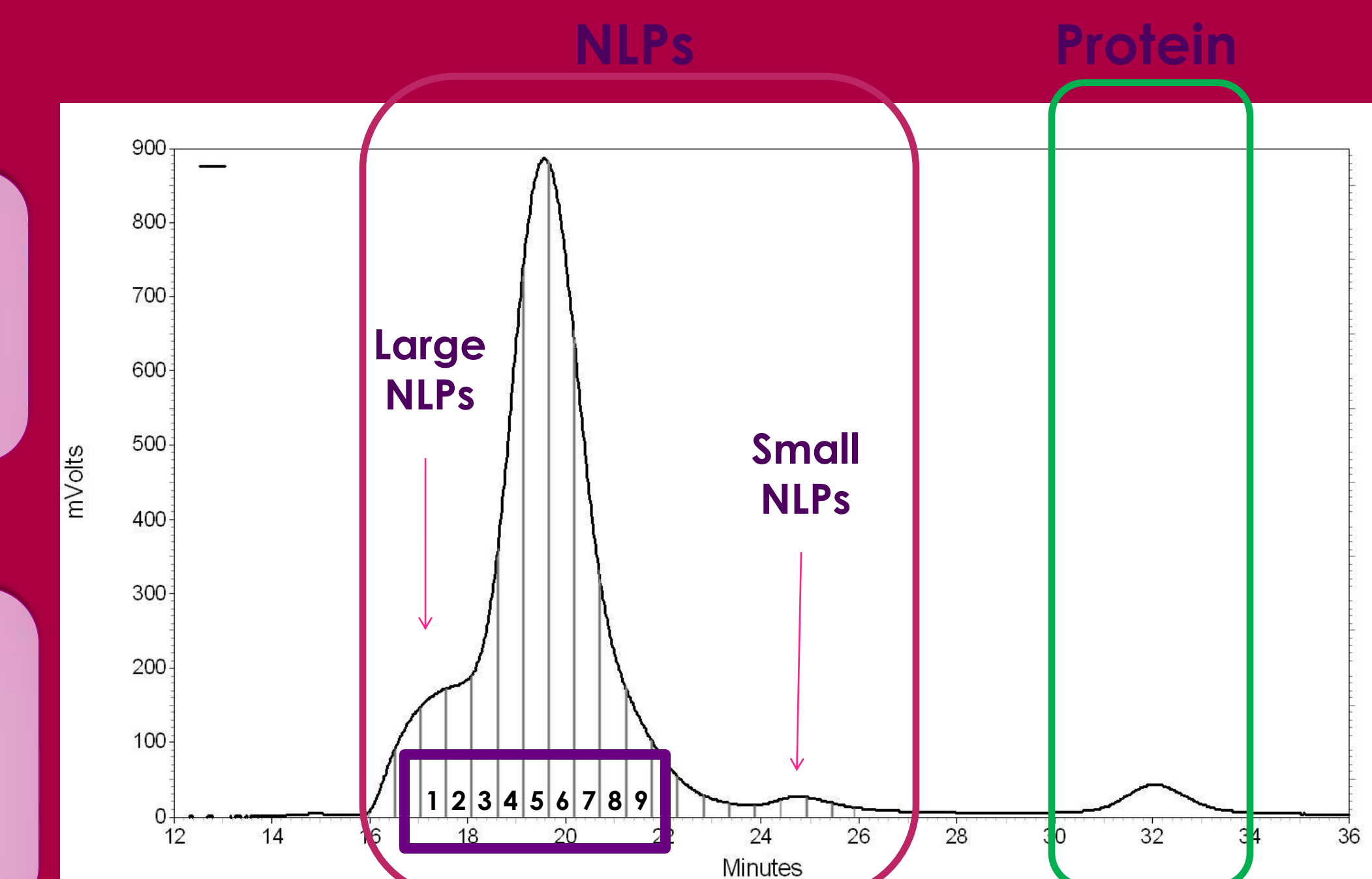
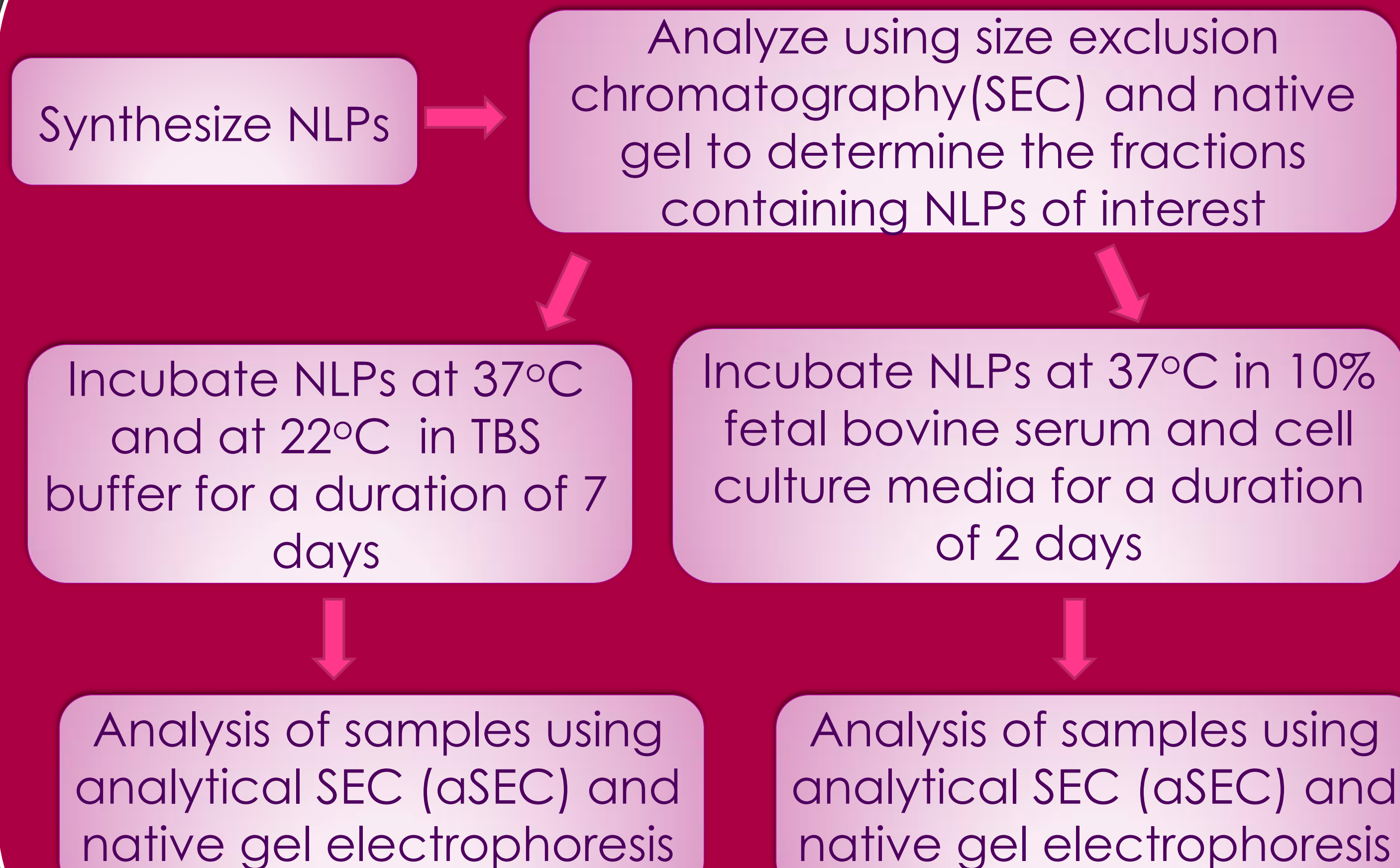
Nanolipoprotein particles (NLPs) have the potential to be versatile platforms for many different kinds of medical applications, from cancer therapeutics to vaccine delivery. These particles can be very useful in medicine because they are composed of molecules that are naturally made by the body and therefore have a lower potential of having harmful side effects. However, there are many questions that are unknown about the function of NLPs within an organism. How long can NLPs circulate within the blood? How stable are NLPs within the blood? At what point do NLPs degrade and is this enough time for them to reach its destination in the body? This particular project tests the stability of NLPs in biological media to understand how NLPs may behave within the blood. Understanding its stability in blood can be useful in cancer therapeutic applications because NLPs can be targeted specifically to cancer cells and deliver drugs directly to the tumor if they are able to degrade only after reaching the target tissue.

Previous Research:



- Panel A shows HeLa cells incubated with fluorescent NLPs tagged with the molecule folate
- Panel B shows HeLa cells incubated with fluorescent NLPs that were not tagged with folate
- Only the folate tagged NLPs were able to enter the cells.

Methods:



Graph above shows a typical SEC graph used to analyze NLPs after synthesis. The peaks within the NLP box correspond to the times in which NLPs are eluted out of the column. The small peak labeled protein shows where excess protein was separated out of the sample.

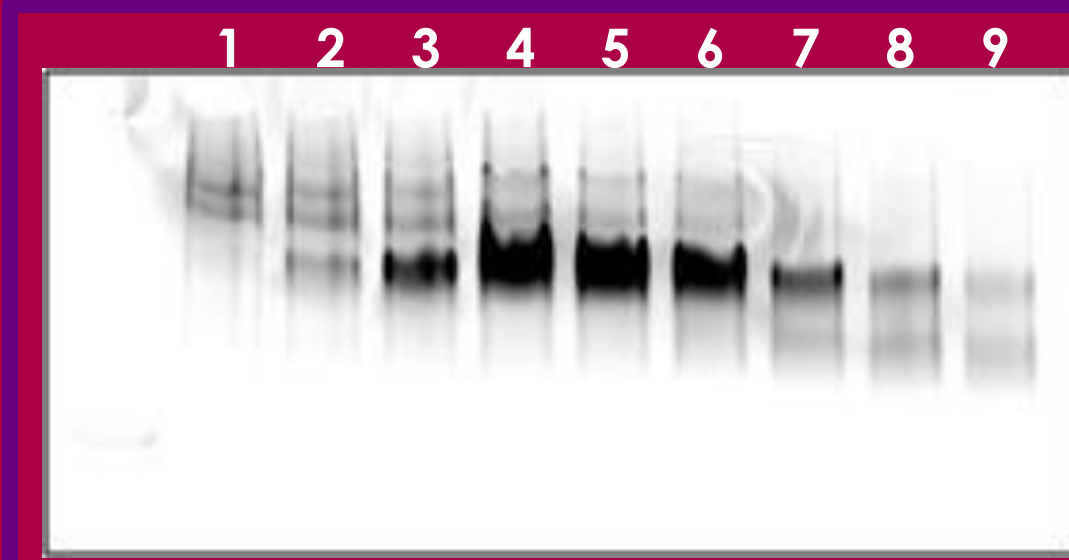
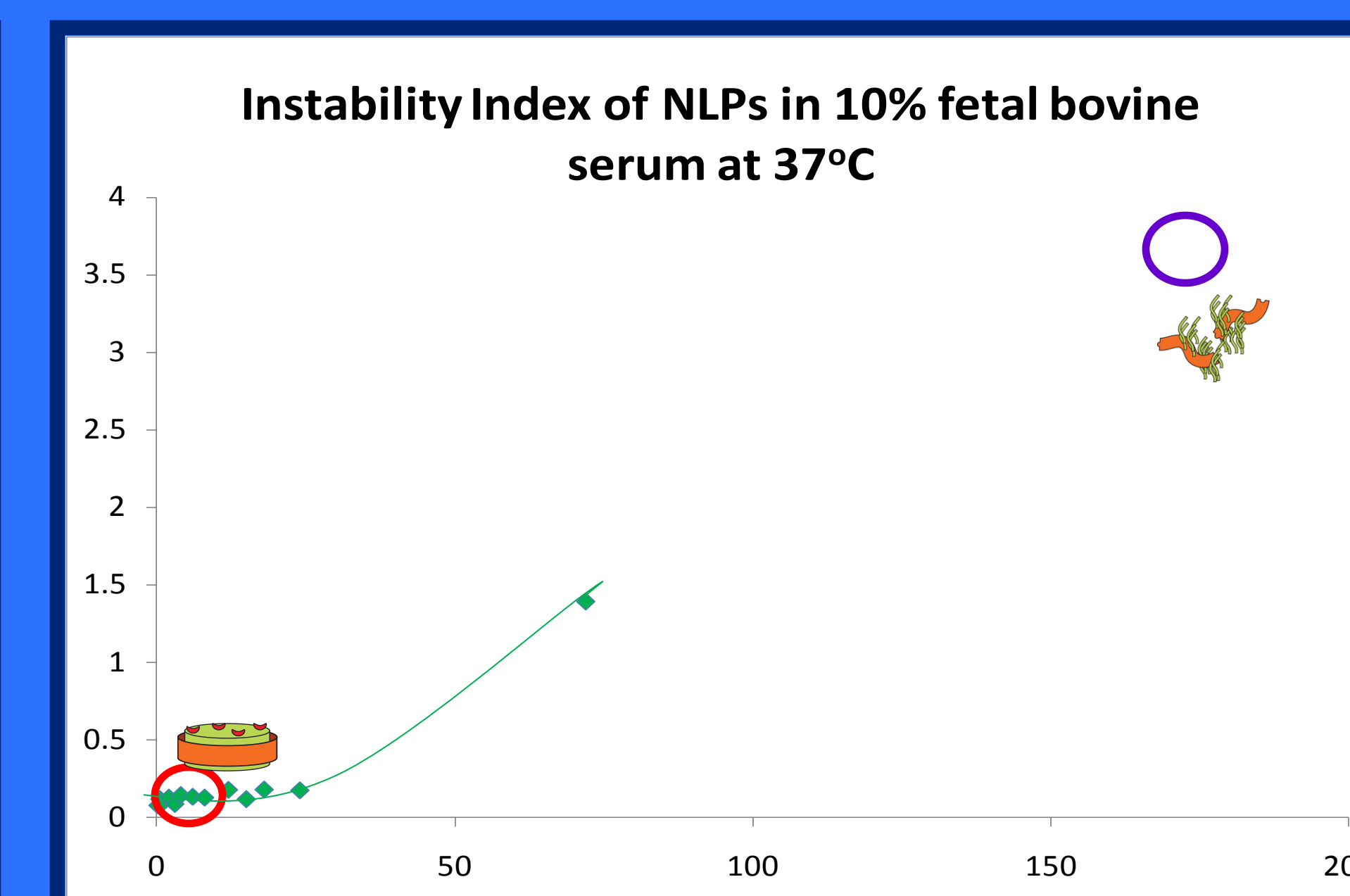
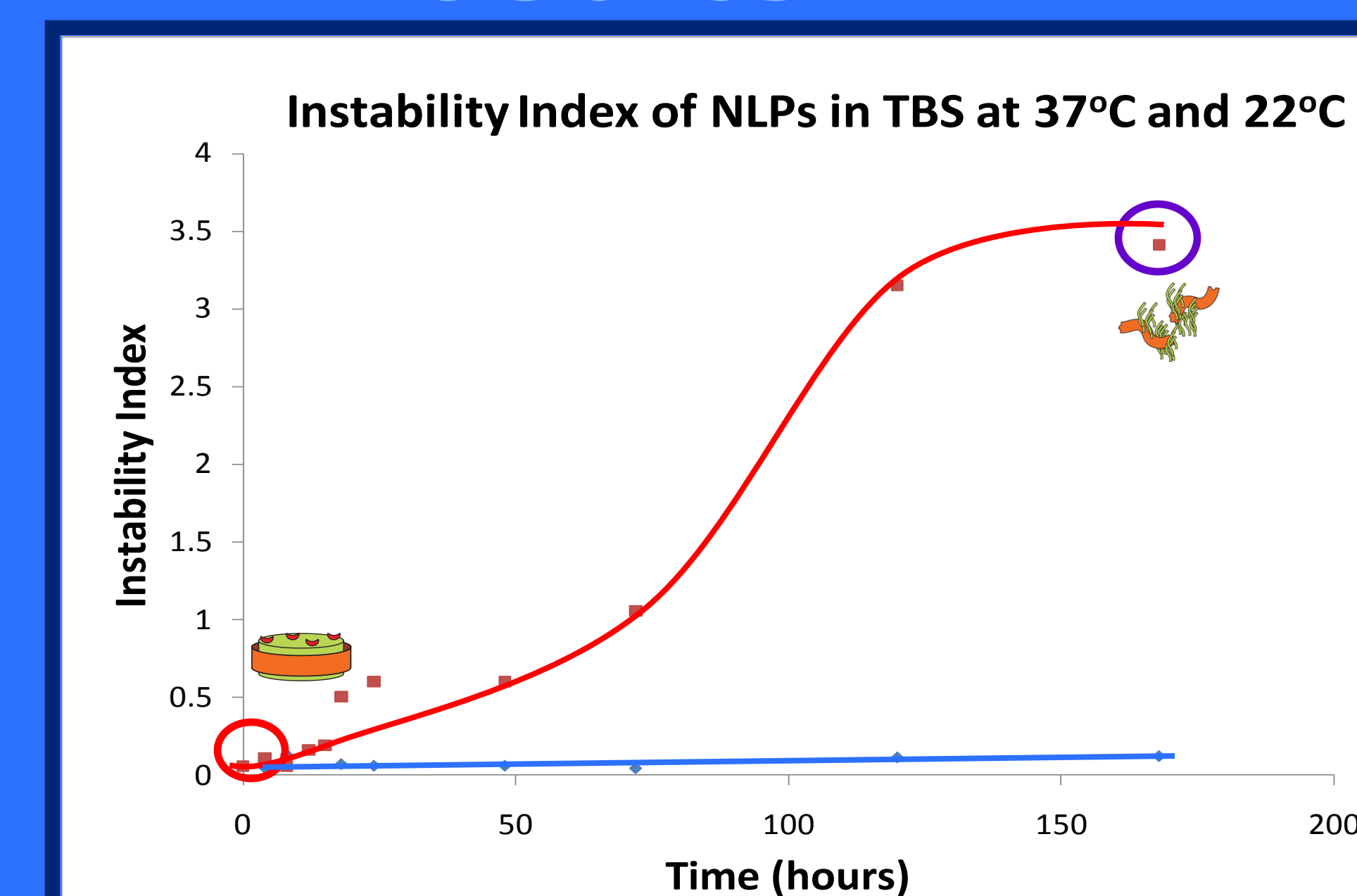


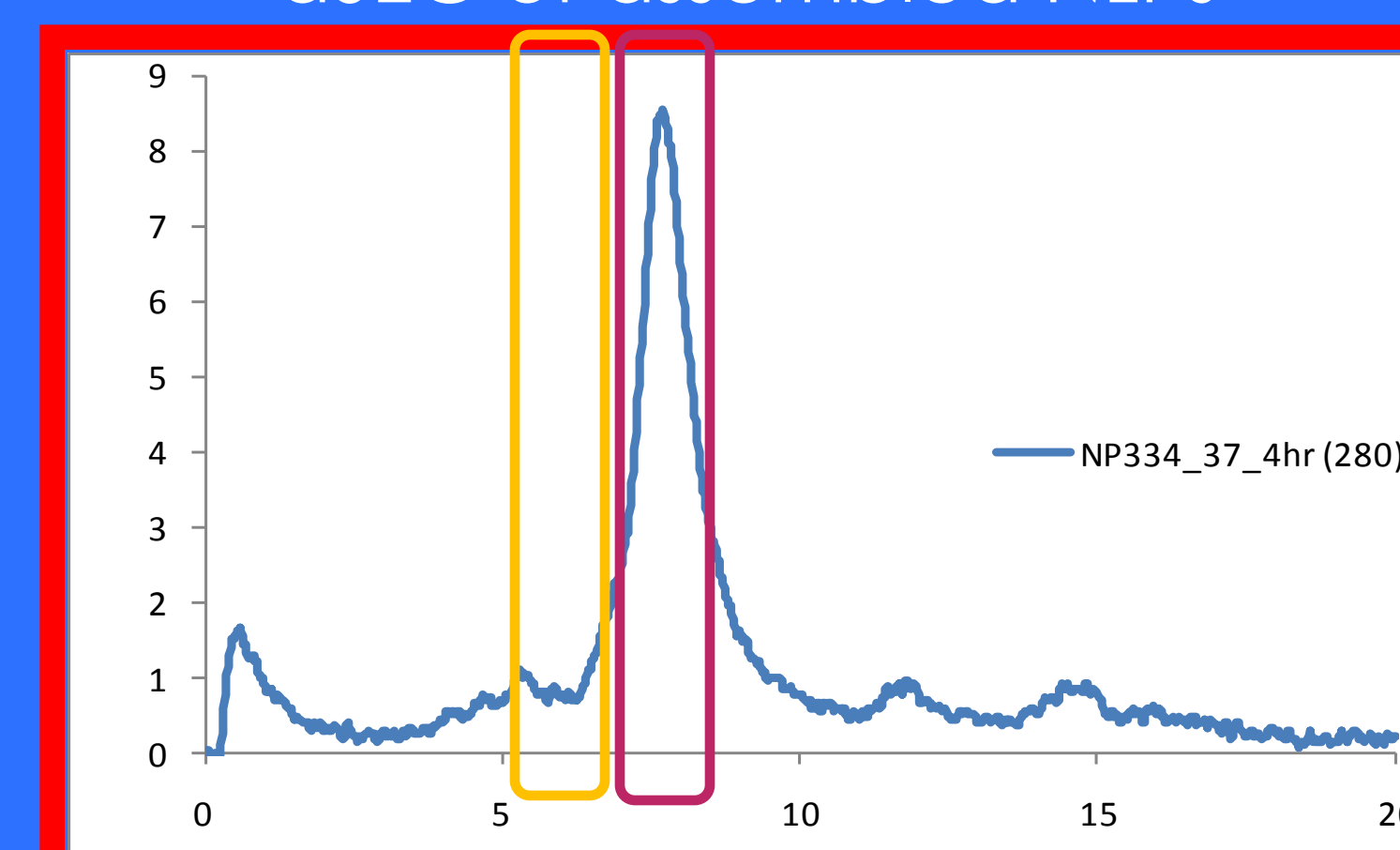
Image above shows a native gel of specific fractions of interest collected from SEC procedure. On the gel, fraction numbers 3 through 11 were run in order to determine the purity of each sample and the relative size of the NLPs in each fraction. A single band on the gel indicates that the fraction is a pure sample of NLPs that are all the same size.

Results:

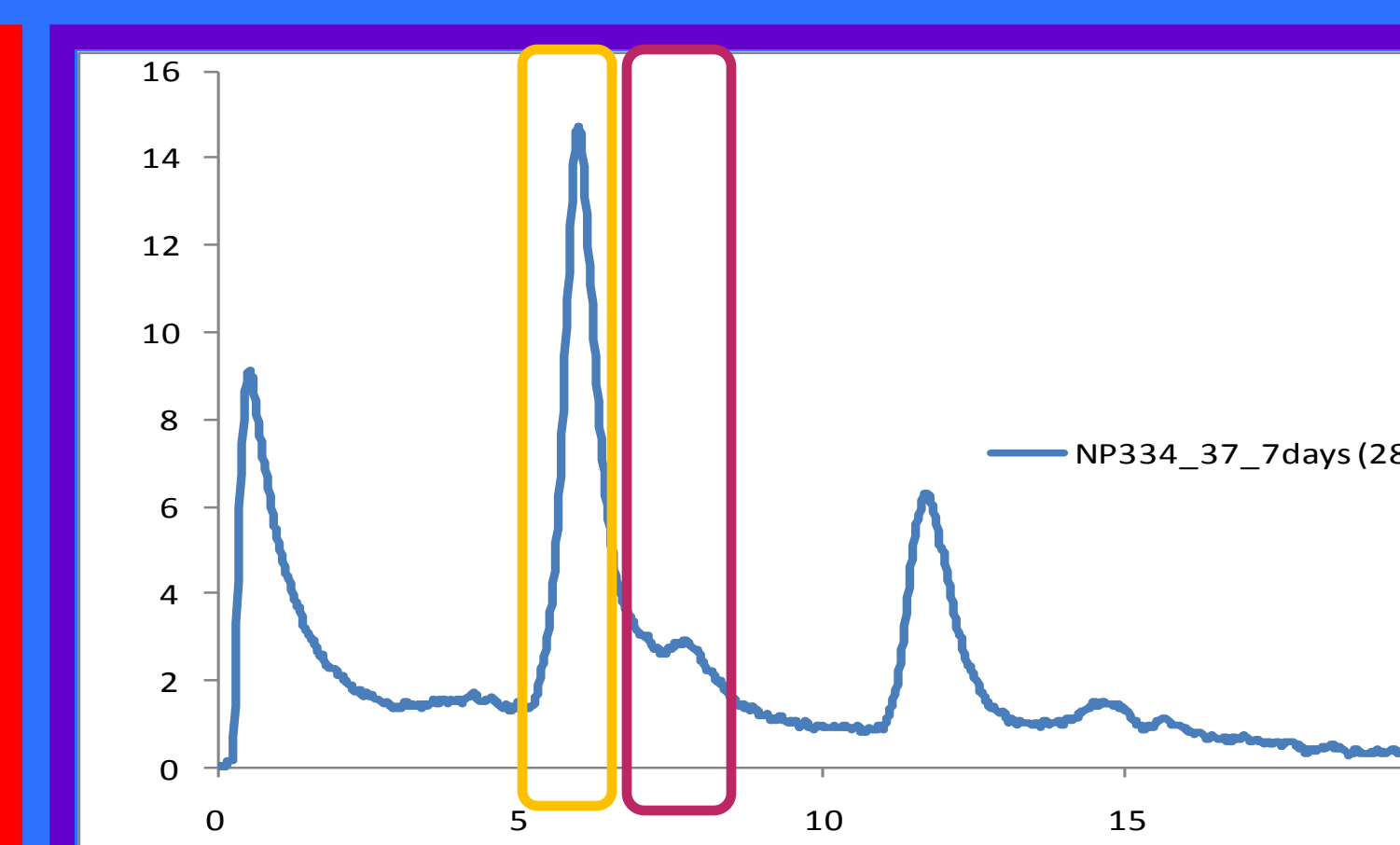


- Instability index: the ratio of average lipid absorbance to average NLP absorbance from the aSEC trace.
- A high instability index value indicates that a sample has degraded into its respective components, lipid and protein. A low instability index value indicates that the NLPs did not degrade.
- The instability index of NLPs was plotted as a function of time when stored at 37°C and 22°C in buffer.
- The instability index of NLPs in fetal bovine serum was plotted as a function of time.

aSEC of assembled NLPs



aSEC of disassembled NLPs



NLPs

Free Lipid

Discussion:

- NLPs in TBS at room temperature were stable over long term storage.
- NLPs in TBS at 37°C had a half life of approximately 100 hours.
- NLPs in 10% cell culture media had half life of greater than 75 hours.
- These data represent a foundation for future *in vivo* and *in vitro* applications

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