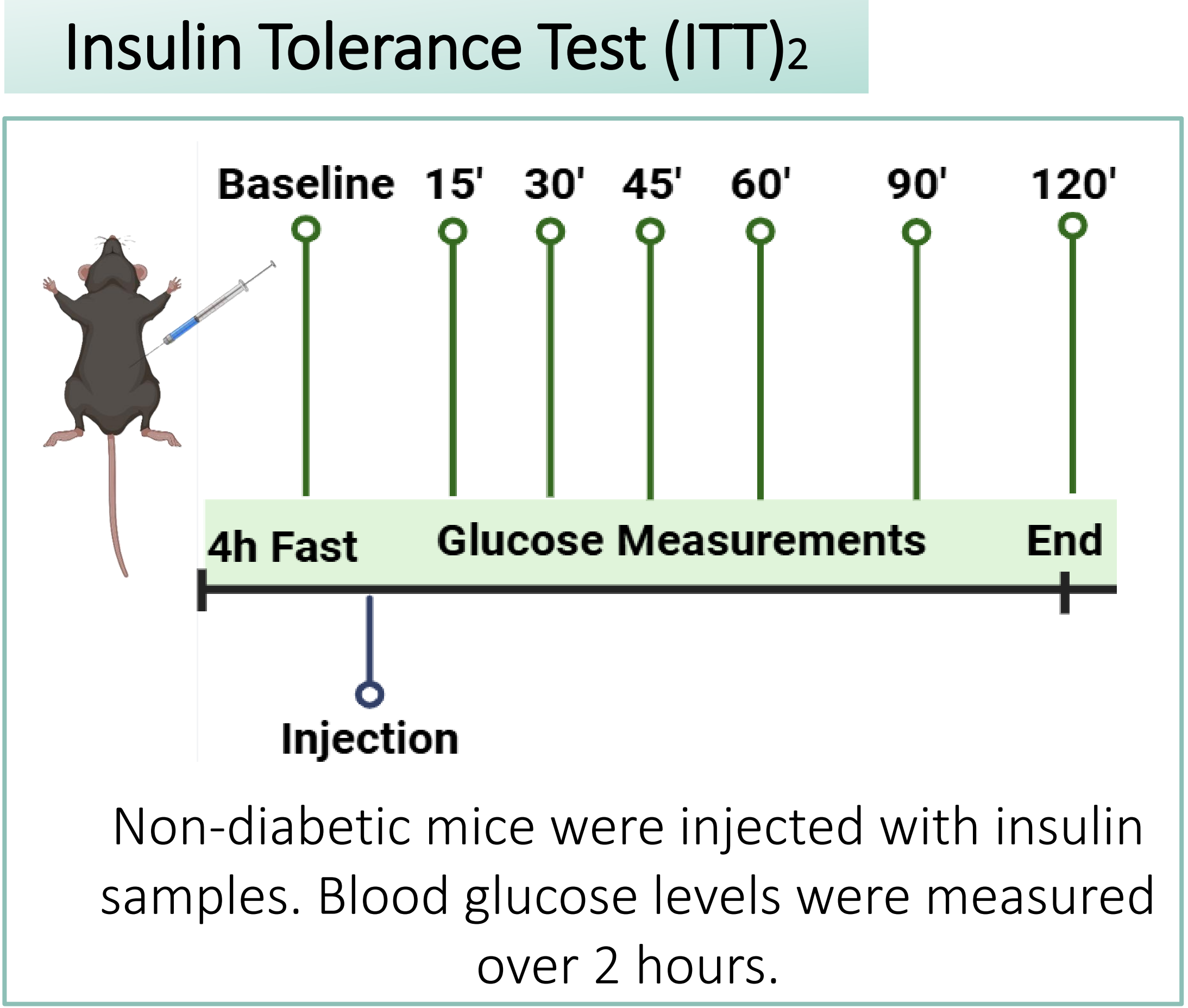
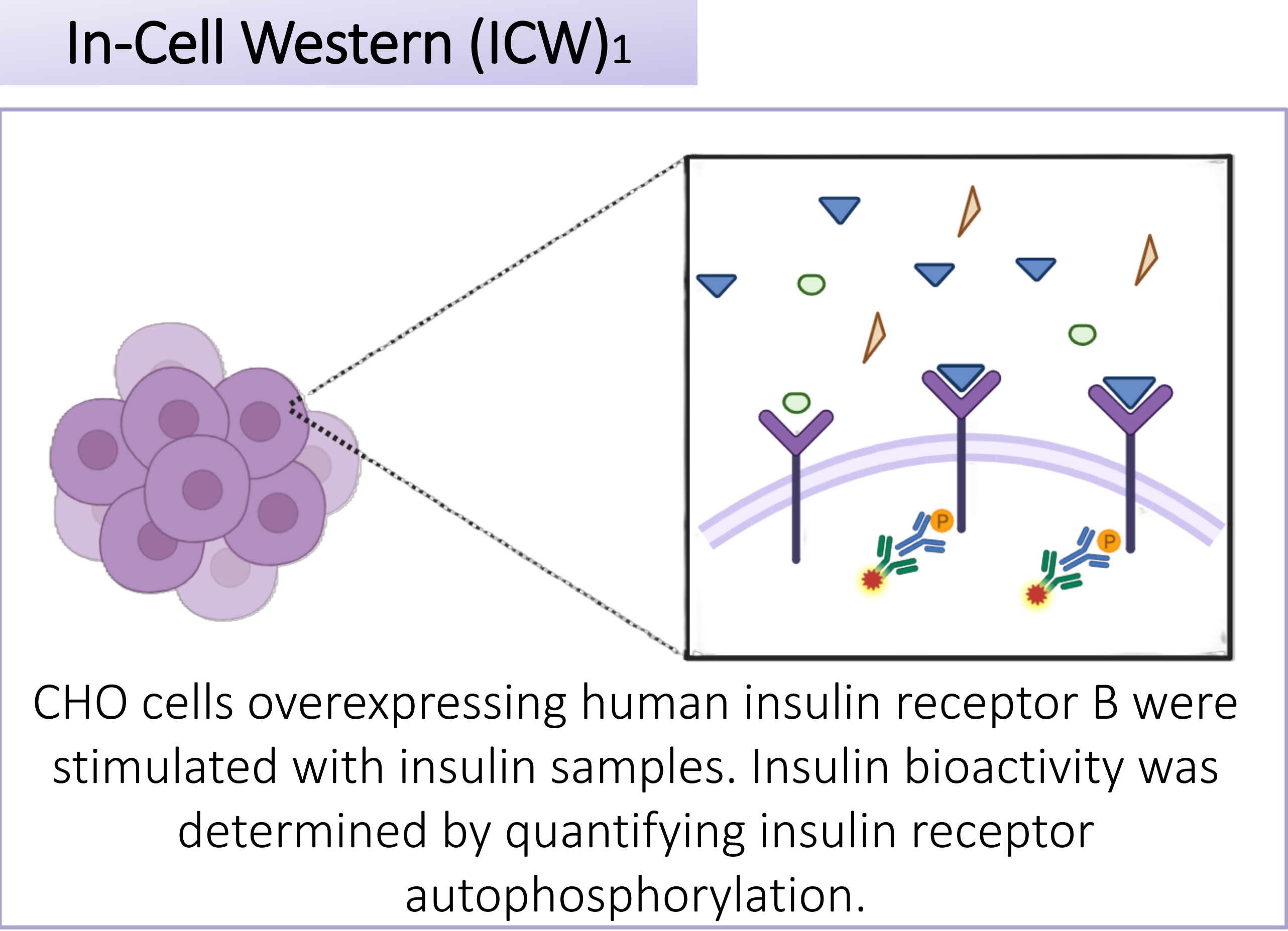
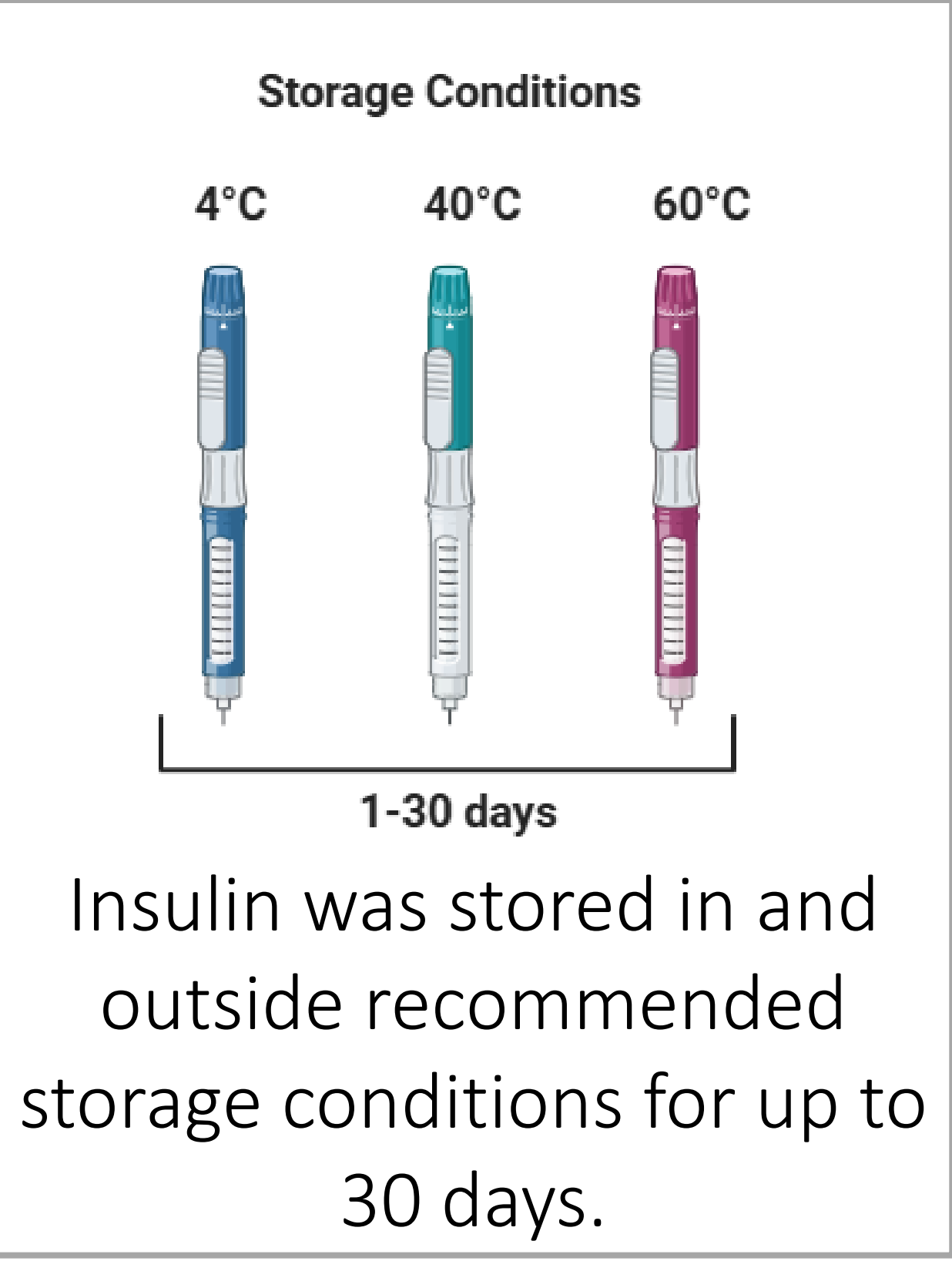


Investigating Insulin Stability: Molecular Insights into Degradation Mechanisms and Structural Alterations for Predictive Stability Modelling and Therapeutic Optimization

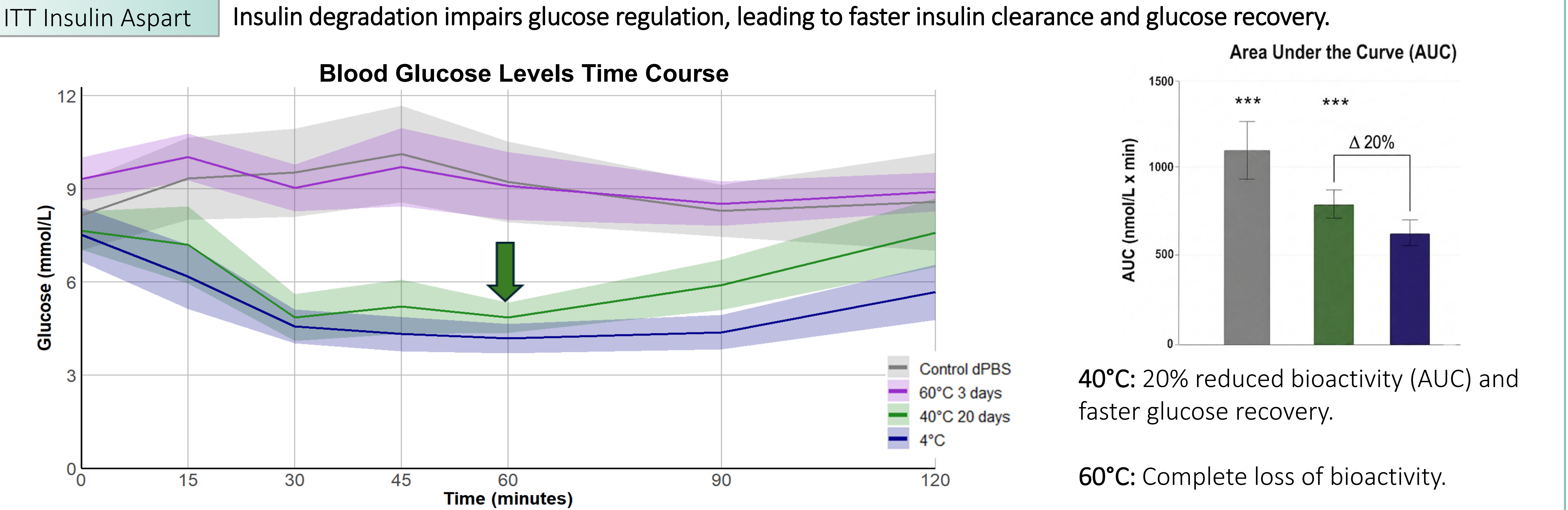
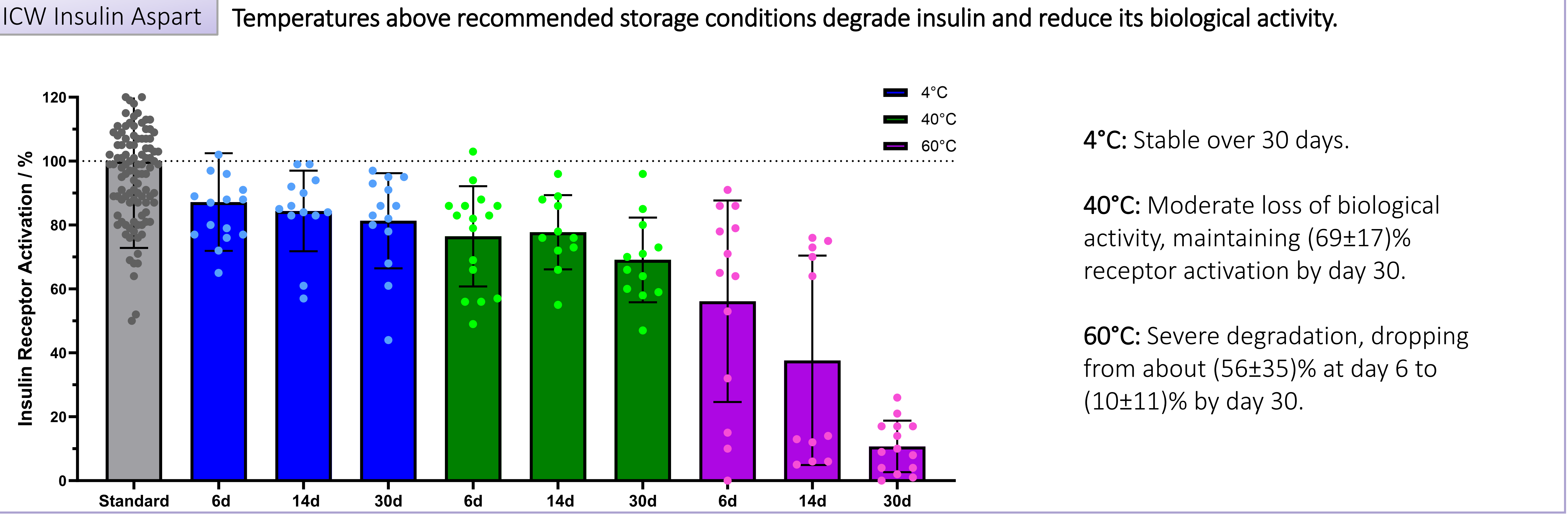
BACKGROUND

Insulin is the essential therapy for people living with diabetes (PwD). During storage and use, insulin can be exposed to temperature fluctuations, reducing its efficacy. Standard analytical methods such as HPLC detect structural changes, but do not determine efficacy, i.e., biological activity. The impact of real-life conditions on insulin's efficacy is currently unclear. We assess how temperature stress affects biological activity using functional in vitro and in vivo assays.

METHODOLOGY



RESULTS



CONCLUSION

Exposure to temperatures above recommended conditions reduced insulin bioactivity and impaired its glucose-lowering effects in vitro and in vivo. Functional assays such as ICW are a preclinically useful evaluation method.

OUTLOOK

- Incorporate shear forces to mimic real-world conditions
- Glucose uptake assays as second functional readout
- Development of a predictive model