

Abstract

Introduction and objectives: G_{M1} localization patterns indicate capacitation status at the single cell level. The Cap-Score™ reports the proportion of sperm displaying G_{M1} localization patterns consistent with capacitation. Two separate studies confirmed that Cap-Score prospectively predicts a man's fertility and his probability of generating a pregnancy. TEST (TES and Tris) yolk buffer (TYB) prolongs the fertilization capacity of sperm. Here, we document that TYB enables home collection for Cap-Score.

Methods: *Validation study:* Following liquefaction, semen samples were split. Half was processed normally for Cap-Score (Control). The other half was diluted with TYB, cooled overnight and then processed the following day (Test). Paired t-tests compared the Control and Test samples. *Real-world observational study:* Cap-Score and concentration were obtained from men seeking fertility assistance at reproductive endocrinology offices. Samples were either collected and processed at Clinics using the same process as the control above (Clinic) or with Home Collection kits (HC) like the Test group. Mann-Whitney tests compared the Clinic and HC samples.

Results: Cap-Score and concentration were the same for the Control and Test (33.6 ± 1.2 vs 34.0 ± 1.2 ; $p=0.601$; $n=40$; 76.9 ± 5.2 vs 79.0 ± 8.8 ; $p=0.767$; $n=35$ respectively). Cap-Score was the same (29.2 ± 0.2 vs 29.3 ± 0.3 ; $p=0.484$) for Clinic ($n=1,889$) and HC ($n=763$). Concentration (68.0 ± 1.3 vs 61.9 ± 1.9 ; $p=0.001$) was reduced with HC.

Conclusions: The validation study and real-world data demonstrated Cap-Score was consistent with HC versus immediate processing at the clinic. Reductions in concentration were anticipated with HC, as a minimum of 10×10^6 cells was originally required with processing at clinics, whereas no minimum was set for HC. Home collection would allow clinics with limited andrology staff to focus on other responsibilities. It may help to encourage men who are concerned with producing at an office or delivering samples to a clinic, to pursue fertility workups. It may also increase the availability of fertility evaluations to individuals that live far from clinics and decrease costs related to travel and time off work.

Introduction

Non-Capacitated

Capacitated

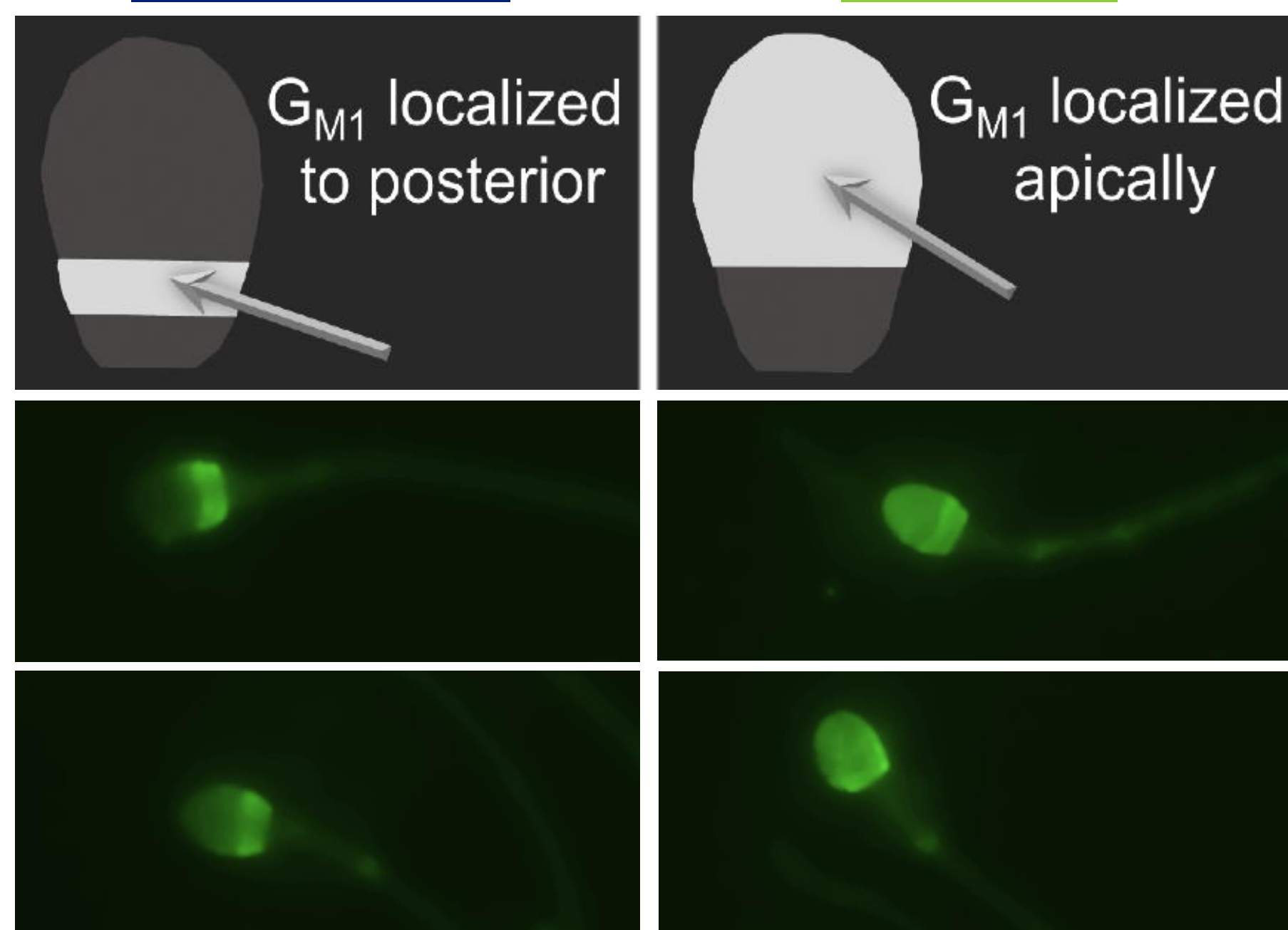


Figure 1. G_{M1} localization patterns indicate capacitation status at the single cell level.

Non-capacitated sperm have less fluid membranes, and predominately show G_{M1} localization in the equatorial region of the sperm head, or posterior aspect of the plasma membrane overlying the acrosome, as shown on the left. In contrast, sperm that were exposed to capacitating conditions, and responded to those conditions, have increased membrane fluidity and predominately show G_{M1} localization throughout the plasma membrane overlying the acrosome.

The Cap-Score™ reports the proportion of sperm displaying G_{M1} localization patterns consistent with capacitation and prospectively predicts a man's probability of generating a pregnancy

Objective

Document how TEST-Yolk Buffer (TYB) enables home collection for Cap-Score™.

Materials and Methods

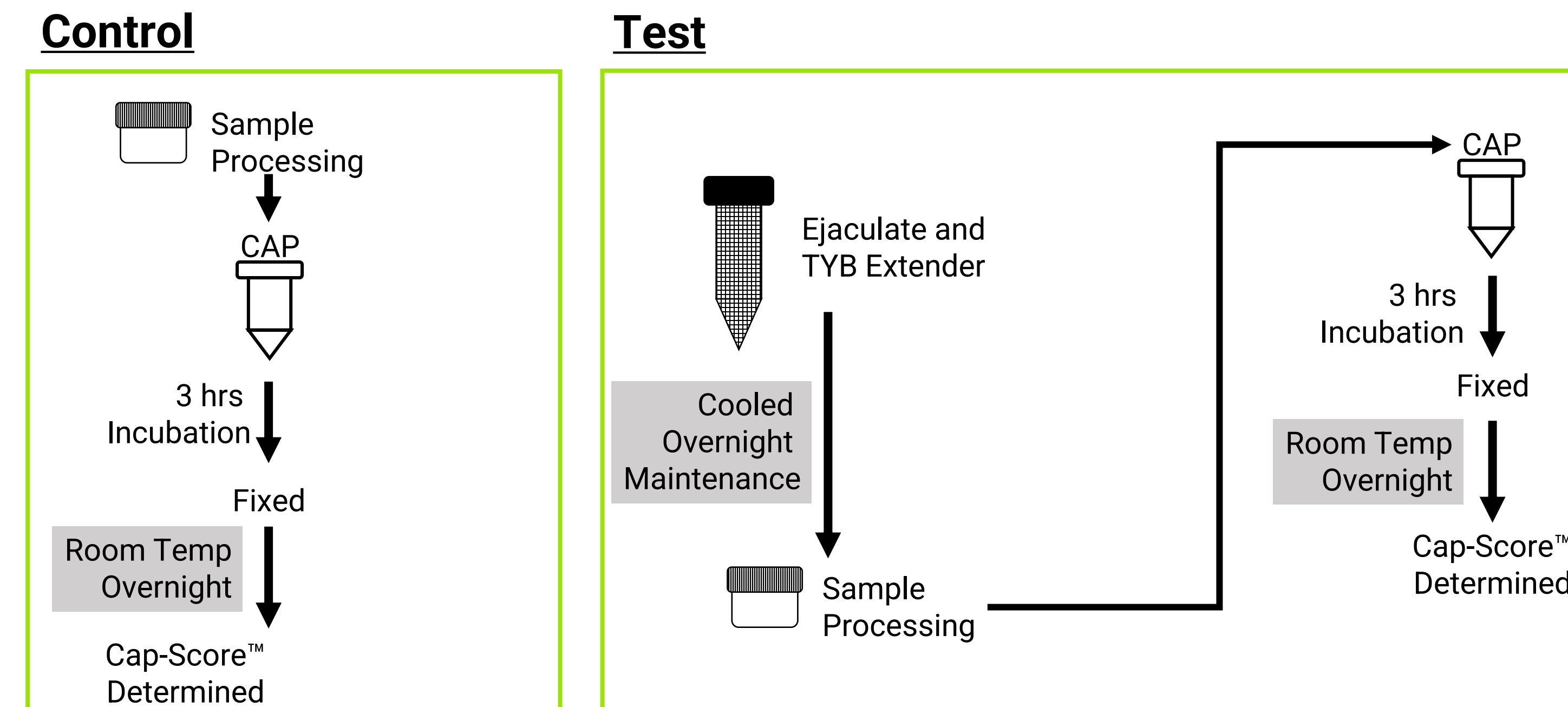


Figure 2. Validation study design. For the initial validation study, samples were liquefied and then split. Half of each sample was processed normally for Cap-Score, as shown for the Control process on the left. The other half served as a test sample, shown on the right, and was diluted with TYB, cooled overnight and then processed the following day. Paired t-tests compared the Control and Test samples.

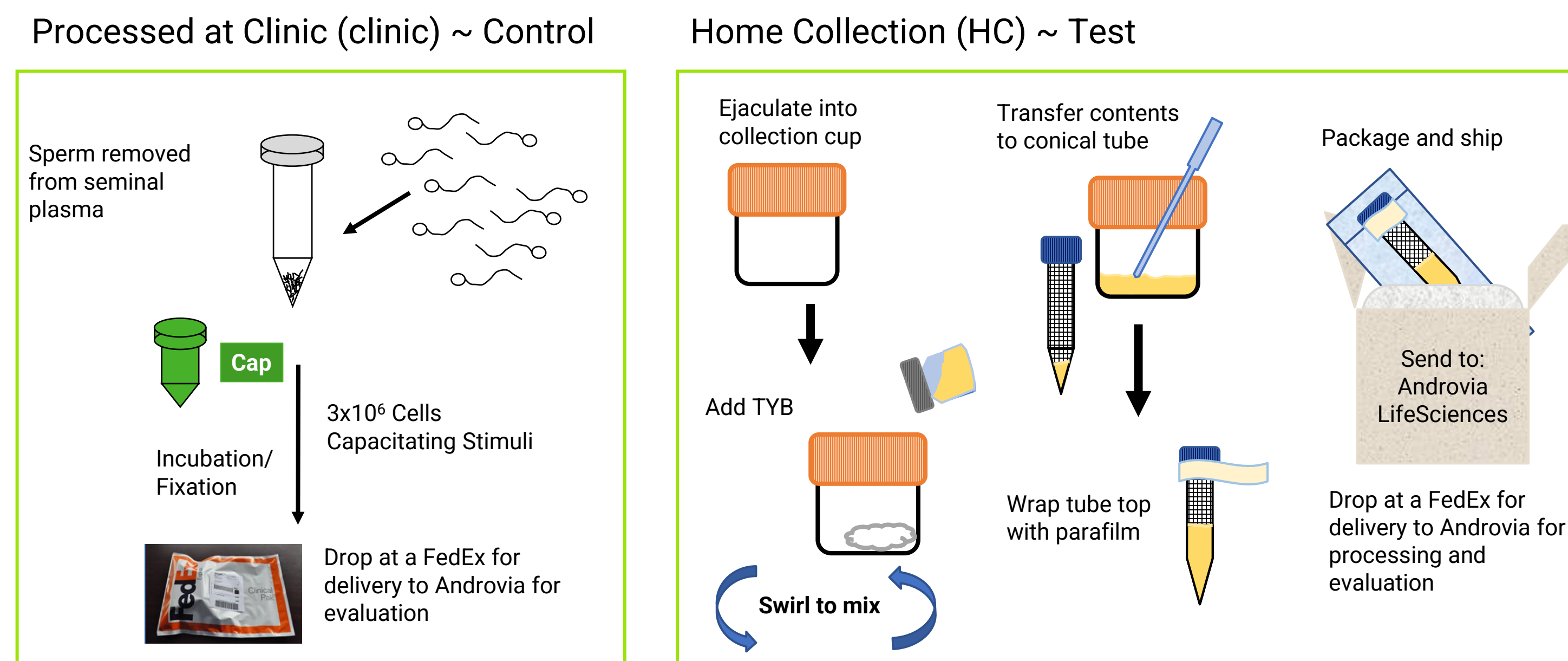


Figure 3. Real world observational study design. In this real-world observational study, Cap-Score and concentration were obtained from men seeking fertility assistance at reproductive endocrinology offices. Samples were either collected and processed at Clinics, using a similar process to the previous control sample or with Home Collection (HC) kits using a comparable process to the previous Test samples. Mann-Whitney tests compared the Clinic and HC samples.

Results

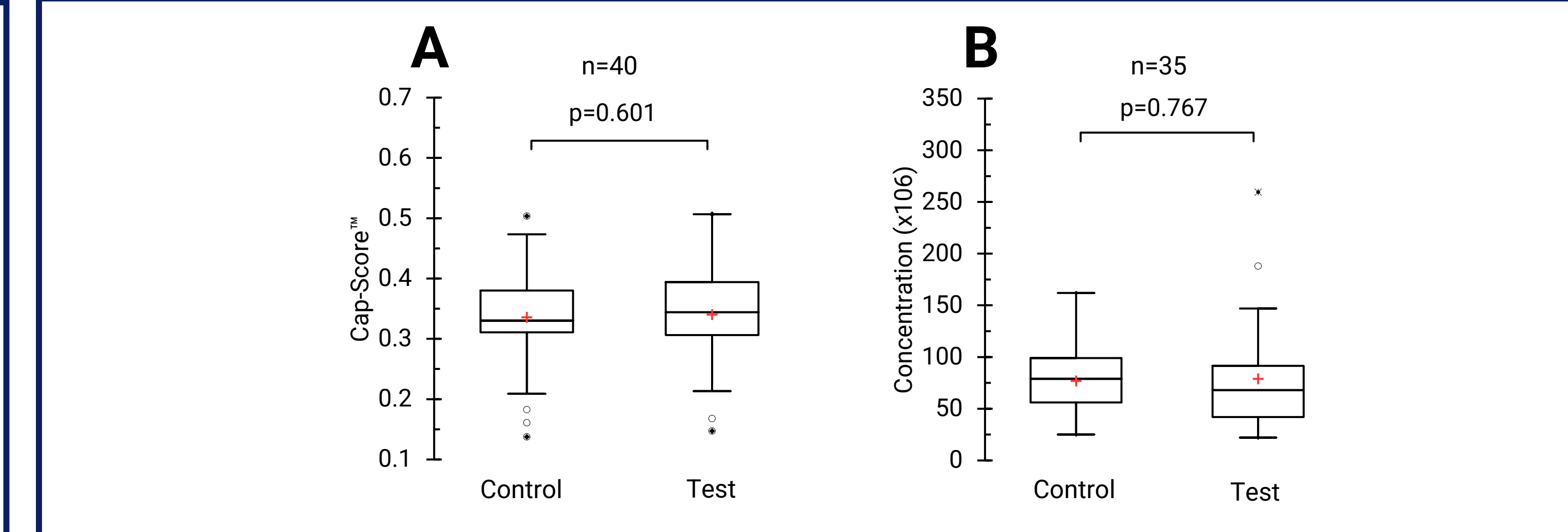


Figure 4. Validation study results. No differences in Cap-Score (Panel A) or Concentration (Panel B) were detected between the control and test samples, suggesting that TYB can preserve samples overnight in such a way that a home collection kit could be utilized. In the "box whisker" plots, the red crosses correspond to the mean. The central horizontal bars are the medians. The lower and upper limits of the boxes are the first and third quartiles, respectively. Points above or below the whiskers' upper and lower bounds may be considered as outliers.

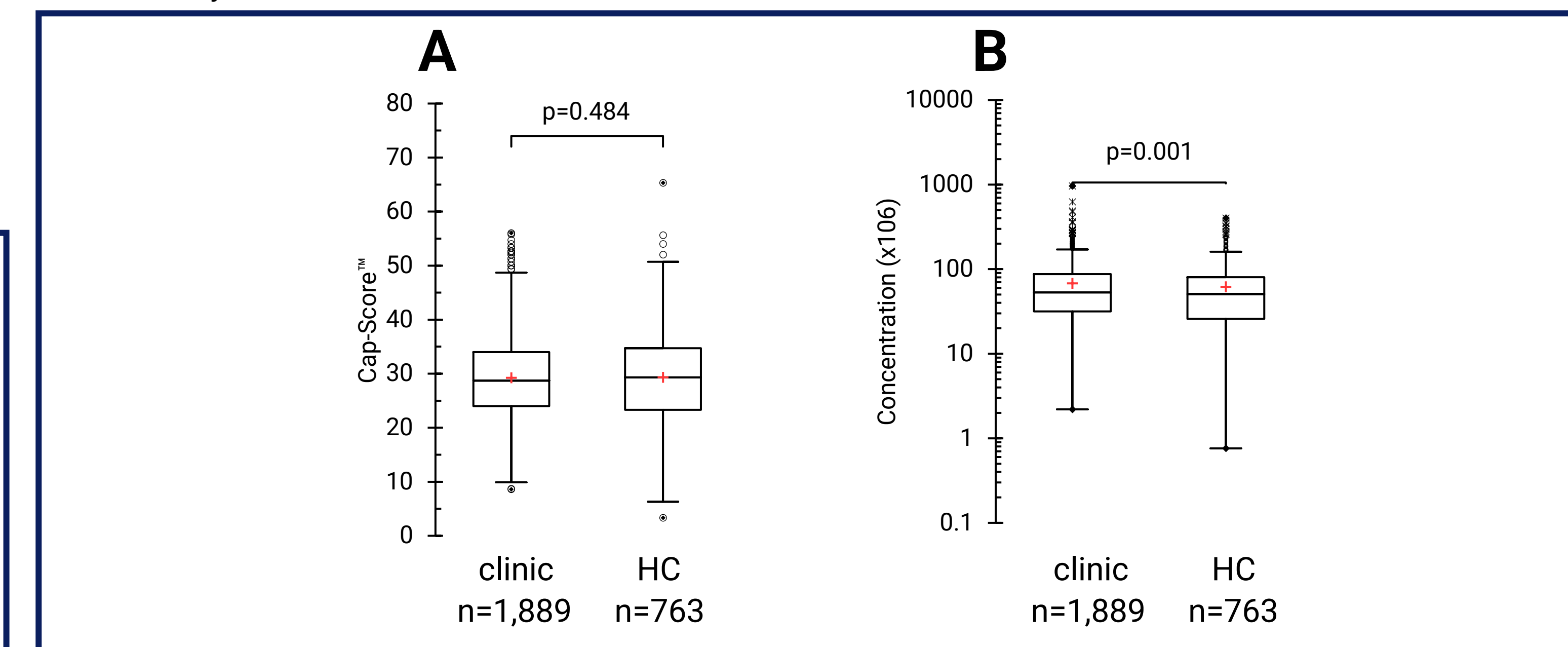


Figure 5. Real world observational study results. Cap-Score was the same for the Clinic and Home Collection samples (Panel A). In contrast, concentration was reduced with home collection (Panel B). This was anticipated, as at least ten million cells, or three million post-wash, were required when processing at clinics, while no minimum was set for home collection (Fig. 3). In the "box whisker" plots, the red crosses correspond to the mean. The central horizontal bars are the medians. The lower and upper limits of the boxes are the first and third quartiles, respectively. Points above or below the whiskers' upper and lower bounds may be considered as outliers.

Conclusions

- Cap-Score was consistent between home collection and processing at clinics.
- With increased ability to sample oligozoospermic men, home collection was associated with an anticipated reduction in concentration.
- In practice, use of the home collection kit:
 - allows clinics to focus on other responsibilities
 - encourages men to pursue fertility workups
 - increases the availability of fertility evaluations