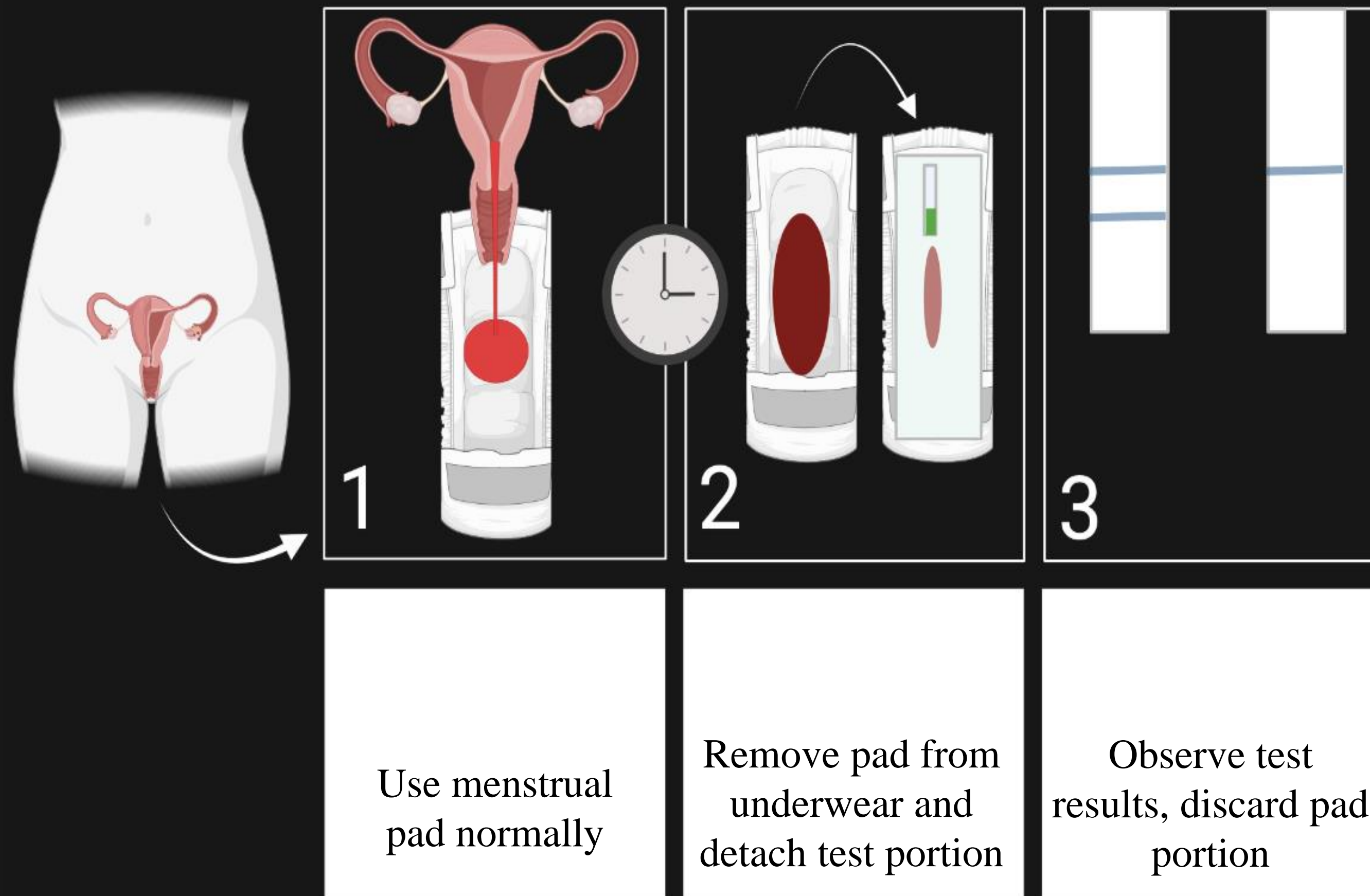


JUPITER

At Home Cervical Cancer Screening

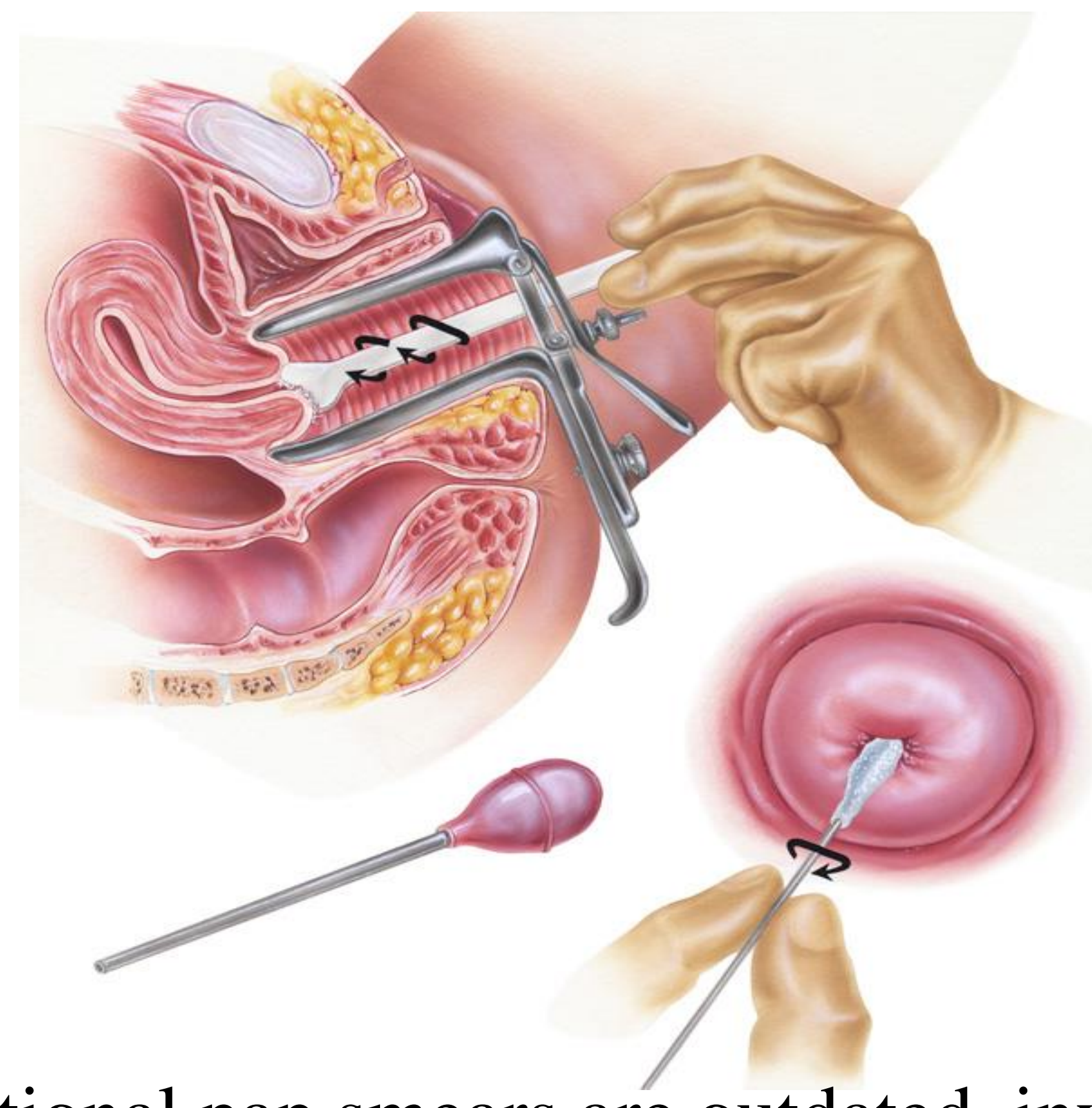
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ABSTRACT



Jupiter is a user-focused, cost-effective, self-administered, and noninvasive test that combines two technologies that many people who menstruate are already familiar with: menstrual pads and pregnancy tests.

INTRODUCTION



Traditional pap smears are outdated, invasive, and uncomfortable

Prototyping

MATERIALS AND METHODS

Fluid Absorption Test

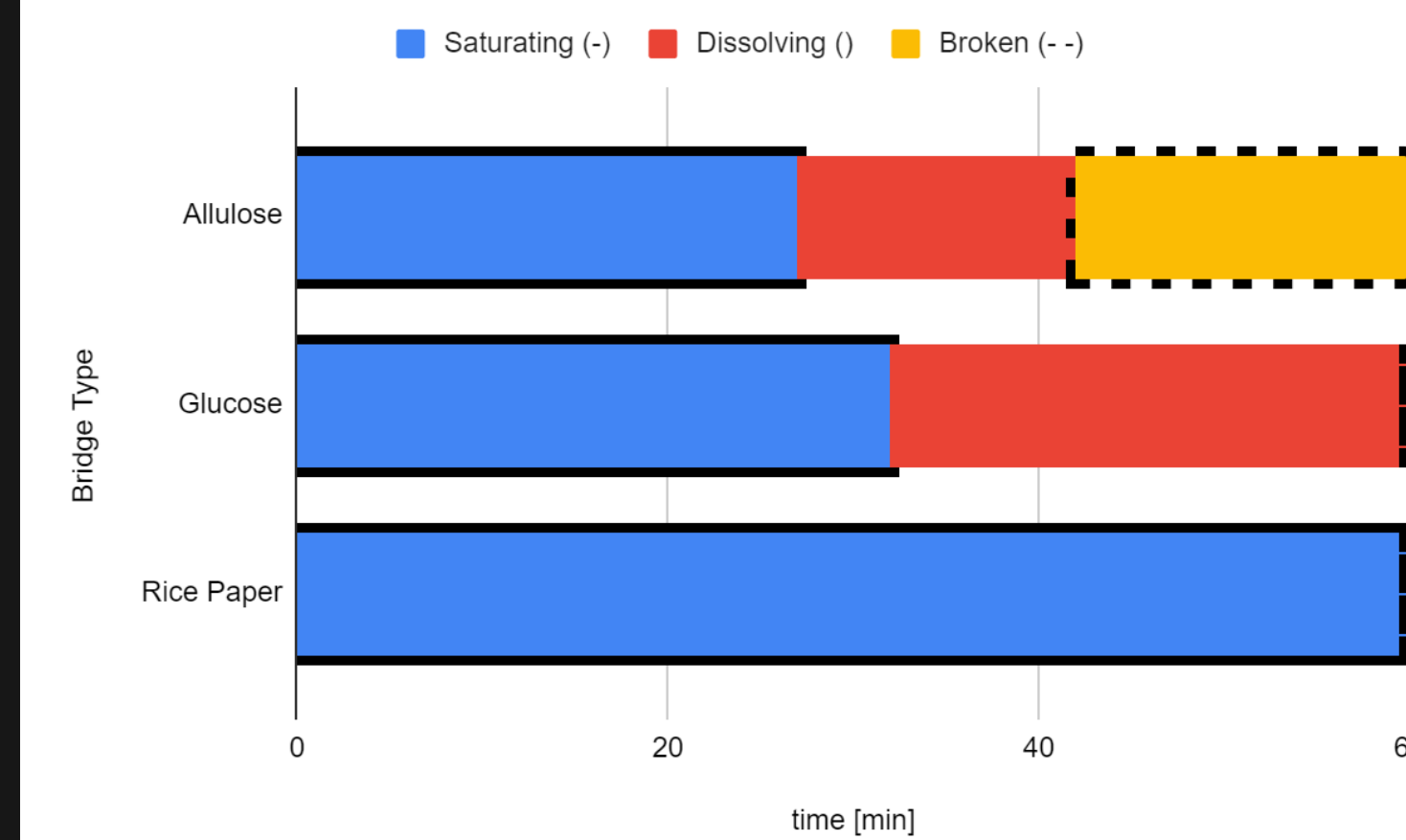
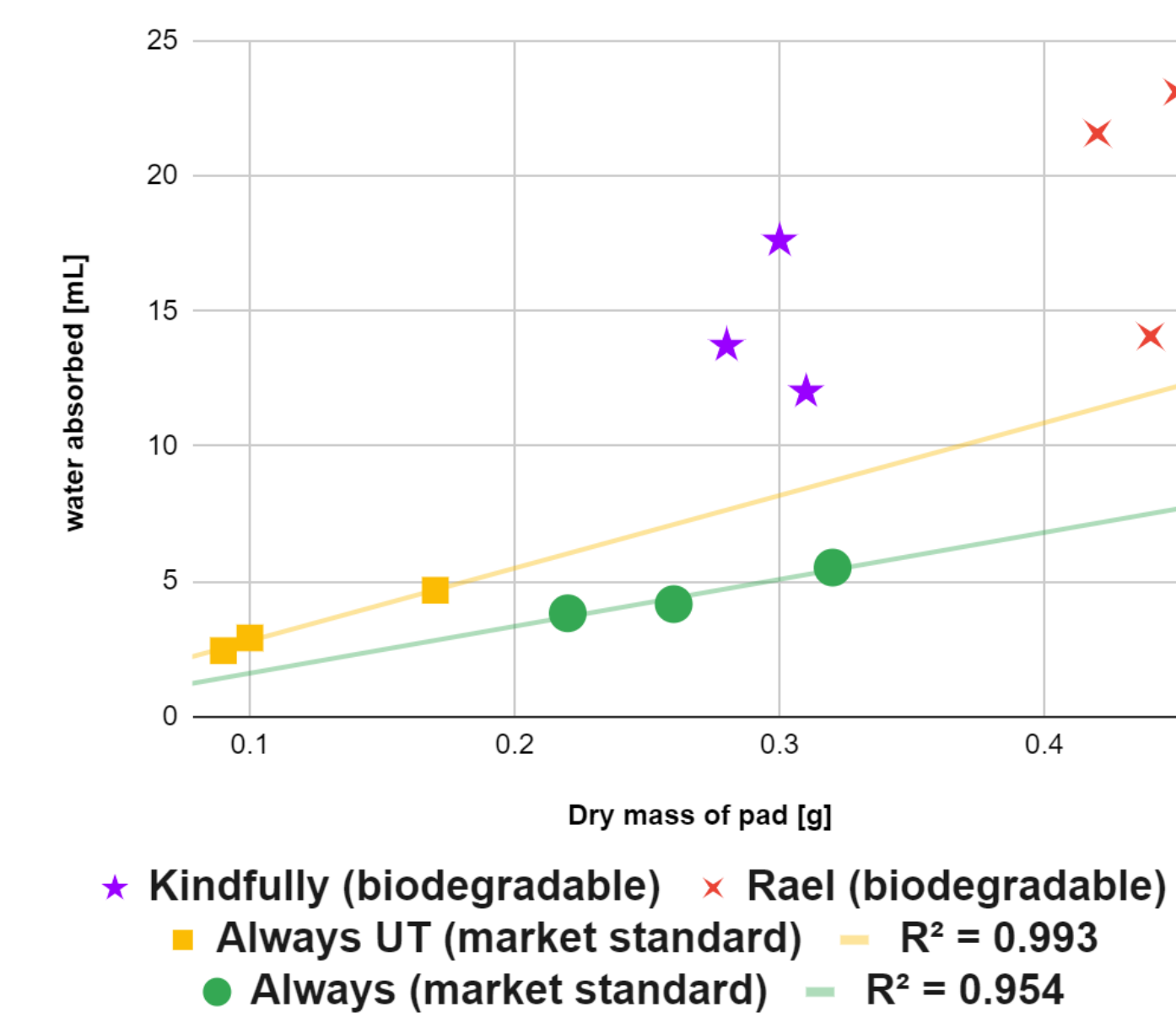
Two biodegradable pads, Rael Organic Cotton Cover Pads (regular absorbency) and Kindfully Sanitary Pads with Wings (regular absorbency, bamboo-based) and two common pads, Always Ultra Thin and Always Maxi pads, were tested for their absorbance of tap water at normal conditions.

Dissolvable Bridge

To ensure that the test strip was delivered blood in an appropriate amount of time and at a standard volume, a dissolvable bridge was investigated for controlling input volumes to the test. Three materials were evaluated for potential use in the system: 1) glucose sugar cubes, 2) allulose pressed sugar, and 3) rice paper.

Color Change Test

Tap water was dosed with HCG at magnitude increments and tested on pregmate brand pregnancy strips until a positive result was observed (top). Blood samples from lamb liver were dosed with super saturated concentration of HCG. Left to Right: pieces of cellulose, nitrocellulose, glass fiber, and a plasma separator were put in line with the strip test. 0.1 mL of the dosed blood was introduced to each material to allow for capillary action.



RESULTS

Fluid Absorption Test

No statistically significant ($p < 0.05$) relationship was observed in the data between area or mass of pad and the volume of water it absorbs. Visual linear correlations were observed, however ($R^2 > 0.95$), in the Always ($R^2 = 0.954$) and Always Ultra Thin pads ($R^2 = 0.993$). This suggests an uneven distribution of SAP within the pads, especially within the biodegradable pads, perhaps because of a lack of a plastic binding agent.

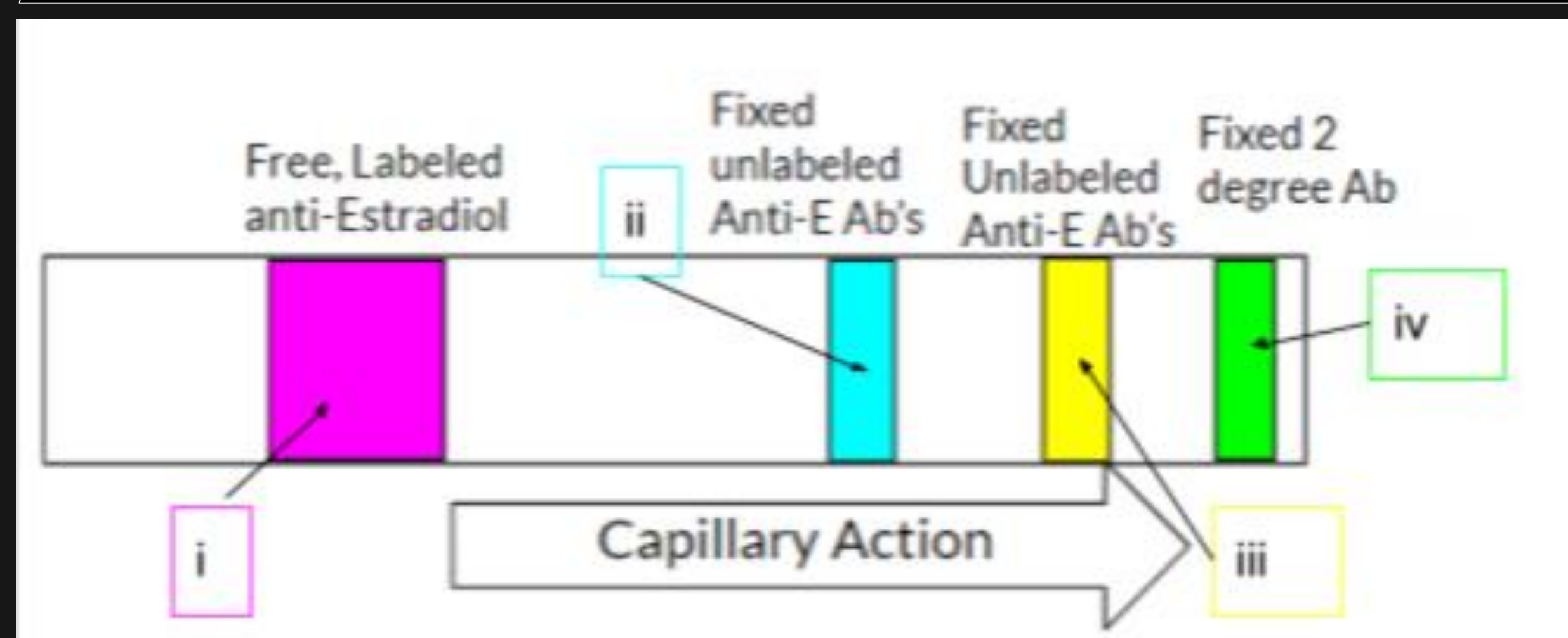
Dissolvable Bridge Test

Each bridge was exposed to blood at an average of 8.5 uL/min in 10 minute increments. The time at which fluid visually reached the opposite side of the bridge via capillary action was recorded along with the time that the bridge broke under its own weight. Allulose exhibited both saturation and breakage within the first hour. The method of production may have contributed to this result. It is likely that if a dissolvable bridge is necessary, allulose or a mixture of sugar compositions would be the most effective due to its rapid saturation and breakage.

Color Change Test

An exploratory experiment suggested that a 30 mU/mL solution of HCG resulted in a positive, observable color change on the Pregmate brand pregnancy tests. At 21 minutes after dosing, noticeable, complete positive test results were observable in the strips with added nitrocellulose and glass fiber in addition to the test with no additional material. At 40 minutes prior to initial dosing, the test completion line was still not visible on the strips with additional cellulose and plasma separator materials. These results suggest that a lateral flow strip comparable to a pregnancy test will be sufficient for Jupiter's application with no additional materials for whole blood separation.

How it Works



Test strip with ELISA components i) free labeled anti-estradiol (pink), ii) fixed unlabeled anti-estradiol antibodies, iii) fixed unlabeled anti-estradiol antibodies, iv) fixed second degree antibody.

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