

**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
DEVICE AND INSTRUMENT TEMPLATE**

A. 510(k) Number:

K041039

B. Analyte:

The Fertell Male Fertility Test measures the concentration of progressively motile sperm.

C. Type of Test:

Qualitative

D. Applicant:

Genesis, Ltd., Kingston Upon Thames, United Kingdom

E. Proprietary and Established Names:

Fertell Male Fertility Test

F. Regulatory Information:

1. Regulation section:
Semen Analysis Devices, although classified are not under a specific regulation.
2. Classification:
Class II
3. Product Code:
MNA (This product code was created by the OB-GYN Branch of ODE.)
4. Panel:
Hematology (81)

G. Intended Use:

1. Indication(s) for use:
The Fertell Male Fertility Test is intended to measure motile sperm in semen as an adjunctive screen of male fertility for over-the-counter (OTC) home use.
2. Special condition for use statement(s):
This device is intended for OTC home use.
3. Special instrument Requirements:
N/A

H. Device Description

The device has two small molded plastic components. The collection container is the bottom component and holds the fresh semen sample. The top component contains the microprocessor which controls the internal fluid temperature at 37° C and provides user prompts by an LED that changes state at the end of each timed activity. A control line is present on the nitrocellulose test strip to confirm to the user that the test has functioned correctly.

I. Substantial Equivalence Information:

1. Predicate device name(s):
 - a. Penetrak Cervical Mucous Penetration Test
 - b. FertilMARQ Test
 - c. Hamilton Thorne IVOS
 - d. Humagen Semen Analysis Kit

2. Predicate K number(s):
 - a. K821186
 - b. K011679
 - c. K920719
 - d. K915229

3. Comparison with predicate:

| Similarities | | |
|---------------------|--|--|
| Item | Device | Predicate |
| Intended Use | OTC home use screening test for male infertility | The FertilMARQ device is the same. |
| Sample | Semen | Same |
| Principle | Sperm migration | Penetrak is the same. |
| Test Medium | Cervical mucous substitute | Penetrak is the same |
| Detection Method | Visual; colored label bound to sperm | FertilMARQ is the same |
| Reporting | Single result. Qualitative | FertilMARQ and Penetrak are the same. |
| Test Temperature | 37° C | Hamilton Thorne and Penetrak are the same. |

| Differences | | |
|--------------------|--|--|
| Item | Device | Predicate |
| Intended Use | OTC home use screening test for male infertility | Hamilton Thorne, Humagen, and Penetrak are for laboratory professional use. |
| Principle | Sperm migration | Hamilton Thorne and Humagen use cell counting. FertilMARQ uses filtration and staining. |
| Test Medium | Cervical mucous substitute | Hamilton Thorne, FertilMARQ, and Humagen use seminal plasma. |
| Detection Method | Visual; colored label bound to sperm | Hamilton Thorne uses a microscope/video camera with video analysis and computer analysis of video images. Humagen and Penetrak use visual and microscope counting. |
| Reporting | Single result. Qualitative | Hamilton Thorne and Humagen give multi-parameter results. |
| Test Temperature | 37° C | FertilMARQ and Humagen use ambient room temperature. |

J. Standard/Guidance Document Referenced (if applicable):

NCCLS GP14-A, *Labeling of Home-Use In Vitro Testing Products; Approved Guideline (1996)*.

K. Test Principle:

The Fertell Male Fertility Test measures the concentration of progressively motile sperm in a fresh semen sample. The test is performed between two and seven days after the last ejaculation.

Semen is collected directly into a custom design collection container and allowed to liquefy for 30 minutes. A test unit is then positioned onto the liquefied sample and the pressing of a button releases a solution of sodium hyaluronate buffer solution over the semen sample and starts heating the fluid to 37°C. Motile sperm swim-up through

the sodium hyaluronate for 30 minutes before a valve is opened, by turning a knob, allowing the buffer solution, and motile sperm present, to flow along a capillary channel. Anti-CD59 monoclonal antibody that is conjugated with colloidal gold is released from an absorbent pad in the channel and reacts with the sperm forming an immunocomplex of gold-labeled sperm. The fluid containing this complex flows onto a nitrocellulose strip where the gold-labeled sperm are trapped, forming a red line. Unreacted conjugate is washed from the strip by the flow of excess buffer.

Turning the knob back to its original position closes the valve and reveals the test result. The appearance of a clear red line (test result) indicates motile sperm in the semen sample at a concentration of $\geq 10\text{M/mL}$. This level is indicative of normally expected motile sperm concentrations.

L. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Inter-observer Reproducibility: Sample donors each collected a semen specimen into a suitable collection container, and handed it to a first professional for testing with Fertell. On completion of the test and after recording the result and the time of recording the result, the device was then handed to a second professional who then, independently, interpreted the result. The second reading to the test was carried out within 5 minutes of the first reading. Fifty samples were assessed. Thirty-six positive, and 14 negative samples were assessed: 28% negative samples. This meets the criterion that at least 25% of the samples tested should be abnormal. Inter-observer reproducibility was 100% based on consistency of result classification. This meets the target for test reproducibility of $\geq 95\%$ agreement.

b. Linearity/assay reportable range:

N/A

c. Traceability (controls, calibrators, or method):

N/A

d. Detection limit:

N/A

e. Analytical specificity:

There is no cross-reactivity with immotile sperm up to a concentration of over 140 M/mL immotile sperm. Also, there is no cross-reactivity with white blood cells up to a concentration of 2.1 M/mL WBCs.

f. Assay cut-off:

The qualitative cut off level is 10 million motile sperm cells per milliliter. This is based on a WHO reference value found in the WHO laboratory manual for the examination of human semen and sperm-cervical mucus interaction, 4th Edition, published by Cambridge University Press, 1999, Reprinted 2000.

2. Comparison studies:

a. Method comparison with predicate device:

The objective of the Method Comparison Study was to demonstrate equivalence between the Fertell Male Fertility Test and the predicate method (a laboratory run, computer-aided sperm analysis system, CASA, the Hamilton Thorne IVOS system). A sperm migration test (modified Kremer test) was also used, as a secondary predicate method. Subjects were asked to attend the trial site and provide a semen sample into a laboratory collection container. Testing of the sample by the two predicate methods and by the Fertell Male Fertility Test was performed by a laboratory professional. The results from 140 subjects expressed as percent accuracy, based on test efficiency according to NCCLS guidelines (GP14-A, June 1996), show a percent accuracy against the predicate method of 95.7%.

b. Matrix comparison:

N/A

3. Clinical studies:

a. Clinical sensitivity:

N/A

b. Clinical specificity:

N/A

c. Other clinical supportive data (when a and b are not applicable):

The following performance evaluations were conducted with the Fertell Male Fertility Test: clinical (i.e., consumer) studies (consumer field evaluations, lay users versus professionals); in-house method comparison study versus predicate; laboratory evaluations (specificity, reproducibility, result stability, robustness to timings, and influence of ambient temperature); and stability studies.

The objective of the consumer field evaluation was to demonstrate that lay users can reliably perform the test in their home environment following the instructions provided in the package insert and other labeling (box labeling and, for some users, a

supplementary instruction sheet), without confusion, complications, or procedural difficulties (i.e., validation of the adequacy of the Instructions for Use). The studies included a questionnaire to obtain feedback from lay users on various aspects of performing the test. A total of 433 questionnaires were received from the three sites. Of the 6495 responses (433 subjects x 15 questions), 6160 were correct, 335 were incorrect or no response. This demonstrates that the Fertell Male Fertility Test could be accurately performed by a general public consumer population in the home environment; the correct response level was 94.8%.

The objective of the Lay Users vs. Professionals study was to demonstrate equivalence between the lay user and professional results. Each lay user was asked to attend the trial site where they provided a semen sample and performed the Fertell Male Fertility Test following the instructions provided in the package insert and other labeling (box labeling and, for some users, a supplementary instruction sheet). On completion of the test, the lay user and a professional read the test result independently, without either having knowledge of the other's result and recorded their interpretation of the result on separate record sheets. The lay users were not given any assistance in the performance of the test. The results from 121 subjects, expressed as percent accuracy based on test efficiency according to NCCLS guidelines (GP14-A, June 1996), show a percent accuracy between the lay user and the professional of 95.0%.

4. Clinical cut-off:
N/A
5. Expected values/Reference range:
A red line will appear as a positive result to show that the person's concentration of motile sperm is above the cut-off level of 10 million motile sperm cells per milliliter.

M. Instrument Name:

Genesis Fertell Male Tester Electronics Module

N. System Descriptions:

1. Modes of Operation:
 - a. A heater for the "swim-up tube" provides a defined temperature.
 - b. A visual indicator provides a signal whenever a user action is required.

2. Software:

FDA has reviewed applicant's Hazard Analysis and software development processes for this line of product types:

Yes X or No _____

3. Sample Identification:

N/A

4. Specimen Sampling and Handling:

A fresh semen sample is produced directly into the sample collection container.

5. Assay Types:

N/A

6. Reaction Types:

N/A

7. Calibration:

N/A

8. Quality Control:

The device performs a self-test of its heating and timing functions.

O. Other Supportive Instrument Performance Characteristics Data Not Covered In The "L. Performance Characteristics" Section Of The SE Determination Decision Summary.

1. Result Stability: Fertell results on 50 semen samples were read by the same operator at 0, 30, and 60 minutes after test completion. The results show 98% agreement between the interpretation immediately after test completion and 60 minutes after test completion.

2. Influence of Ambient Temperature: Five donor semen samples below the test cut-off (10×10^6 motile sperm/ mL) and 15 samples above the test cut-off were, after liquefaction, divided into two aliquots. The aliquots were tested at ambient temperatures at the extremes of the intended temperature range for use of the device; 18° C and 30° C. There is no difference in performance between 18° C and 30° C ambient temperature. Overall agreement was 95.2%.

P. Conclusion:

The Genosis Fertell Male Fertility Test is substantially equivalent to the Hamilton Thorne IVOS, the FertILMARQ, the Humagen Semen Analysis Kit, and the Penetrak Cervical Mucus Penetration Test.