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Biotechnology and original approach for cervical secretion devise to detect biophysical measurement of cervical secretion

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Abstract:

The Biosensor consists in a non-invasive device to measure and integrate the biophysical properties of the cervical secretion, and the progress of biophysical properties, such as stretching, elasticity, fluidity, and crystallization of the cervical secretion. The present invention identifies the rheological properties and crystallization of cervical discharge. The device emits tree signals of cervical discharge on successive days. The three signs are stretching, elasticity, and fluidity. At the same time, these sample data are integrated into the record of the difference between sampling on successive days. Therefore, a measurement at a certain moment can provide measures that reflect a significant change in the biophysical characteristics of cervical secretion, under quantification and determination of its change of condition. In this way, the device verifies the state of the fertile window by a point evaluation or scaled according to the progress of the fertile state.

Discussion:

The biosensor devise identify and determine the biophysical characteristics of the cervical secretion. The devise has a system to receive a sample through a non-invasive sampling, with compartments that receive the cervical secretion to analyze spinnbarkeit, elasticity, fluidity, and crystallization. This device allows the recognition of changes on the characterization of the physical properties of the cervical secretion, during the menstrual cycle and correlates changes on the cervical secretion properties to apply them on the fertility recognition field. The invention and its method has well established biological basis since the type of estrogen-dependent cervical secretion increases about 5 to 6 days before ovulation, and decreases after it. Currently, the study of the cervical secretion for recognition of the fertile period is widely accepted by the scientist world, but there is not objective method to measure and quantify physical changes of the cervical secretion as proposed by this new invention.

Some of the scientific advances related to the recognition of fertility changes at the level of the female menstrual cycle are of special interest for the justification of this device. This device is based on the scientific contribution widely recognized in the literature, of the hormonal changes that occur in the hypothalamic-pituitary-gonadal axis, at the level of response in target organs of the female genital tract. The pulsatile release of the gonadotropin-releasing hormone GNRH, stimulates the release of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) in the anterior pituitary. These two hormones are responsible for producing the release of estrogens and progesterone in the ovary, the physicochemical changes that occur in these two hormones justify the changes observed in cervical secretion and justify this invention.

Cervical discharge has been considered as a hydrogel composed of a liquid phase and a solid phase. The solid phase consists mainly of currently characterized glycoproteins. The liquid phase is made up of water and chemical and biochemical compounds such as salts, minerals, sugars, amino acids, lipids, protein chains, enzymes, etc. These components determine the main biophysical parameters of the secretion of the cervix, which are mainly variations in quantity, appearance, transparency, viscoelasticity, crystallization. Crystallization today is not object of objective practical application given its complexity in interpreting the data of Odeblad, who has detected different types of cervical secretion by crystallizing the secretion obtained by endocervical examination. Odeblad has determined different patterns, but based on an endocervical examination, thus being able to recognize the different patterns described by him, however, currently only probably applied in clinical practice due to the difficulty of sampling and the difficulty in the process of crystallization, observation and determination.

It is well known that the volume of cervical secretion increases near the peri-ovulatory period, with the greatest amount of secretion being observed around day -1 and 0 in relation to EDO, in cycles not subject to any type of treatment, but not between phases of the fertile cycle, nor is there an analysis objectified by an apparatus of the gradual change between phases. For this reason, our invention aims to provide more information on cervical secretion, quantifying the typical evolution of cervical secretion by means of the physicochemical variables of cervical secretion, it is not a viscoelasticity meter simply of cervical mucus, it is not a viscometer. The subjective assessment of the phase of changes from an opaque and less transparent sample in the early stage of the fertility period, to one that reflects greater transparency, quantity and stretching in the mean moment of the fertile window.

Conclusion:

The daily secretion, during the pre-ovulatory period, is around 600 to 700 mg / day, and outside it 40 or 60 mg. This difference in the amount of estrogens determines the type E (estrogenic) secretion, which is abundant, easy to quantify within the fertile phase, in quantity, appearance; that it is clear, of aqueous and stretching consistency, acellular and supports the sperm for its penetration and survival clearly identified by means of the filancy or elasticity of the same in a digital way but subjectively. The secretion type G (gestagenic) is scarce, thick, opaque, cellular and inhibits sperm penetration. There is no characterization of this phase transit and the physical characteristics of the mucus. The liquid medium is composed of water, electrolytes, sugars, amino acids, lipids, numerous enzymes lysozyme and lactoferrin, and immunoglobulins, a part of which is closely linked to the glycoprotein network. Viscosity is inversely proportional to estrogenic impregnation: minimum in the preovulatory phase and increases as progesterone increases, elasticiy and filancy determines the ability of cervical mucus to stretch and increases with estrogenic impregnation, determined by digital stretching in cm by most clinical studies.The characterization of this fluidity in the preovulatory phase is progresive. The internal structure of cervical secretion varies depending on the glycoprotein net that retain a liquid medium in their meshes. At the beginning and at the luteal end of the cycle, the mesh diameter of the holes does not exceed 0.5 µm. During the follicular phase it increases gradually under the effects of estrogens until reaching or exceeding 2-5 µm in the pre-ovulatory period.