Thawing semen at higher temperature helps to improve quality

- **Thawing at 40ºC reduces cellular damage caused by free radicals and improves mobility of the spermatozoon.**
- **Article published in the journal *Fertility and Sterility***

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The thawing temperature can be a crucial fact for the final quality of the spermatozoons. According to a scientific study done by the Reproduction Biology Department of the Instituto Marques in cooperation with other international investigation units, thawing semen sample at 40ºC (and not at 37ºC) allows to obtain bigger amounts of mobile spermatozoons (up to 40% more).

The study published in the journal *Fertility and Sterility* has been a cooperation with the Center of Research on Reproduction of the University of Pennsylvania, the Jones Institute for Reproduction Medicine of the Virginia Medical School, the Centro Médico Seremas of Buenos Aires and the Laboratorio de Estudios en Reproducción of Buenos Aires.

The discovery is of importance for artificial insemination treatments. According to Juan Alvarez, scientific director of the Instituto Marques and teacher of Reproduction Biology at Harvard University " in order to carry out an artificial insemination a minimum of 5 million mobile spermatozoons is recommended, thawing with a temperature of 40ºC we can obtain up to 5.6 million and therefore perform the insemination under optimal conditiones.

Higher temperature against free radicals

During the thawing process the spermatozoons are exposed to a physically and chemically stressful process. According to Prof. Alvarez "during this process free radicals are produced which provoke a cellular damage, especially to the "motor machinery" of the spermatozoons (microtubes of the

cilium). At 40ºC we achieve to “awake” antioxidant enzymes more quickly, which are responsible for compensating these free radicals.

Within this study, security and efficiency of the thawing process at 20ºC, 37ºC, 39ºC and 40ºC has been compared. As a result it was discovered that at 40ºC the highest gain rate of mobile spermatozoons was achieved, up to 40% higher comparing with the result of the thawing process at 37ºC.

When do we thaw semen?

Thawing semen is a obligatory practice in all sperm banks. According to Dr. Elbaile, director of the sperm bank Biosperm “a sample is always analysed twice – before and after the thawing process – in order to record survival chances, concentration and motility rate of the spermatozoons, apart from that it is exposed to genetic material analysis techniques.” The donor goes as well through a double screening: before donating in order to find out if he would be a good candidate and again once approved as a donor but before using his sample in order to repeat the blood analysis after 6 months and to check if the results are still negative for venereal diseases which had been excluded in the first place.

Thawing semen is also common use for couples in sterility treatment (insemination or in vitro fertilisation) when it is foreseeable that the male partner might have difficulties in obtaining a sample on the day needed (due to psychological stress) or when it turns out to be impossible for him to provide the sample (due to work issues or long distance for instance in the case of patients coming from abroad like U.S. or Australia).

Finally, the freezing of sperm has been common practice for years for oncological patients who before starting chemotherapy decide to freeze their sperm in order to avoid future fertility damage due to their treatment.

Sperm freezing , an old technique

The freezing or cryopreservation of semen is an often used technique in assisted reproduction which has been known for over 70 years, eventhough the first insemination with frozen donor sperm was not performed before 1953 when the use of cryoprotectores such as glycerol allowed to improve results.

In order to freeze, the spermatozoons – covered in cryoprotectores – are introduced into containers of liquid nitrogen at -196ºC. At this temperature no chemical reaction is possible and the cell remains stuck in time.

Eventhough technological aspects of sperm cryopreservation have improved significantly throughout the last decades, until now no standard protocol able

to minimize possible cellular damage after the thawing process has been established. The thawing temperature as well as the freezing and thawing systems usually applied, varied among the assisted reproduction laboratories. This explains the importance provided by the discovery of this multi-centered study which is currently under clinical application.