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Stimulation of human damaged sperm motility with hydrogen molecule

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Abstract

Background: Sperm motility is a critical factor in male fertility. Low motility can be caused by a variety factors including abnormal spermatogenesis, oxidative damage, or depletion of intracellular ATP. Recent findings indicate that hydrogen molecule (H2) selectively reduces toxic reactive oxygen species. In this study, we investigated the effects of H2 on human sperm motility in vitro.

Methods: Experimentally damaged sperm suspensions from patients left at room temperature for > 5 days or frozen immediately after ejaculation were used. After exposure with H2, their forward motility was measured with a counting chamber. A time-lapse movie was recorded to analyze sperm swimming speed. Mitochondria were stained with a membrane potential-sensitive dye.

Results: H2 treatment significantly improved the rate of forward motility, whereas treatment with nitrogen gas did not. While treatment for 30 min was sufficient to improve motility, it did not affect sperm swimming speed. After 24 h, retreatment with H2 increased the motility again. H2 treatment also increased mitochondrial membrane potential. Forward motility of low motile frozen-thawed sperm from patients significantly improved with cleavage medium containing H2.

Conclusions: Our results illustrated that H2 treatment stimulates low sperm motility. H2 is a new promising tool for male infertility treatments.

Keywords: Frozen-thawed sperm; Hydrogen molecule; Male infertility; Mitochondria; Sperm motility.

Figures

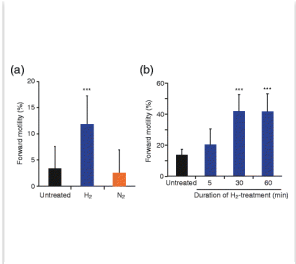

Figure 1 Effect of H_2 treatment...

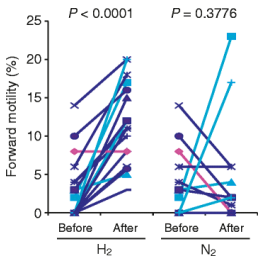

Figure 2 Effect of H_2 treatment...

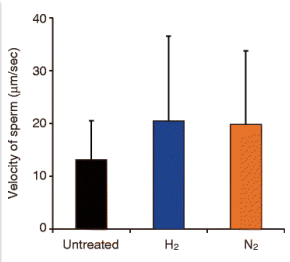

Figure 3 Effect of H_2 treatment...

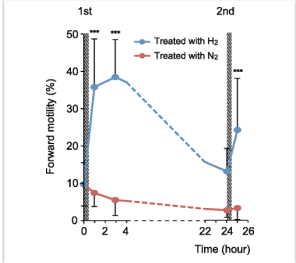

Figure 4 Retention time of sperm suspensions...

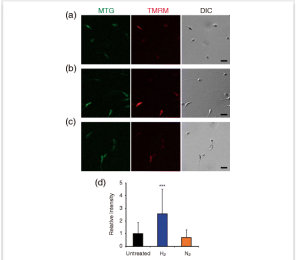

Figure 5 Increase of mitochondrial membrane potential...

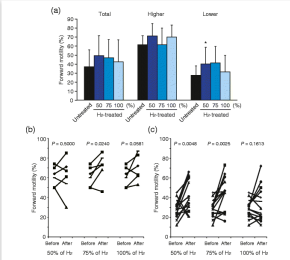

Figure 6 Effect of H_2 treatment...

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