Expression of Mitochondrial Uncoupling Proteins (UCPs) in Human Sertoli Cells and Spermatozoa

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Introduction

- Mitochondrial uncoupling proteins (UCPs) are members of the mitochondrial anion transporter family. Currently, six UCP homologues have been described (UCP1-6) [1].
- UCPs are important modulators of the mitochondrial membrane potential, being responsible not only for energy dissipation in the form of heat (thermogenesis) but also for the regulation of oxidative phosphorylation, ROS production, and redox balance [2].
- Elevated ROS production and high oxidative stress are one of the leading causes for male infertility [3]. However, little is known about the presence and function of UCPs in the human testis and spermatozoa.

Aim

- Evaluate the mRNA expression of all six UCPs homologues (UCP1-6) in human Sertoli cells and spermatozoa.

Methodology

Human testicular biopsy

Sertoli cells (hSC) Primary 2D culture

Reverse transcriptase – polymerase reaction (RT-PCR)

Sperm wash

Normozoospermic human seminal samples (n=2)

Density gradient centrifugation

High motility sperm retrieval

Results

UCPs homologues mRNA expression in human Sertoli cells and spermatozoa

<table>
<thead>
<tr>
<th>UCP</th>
<th>A</th>
<th>B</th>
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<tbody>
<tr>
<td></td>
<td>hSCs C+</td>
<td>hSPZ1 hSPZ2 C+</td>
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<tr>
<td>UCP1</td>
<td>84 b.p.</td>
<td>257 b.p.</td>
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<tr>
<td>UCP4</td>
<td>204 b.p.</td>
<td>79 b.p.</td>
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<tr>
<td>UCP6</td>
<td>70 b.p.</td>
<td>70 b.p.</td>
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(A) UCPs mRNA expression in human Sertoli cells (hSCs). (B) UCPs mRNA expression in human spermatozoa from two different individuals (hSPZ1 and hSPZ2). Peripheral blood leukocytes were used as positive control (C+). Negative control is represented as (C-).

Conclusion

- We were able to identify all UCPs homologues (UCP1-6) in both human Sertoli cells and human spermatozoa.
- The identification of UCPs in the human male reproductive tract and spermatozoa presents itself as a first step towards clarifying the crosstalk between metabolic disorders, and consequent high oxidative stress, and male infertility, opening a new path for future studies.

References