

# EFEK DARI KONDISI HIPERGLIKEMIA TERHADAP KONDISI FERTILITAS TIKUS WISTAR DENGAN KONDISI DIABETES YANG TERINDUKSI

## INTISARI

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### Latar Belakang:

Transporter glukosa (GLUTs) dan metabolisme oksidatif berkaitan dengan mekanisme infertilitas. Penelitian ini melakukan evaluasi dampak hiperglikemia pada metabolisme glukosa dan oksidan pada sel Sertoli (SCs).

### Metode:

Penelitian ini dilakukan pada hewan untuk mengamati ekspresi *messenger* RNA transporter monokarboksilat 4 (MCT4), GLUT1, GLUT3, faktor nuklear eritroid 2 terkait faktor 2 (Nrf2), glutathione peroksidase, katalase (CAT), dan laktat dehidrogenase A (LDHA) pada testis tikus Wistar yang diinduksi hiperglikemia. Analisis *reverse transcription polymerase chain reaction* dilakukan. Kondisi hiperglikemia pada tikus Wistar diinduksi dengan streptozotocin. Sebanyak 24 ekor tikus dibagi menjadi 3 kelompok, yaitu non-hiperglikemia (control), kondisi hiperglikemia selama 2 minggu dan 4 minggu. Semua data dikumpulkan dan dianalisis menggunakan SPSS versi 15.0 (IBM Corp., USA)

### Hasil:

Ekspresi transporter glukosa (GLUT1 dan GLUT3), transporter laktat (MCT4) dan protein pertahanan sel dibandingkan dengan oksidan (Nrf2 dan CAT) meningkat secara signifikan pada kelompok kondisi hiperglikemia selama 2 minggu dan 4 minggu dengan  $p < 0.01$ .

### Kesimpulan:

Kondisi hiperglikemia mempengaruhi metabolisme SCs. Perubahan GLUT dan metabolisme oksidatif mungkin menunjukkan perubahan metabolik akibat paparan hiperglikemia berkepanjangan yang dapat menyebabkan infertilitas pada pria dengan diabetes.

**Kata kunci:** GLUT1, GLUT3, glutathione peroksidase, infertilitas, MCT4, Nrf2

## EFFECT OF HYPERGLYCEMIA ON FERTILITY IN STREPTOZOTOCIN-INDUCED DIABETIC MALE WHISTAR RATS

### ABSTRACT

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### Background:

Glucose transporters (GLUTs) and oxidant metabolism are associated with the mechanism of infertility. This study evaluated the impact of hyperglycemia on glucose and oxidant metabolisms of Sertoli cells (SCs).

### Methods:

This study was an animal study to investigate the expression of messenger RNA monocarboxylate transporter 4 (MCT4), GLUT1, GLUT3, nuclear factor erythroid 2-related factor 2 (Nrf2), glutathione peroxidase, catalase (CAT), and lactate dehydrogenase A (LDHA) of Wistar rats testes that were induced hyperglycemia. Reverse transcription polymerase chain reaction analysis was used. Hyperglycemic state in the Wistar rats was induced by streptozotocin. 24 rats were divided into 3 groups: non-hyperglycemia (control), 2-week, and 4-week hyperglycemic state. All data were collected and analyzed using SPSS version 15.0 (IBM Corp., USA).

### Results:

The expression of glucose transporter (GLUT1 and GLUT3), lactate transporter (MCT4), and cellular defense protein against oxidant (Nrf2 and CAT) was significantly increased in the 2-week and 4-week hyperglycemic state groups with  $p < 0.01$ , respectively.

### Conclusions:

Hyperglycemic state affects the metabolism of SCs. Alteration of GLUTs and oxidative metabolism may indicate metabolic alterations by a prolonged exposure to hyperglycemia that may be responsible for diabetes-related male infertility.

**Keywords:** GLUT1, GLUT3, glutathione peroxidase, infertility, MCT4, Nrf2