

# Interaction between Acupuncture and Drug



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## Abstract

Can the acupuncture stimulations impact on the effect or lower the dose of drugs stimulation using at the same time and the same organism? In recent years, we applied electroacupuncture (EA), a physical stimulation and some drugs (insulin, hypoglycemic agents, steroids or volatile anesthetics. etc.) at the same time on the same animal model to test the hypoglycemic activity obtain that the EA stimulation may elevated the hypoglycemic effect of drugs. In another physical stimulation, Ear acupoints were stimulated by small balls obtained that lower down the effect dose of atropine for the treatment of myopia. There were some interactions such as: antagonism, synergism, potentiation and summation. etc. This is an important issue worth for further investigations.

**Keywords:** Interaction; Electroacupuncture; Hypoglycemic agent; Steroid; Volatile anesthetics

**Abbreviations:** EA: Electro Acupuncture; TENS: Transcutaneous electrical nerve stimulation; STZ: Streptozotocin; FFA: Free Fatty Acid; MAPK: Activating Mitogen-activated protein kinase; SIIR: steroid induced insulin resistant

## Introduction

As we know there are some interactions between two drugs named drug-drug interaction. One drug can be changed the effect of the other drug which is applied before or at the same time with the other drug [1]. The bad drug interaction may change of the pharmacological activity to induce lower effect of drug, even to archive over dose or toxicity [2]. But, well drug interaction may archive better effect than used alone, lower down the effective dose or against the disadvantages. There are several types of drug interaction such as, antagonism, synergism, potentiation and summation etc [3]. The mechanisms of drug interaction may due to the change of pharmacokinetic such as absorption, distribution, metabolism and excretion [4]. To answer a question, can the acupuncture stimulations impact on the effect or lower the dose of drugs stimulation, at the same time and the same organism? Several our previous studies will be discussed and try to answer this question [5-8]. Acupuncture, electroacupuncture (EA) or transcutaneous electrical nerve stimulation (TENS) are the method of physical stimulations on the acupoint that would change the effect or their disadvantage effect of drugs (insulin, hypoglycemic agents, steroids or volatile anesthetics..etc)[6-12].

### EA Enhanced the Hypoglycemic Effect of Insulin

A physical stimulation, EA and exogenous regular insulin, which the hypoglycemic onset is 30 min, were used on the Normal

rat and Streptozotocin (STZ)-induced diabetic rat at the same time and compare with non-EA group, only injecting regular insulin in 2006 [6]. The more hypoglycemic activity in bilateral Zusanli acupoint (ST36) EA group was obtained than in the non-EA group 30 min after the start of insulin injecting to the normal rat. Also, 60 minutes after the start of insulin injection, the hypoglycemic activity of the EA group still was significantly higher than that of the non-EA group. The STZ-induced diabetic rats showed the same trends as the normal rats, including that more hypoglycemic activity for the EA group was obtained than for the non-EA group[6]. In this case, the physical stimulation, EA may enhance the hypoglycemic activity of regular insulin and/or insulin sensitivity that would be thought as a summation or synergism or potentiation effect.

### EA Enhance the Hypoglycemic Effect of Hypoglycemic Agents

There were some kinds of hypoglycemic agents such as rosiglitazone, metformine..etc using combined with EA for observing the interaction on the hypoglycemic effect [7-11]. In 2009, the hypoglycemic effect of rosiglitazone was increased by EA in both normal and type 2 diabetic rats, indicating that the application of EA may enhance the hypoglycemic action of this insulin sensitizer. Also, a randomized control clinical trial was reported to reveal this interaction between EA and rosiglitazone in

2013. This combined therapy seems to suppress endogenous insulin secretion of type 2 diabetic patient by improving insulin resistance via a reduction in plasma free fatty acid (FFA). Until 2015, a report entitled "Electroacupuncture plus metformin lowers glucose levels and facilitates insulin sensitivity by activating mitogen-activated protein kinase (MAPK) in steroid-induced insulin-resistant rats" showed that this combined therapy resulted in a greater glucose-lowering effect, higher insulin sensitivity, lower plasma FFA levels and higher levels of MAPK than metformin alone [11]. This study also showed a physical stimulation, EA enhance the hypoglycemic effect of hypoglycemic drug that would be thought as a summation or synergism or potentiation effect.

### EA Improved the Insulin Resistance Induced by Steroid

The plasma glucose level is elevated by archiving insulin resistance usually that is disadvantage effect of steroid treatment. In 2009, a study entitled "Acute effect of electroacupuncture at the Zusanli acupoints on decreasing insulin resistance as shown by lowering plasma free fatty acid levels in steroid-background male rats" that reported the steroid induced insulin resistant (SIIR) state can be improved by 15 Hz EA at the bilateral Zusanli acupoints, as shown by decreased plasma levels of FFA [12,13]. Also, another study reported that EA decreased the FFA level and increased insulin sensitivity in dexamethasone chronic induced insulin resistant rats in 2016 [12]. The EA stimulation lowered down plasma FFA level and enhanced the insulin signal transduction of SIIR. EA improved the insulin resistance induced by steroid that would be a style of interaction, diminish their disadvantage effect of drugs.

### TENS Improved the Insulin Resistance Induced by Volatile Anesthetics

Volatile anesthetics directly manipulate glucose homeostasis by affecting pancreatic insulin release and induce hyperglycemia usually that is disadvantage effect of anesthesia during surgery especially in hyperglycemic patient. In 2011, a physical stimulation, TENS stimulated to the Chinese acupoints Zusanli (ST36) and Sanyinjiao (SP6) of patient before surgery as a complementary therapy for controlling plasma glucose and improving insulin resistance during anesthesia. This study concluded that the TENS at bilateral ST36 and SP6 acupoints to be an alternative means of managing the plasma glucose level and improving insulin resistance [8]. TENS improved the insulin resistance induced by volatile anesthetics that would be a style of interaction, diminish their disadvantage effect of drugs.

### Auricular acupoints stimulation reduce the effective dose of atropine for treating myopia

In 2008, a randomized single-blind clinical controlled trial was designed to compare the reduction in myopia progression in patients treated with atropine eye drops alone with patients treated with a combined treatment of atropine and stimulation of the auricular acupoints. The school-aged children with myopia were randomly assigned into three groups. These were (1) 0.25A: treated with the 0.25% atropine only, (2) 0.5A: treated with the 0.5% atropine only and (3) 0.25A+E: treated with 0.25%atropine together with stimulation of the auricular acupoints. This study

demonstrates that there was efficacy in stimulating the auricular acupoints and this enhanced the action of 0.25% atropine as a means of myopia control. The result was an effect almost equal to that of 0.5% atropine alone [14]. Auricular acupoints stimulation reduced the effective dose of atropine for treating myopia that would be thought as a synergism or potentiation effect.

### Conclusion

Taken together, the physical stimulations such as TENS, EA or acupuncture impact on the effect or lower the effective dose of drugs stimulation using at the same time and the same organism. That may have interaction between acupuncture and drugs. This issue is worthy systemic exploration.

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