

Diabetic Animal Modeling and Role of Gamma Knife and Cautery

Suleyman Aydin, İbrahim Sahin , Suna Aydin, Kader Ugur and Meltem Yardim

Department of Medical Biochemistry and Clinical Biochemistry, (Firat Hormones Research Group), Medical School, Firat University, 23119 Elazig, Turkey

Department of Medical Biology, Medical School, Erzincan Binali Yildirim University, 24100 Erzincan, Turkey

Cardiovascular Surgery Department, Elazig Education and Research Hospital, Health Science University, 23280 Elazig, Turkey

Department of Anatomy, Medical School, Firat University, 23119 Elazig, Turkey

Department of Endocrinology and Metabolism Disease, Medical School, Firat University, 23119 Elazig, Turkey

*Corresponding author: Dr. Suleyman Aydin, Department of Biochemistry and Clinical Biochemistry, School of Medicine, Firat University, 23119-Elazig, Turkey; Tel: 905334934643; Fax: 904242379138; E-mail: saydin1@hotmail.com

Received date: March 18, 2019; Accepted date: March 22, 2019; Published date: March 27, 2019

Citation: Aydin S, Sahin I, Aydin S, Ugur K, Yardim M, et al. (2019) Diabetic Animal Modeling and Role of Gamma Knife and Cautery. J Clin Mol Endocrinol 4: e114.

Editorial

The experimental diabetes animal modeling is frequently used in order to understand the mechanisms underlying of the micro and macrovascular complications observed in the diabetes disease [1]. The streptozotocin and alloxane are the most frequent used molecules in order to create the diabetes in the animals [2]. These molecules may be given as intraperitoneal, subcutaneous, intravenous (iv) and parenteral in order to create the diabetes. These two molecules destroy the beta cells in the Langerhans islets localized in the tail part of the pancreas, remove the insulin production partly or completely and cause to the diabetes [2,3]. The IV dose is 65 mg/kg in the rats [4] and IV dose is 100-200 mg/kg in the mice [5] for the alloxane in order to create the diabetes. While the most frequent used dose is 60-80 mg/kg as ip, it is 150 mg/kg in order to create the diabetes in the rats by using the streptozotocin [6]. These two molecules are toxic for the cells. While the streptozotocin causes to the cell death by forming the alkylation in the deoxyribonucleic acid, the alloxane causes to the toxicity in the islet by conducting toward the massive calcium increase in the pancreas beta islets through the dialuric acid being a reduction product [2]. In addition to the damage of the streptozotocin islet, it also causes to the renal damage and endothelium damage. The ferric nitrilotriacetate is also used in the diabetes induction rather than these two chemical molecules; however, it is not the most preferred model as it causes to the diabetes formation in the long period of time such as 60 days in the animals applied [2,4-6].

The genetical spontaneous is used as the diabetes models in the diabetic rats (Goto-Kakizaki rats) rather than the chemical ways mentioned above [2,7]. For instance, the Goto-Kakizaki rats are used as the Type 2 diabetes mellitus model. Moreover, the ob/ob and db/db mice and fa/fa rats are the autosomal recessive hereditary Type 2 diabetic rats formed with the spontaneous single gene mutation. Another method used in creating the diabetes is the total resection of the pancreas [2]. The usage of this technique becomes difficult in practice as it

requires the surgical intervention and creates the malabsorption [2,7].

As it is seen, there is not an animal modeling being the ideal "single and better method" in order to reveal the mechanisms already underlying of the diabetes. We may increase our knowledge about the diabetes by destroying the pancreas partly, in other words, by limiting the insulin releasing. The cauterization may help us in this matter [8]. The cauterization of the pancreas beta cells in the animals may be performed by observing them with the tomography or ultrasonography under the local anesthesia. The diabetes shall occur with the method suggested herein, as the insulin releasing cells are destroyed with the cautery as much as we want upon completely decreasing and disappearing of the insulin secretion. The burned ulcers to be occurred depending on the cautery may disappear for a length of time [9]. In this case, we may have the chance to observe the late period complications of the diabetes. Moreover, the Gamma knife (stereotactic radiosurgery) technique may be used in order to create the experimental diabetes in the animals [10,11]. In other words, the experimental diabetes may be occurred by removing these parts partly or completely with the Gamma knife upon determining the coordinates of the beta cells of the pancreas.

In the future, we predict with these propounded methods herein that the diabetes mechanism being a serious public health problem all over the world shall be able to present a research opportunity by eliminating the dangerous effects of the chemical methods already used. Being as immediate as possible tested of the hypotheses propounded herein with the animal experiments shall be able to be an important step for the mankind. Therefore, there shall not the side effects coming to existence depending on the chemical molecules used for the diabetic induction, and the effects depending on the hyperglycemia shall be provided to be come to existence more luminously.

References

1. Al-Awar A, Kupai K, Veszeka M, Szűcs G, Attieh Z, et al. (2016) Experimental diabetes mellitus in different animal models. *J Diabetes Res* 9051426.
2. Erbas O (2015) Experimental diabetes model. *FNG & Bilim Tıp Dergisi* 1: 40-42.
3. Maldonato A, Bloise D, Ceci M, Fraticelli E, Fallucca F, et al. (1995) Diabetes mellitus: lessons from patient education. *Patient Educ Couns* 26: 57-66.
4. Federiuk IF, Casey HM, Quinn MJ, Wood MD, Ward WK, et al. (2004) Induction of type-1 diabetes mellitus in laboratory rats by use of alloxan: Route of administration, pitfalls, and insulin treatment. *Comp Med* 54: 252-257.
5. Bukhari SSI, Abbasi MH, Khan MKA (2015) Dose optimization of Alloxan for diabetes in albino mice. *Biologia (Pakistan)* 61: 301-305.
6. Furman BL (2015) Streptozotocin-induced diabetic models in mice and rats. *Curr Protoc Pharmacol* 70: 5.47.1-5.47.20.
7. Chen D, Wang MW (2005) Development and application of rodent models for type 2 diabetes. *Diabetes Obes Metab* 7: 307-317.
8. McCullagh KG, Silver IA (1981) The actual cautery -- myth and reality in the art of firing. *Equine Vet J* 13: 81-84.
9. Sabzi F, Faraji R (2014) Factors predicts skin ulcer following coronary artery bypass. *J Med Life* 2: 29-33.
10. Nwokedi EC, DiBiase SJ, Jabbour S, Herman J, Amin P, et al. (2002) Gamma knife stereotactic radiosurgery for patients with glioblastoma multiforme. *Neurosurgery* 50: 41-47.
11. Aydin S, Ugur K, Aydin S (2018) Do Gamma knife and cautery have a place in obesity treatment in future? *Glob Med Therap* 1: 1-2.