Research on the Portable Biochemistry Blood Glucose Monitoring and Control System for Diabetics

林建銘、陳俊達

E-mail: 9224491@mail.dyu.edu.tw

ABSTRACT

- vi - Recently, many professions have studied much about Diabetes Mellitus. The experiments showed us that the Diabetes Mellitus could control well by blood glucose which can avoid some diseases such as Diabetic retinopathy, Kidney failure and Diabetic neuropathy. The central idea of the dissertation applied to design the construction between controller and observer in terms of Separation Principle. And the theoretical core will basic on H∞ (Full-Information). The purpose is to deal with various and complicated physical situation and situation of body cause from outside environment. Then, the observer used to estimation the unmeasurable Insulin. Finally, the constitution of biochemistry blood glucose monitoring and control system is necessary for this we can discuss about reasons of the phenomenon of pathology and result from experiment. In addition, we can estimate the practice of experiments. All the system hopes to supply more comfortable, safely, simple methods to control blood glucose for Diabetic.

Keywords : Diabetes Mellitus, Separation Principle, H∞ Full-Information, uncertain, disturbance, observer

Table of Contents

REFERENCES

【1】 http://www.doh.gov.tw 台灣行政院衛生署 【2】戴東原，〝糖尿病講座〞, 健康世界出版社, 1993. 【3】G. Sparacino and C. Cobelli, 〝A Stochastic Deconvolution Method to Reconstruct Insulin Secretion Rate After a Glucose Stimulus,〞 IEEE Trans. Bio. Eng., Vol. 43, pp. 512-529, 1996. 【4】Liang-Wey Chang, 〝A Robust Observer Design for Biomedical System,〞 Biomedical Engineering, pp. 61-68, 1995. 【5】F. Chee, T. Fernando and P.V. Heerden, 〝Simulation Study onAutomatic Blood Glucose Control,〞 IEEE Trans. Bio. Eng., 【6】Karl Heinz Kienitz and Takashi Yoneyama, 〝A RobustController for Insulin Pumps Based on H-Infinity Theroy,〞 IEEE Trans. Bio. Eng., Vol. 40, No. 11, pp. 1133-1137, 1993. 【7】Chatchai Neatpisarnvanit and John Robert Boston, 〝Estimation of Plasma Insulin From Plasma Glucose,〞 IEEE Trans. Bio. Eng., Vol. 49, No. 11, pp. 1253-1259, 2002. 【8】M. Berger and D. Rodbard, 〝Computer Simulation of Plasma Insulin and Glucose Dynamics After Subcutaneous Insulin Injection,〞 Diabetes Care, Vol. 12, pp. 725-736, 1989. 【9】R.N. Bergman, D.T. Finegood and M. Ader, 〝Assessment of Insulin Sensitivity in Vivo,〞 Endocrine Review, Vol. 6, 【10】C. Cobelli and A. Mari, 〝Validation of Mathematical Model of Complex Endocrin-Metabolic System, A Case Study on a Model of Glucose Regultion,〞 Med. Bio. Eng, Vol. 21, pp. 390-399, 1983. 【11】鄭炎煒, 〝血糖控制系統的參數評估〞, 國立台灣大學電機工程研究所碩士論文, 1994. 【12】E. Salzsieder, G. Albrecht, V. Fischer and E.J. Freyse, 〝Kinetic Modeling of the Gluco-regulatory System to Improve Insulin Therapy,〞 IEEE Trans. Bio. Eng., Vol. 32, pp. 846-855, 1985. 【13】M.D. Maria Collazo-Clavell, 〝Mayo Clinic on Managing Diabetes,〞 2001. 【14】楊憲東、葉芳柏, 〝線性與非線性H∞ 控制理論〞, 全華科技圖書, 1997. 【15】黃鴻鈞, 〝血糖量測與胰島素注射裝置作業技術規範〞,教育部醫學工程科技教育改進計畫, 1999. 【16】 http://www.amiramed.com/ 【17】 http://www.cellrobotics.com/ 【18】J.A. Tamada, S. Garg and L. Jovanovic, 〝Noninvasive Gluco- se Monitoring-Comprehensive Clinical Results,〞 JAMA, Vol.282, pp. 1839-1844, 1999. 【19】DC. Klonoff, 〝Non Invasive Blood Glucose Monitoring,〞 Diabetes Care, Vol. 20, pp. 433-437, 1997. 【20】 http://www.spectrx.com/ 【21】 http://www.cygn.com 【22】J.A. Tamada, Matthew Lesho and M.J. Tierney, 〝Keeping Watch on Glucose,〞 IEEE Spectrum, pp. 52-57,2002. 【23】 http://www.minimed.com/ 【24】JH. Silverstein and AL. Rosenbloom, 〝New Developments in Type 1 (Insulin Dependent) Diabetes,〞 Clin Pediatr, Vol. 39,pp. 257-266, 2000. 【25】楊台鴻, 〝人工器官〞, 臺北市:教育部, 2000.