

## Short Communication

# Analysis of Type I Diabetic Patients for Planning Pancreatic Islet Cell Transplantation in Nagasaki

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Pancreatic islet cell transplantation (IT) has now been a treatment of choice for the type I diabetes mellitus (DM), and the demand for IT is increasing. With the aim to grasp the present state and to survey the prospects of IT management in Nagasaki, we reviewed 75 type I DM patients who had been followed at the First Department of Internal Medicine of Nagasaki University Hospital. Among the 75 patients, 3 cases (4%) were judged to be candidates for IT according to the Japanese Islet Transplant Registry criteria. In addition, the estimated number of newly developing candidate for IT was one per year in Nagasaki prefecture, based on the epidemiologic factors including the annual incidence rate of type I DM patients in Japan, the population of Nagasaki prefecture, and the proportion of IT candidates among the type I DM patients followed at Nagasaki University Hospital. These results indicated that if an institute in Nagasaki newly constructs a standard IT unit and to run it in accordance with the Good Manufacturing Practice (GMP), they should cooperate with other laboratory units operating cell therapy, since GMP entails large amount of running costs.

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## Introduction

Pancreatic islet cell transplantation (IT) has developed into the treatment of choice for type I diabetes mellitus (DM) since the release of the Edmonton protocol,<sup>1</sup> and is now carried out at various centers around the world. To our best knowledge, however, there is scarcely any research estimating the adequate number of IT centers in individual districts based on the number of candidates for IT. We report herein the actual and prospective number of IT candidates in Nagasaki, a mid-size prefecture with a population of 1.5 million, and view the ideal strategy for IT.

been followed at the First Department of Internal Medicine of Nagasaki University Hospital, the primary DM medical center in Nagasaki prefecture, Japan. The records of these patients were evaluated in March 2007. We investigated the characteristics and clinical data of these patients and then identified the candidates for IT according to the Japanese Islet Transplant Registry criteria. We also estimated the annual occurrence of new IT candidates in Nagasaki, based on the annual incidence rate of type I DM patients in Japan, the population of Nagasaki prefecture, and the proportion of IT candidates among the type I DM patients followed at Nagasaki University Hospital.

## Subjects and Methods

The subjects of this study were 75 type I DM patients who had

## Results

There were 19 men and 56 women aged 14-84 years with the

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mean of 47.9 years. The clinical data of these patients were as follows: the mean (range) of DM duration was 13.8 (1-43) years; body mass index (BMI)—22.6 (16.4-38.5) kg/m<sup>2</sup>; insulin requirement—41.44 (8-166) U/day; HbA1c—7.3 (5.0-11.7) %; and serum c-peptide secretion—0.20 (< 0.01-0.94) ng/mL. Based on the Japanese Islet Transplant Registry criteria for recipients, namely, 1) over 5 years' duration of diabetes mellitus, 2) less than 75 years old, 3) BMI < 25 kg/m<sup>2</sup>, 4) metabolic instability (HbA1c > 7.5%), 5) hypo-insulin secretion (serum c-peptide secretion < 0.1ng/mL), and 6) frequently severe hypoglycemia with coma, 3 of the 75 patients (4%) were judged to be candidates for IT. We estimated the number of new candidate for IT in Nagasaki prefecture as one per year, taking account of the following epidemiologic factors: 1) the annual incidence rate of type I DM patients,  $1.6 \times 10^{-5}$  %, in Japan,<sup>2</sup> 2) the population of Nagasaki prefecture,  $1.5 \times 10^6$ , and 3) the proportion of IT candidates followed at Nagasaki University Hospital, 4% (3/75).

## Discussion

Establishment and management of IT center are under the rule of the Japanese Islet Transplant Registry in Japan. Six IT centers, including Fukushima Medical University, Tohoku University, National Hospital Organization Chiba-East Hospital, Kyoto University, Kobe University and Fukuoka University, have already been licensed and have accumulated 30 cases of IT in the last 3 years. The demand for IT is now surely increasing in Japan as well as in Nagasaki. However, the maintenance of IT laboratory unit according to the GMP standards is mandatory,<sup>3</sup> and its running cost is high. After a successful construction of a new GMP standard laboratory for IT in Nagasaki, we therefore should cooperate with other cell therapy

departments, such as bone marrow transplantation, blood vessel regeneration or skin regeneration, to keep the facilities in good working order, because our present study indicated that only one new candidate for IT would occur in a year in our district.

It is very difficult to determine the number of IT centers necessary in Japan in the near future. The present very strict criteria of recipient may restrict the number of candidates for IT in Japan. At present, since donors are few, the 6 IT centers might be suitable in Japan. However, the reliance and demand on IT should certainly increase when we establish more advanced techniques for preserving the viability of transplant islets, reducing the blood loss during islets transplantation into the liver via the portal system, or inducing the immune tolerance after IT. Accordingly, we have to prepare for IT from now to meet patients' requirement in Nagasaki. Some investigators have emphasized that less experienced centers present poor insulin independence after IT,<sup>4</sup> and thus it is also important to establish an advanced method for harvesting a sufficient number of islets from one pancreatic gland, or develop a cell-banking system of islets.

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