

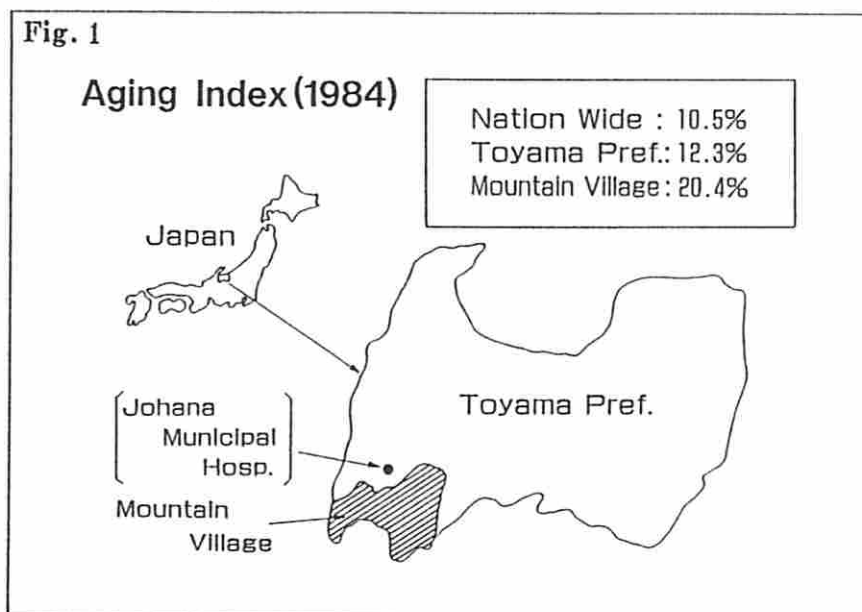
## Development of a New Computer Aided System for Adult Diseases

Masaaki Teranaka, M.D.

Johana Municipal Hospital (Japan)

Japan has now become the country with the world's longest life expectancy. Among aged Japanese, malignant neoplasm, cerebrovascular accident and ischemic heart disease are the major causes of their death. This is not limited to problems of people's health or medical treatment. Since most of the medical treatment costs for the aged are borne by the government, this has resulted in a heavy burden on the state budget, and attention and effort is being paid to the prevention of adult diseases.

It is 10 years since our Hospital began medical examinations of residents of municipalities in the vicinity for the purpose of preventing adult diseases. The hospital is located in a prefecture with one of the highest aged populations, and is the central medical institution of a region adjacent to a mountain village area with the highest aging index (Fig.1). The aging index of the mountain village is 20.4 percent, which is approximately twice the nation wide average of 10.5 percent. The anticipation is that this village society at present, represents Japanese society as a whole in 30 years later time.



We have therefore analyzed the results of medical examinations we have been conducting on local residents in the area. After studying the outcome we developed a new method for prevention of adult diseases as follows.

### 1. Method of high-risk group classification

The hospital has been filing and storing health examination data of the residents for the past few years. The data are all coded and entered into the computer, and used for statistical analysis for prevention and control of adult diseases of the area (Fig.2). From the outcome of past health examinations entered into the computer, adult diseases of high mortality and morbidity rate are malignant neoplasm, hypertension, cerebrovascular accident, ischemic heart diseases and diabetes. We extracted the risk factors related to the occurrence of these adult diseases and each factor was given a number of risk points, which were then added to determine the degree of risk and compared with the total, and high-risk groups for each disease (Fig.3).

For example, the high-risk score calculation method for diabetes is shown in Fig.4 and 5. In the case of diabetes, when the total score exceeds 8 points, the individual is classified as being in a high-risk group. A detailed second stage health examination will be conducted on individuals in the high-risk group, and health control guidance given. For determination of points to classify as being in the high-risk group, disease prevalence, mortality and morbidity rate of adult diseases, and condition of receiving health examination in the area should be fully taken into consideration.

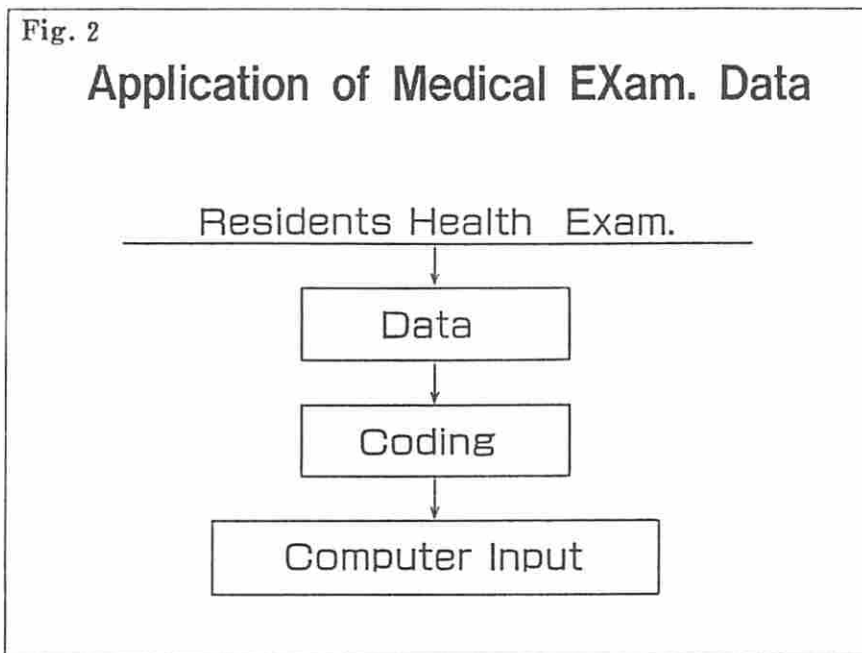


Fig. 3

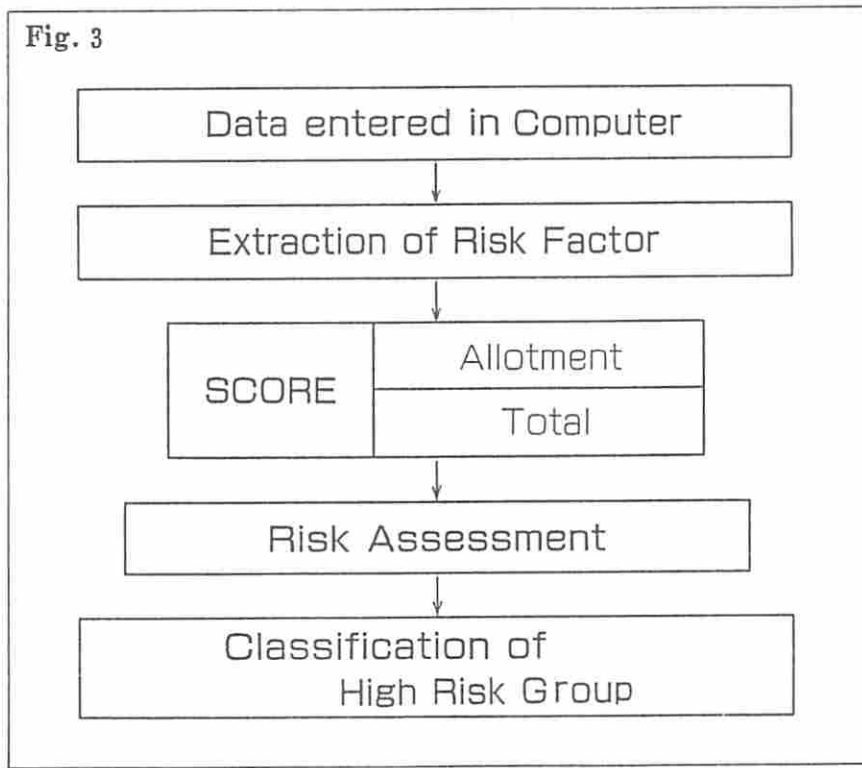


Fig. 4

Ex.) Diabetes Risk Scores

1. Diabetic Family History

- Afflicted (Himself) : 5points
- Parent (+) : 4points/case
- Grandparent (+) : 1point/case
- Siblings (+) : 1point/case

2. Mode of Diabetes Treatment

- Ignored : 5points
- Intermittent : 3points

3. Total Volume of Meals

- Large : 1point

4. Between Meal

- Large : 1point

5. Seasoning

- Sweeter : 1point

- 6. Obesity Over 40% : 3points
- Over 30% : 2points
- Over 20% : 1point

7. Glucosuria Over +1 : 3points

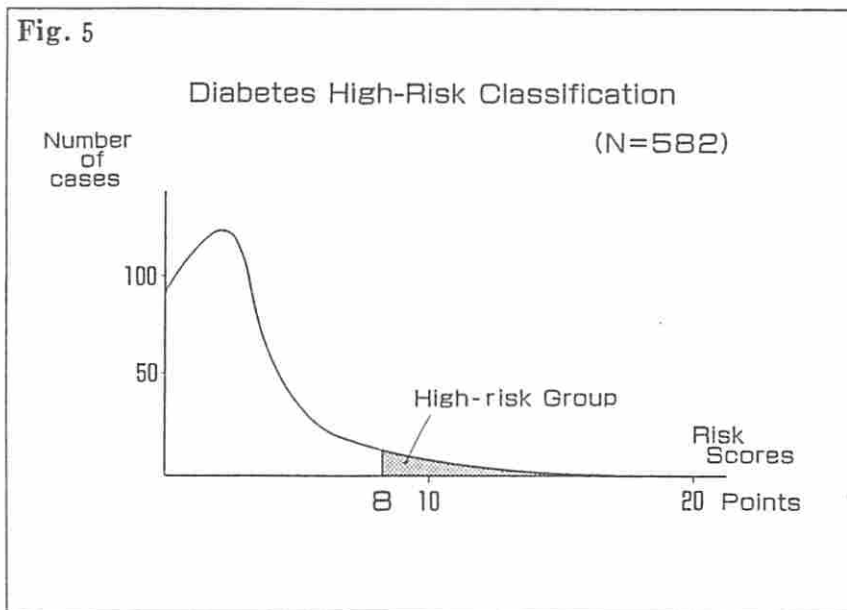
8. Subjective Symptoms

(related to diabetes)

- 4~6 symptoms : 2 points
- 1~3 symptoms : 1 point

9. Fundus oculi (Scott's Classification)

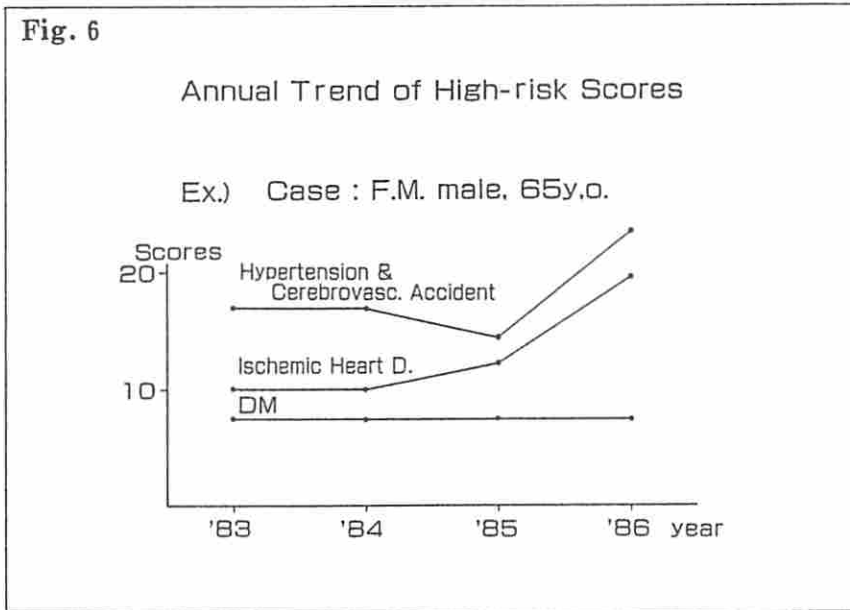
- Grade IV : 4 points
- III : 3 points
- II : 2 points
- I : 1 point



## 2. Usefulness of high-risk group classification method

Furthermore, we developed detailed health guidance in a man-to-man system. Under this system, the annual trend of high-risk scores for each resident is shown using visual images for easy understanding just likely as shown in Fig.6. And in cases where the high-risk scores are increasing annually, the individual's attention will be directed to this, and asked to consider "whether there are concrete measures which could be taken to improve their life style in order to prevent adult diseases." At this time, we consider that it would be even more convincing if a table of high-risk scores of the individual against that of all examinees in the same category were used.

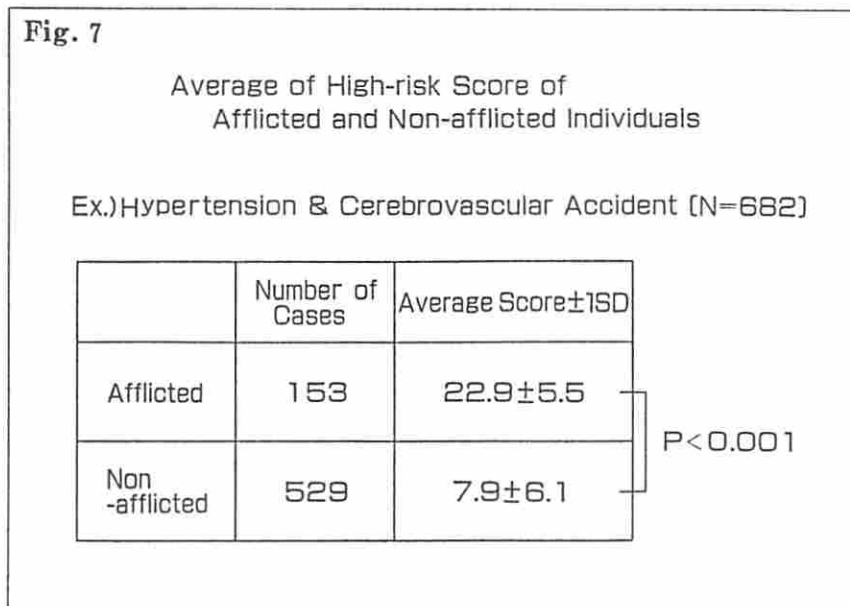
Thus, this high-risk group classification method has been approved as being useful. However, before practical application of the method, there are a few problems to be solved, including discovering the appropriateness of the score points distribution method to risk factor, or correlation of degree of risk and adult diseases occurrence frequency.



### 3. Appropriateness of high-risk group classification method

In order to study whether the score distribution method we are adopting is appropriate, we examined if there was a significant difference in total scores between afflicted and non-afflicted individuals. In the case of hypertension and cerebrovascular accident (Fig.7), the average score of afflicted individuals was 22.9, whereas that of non-afflicted individuals was 7.9, as shown in Fig.7, and the statistically significant difference between the two was observed.

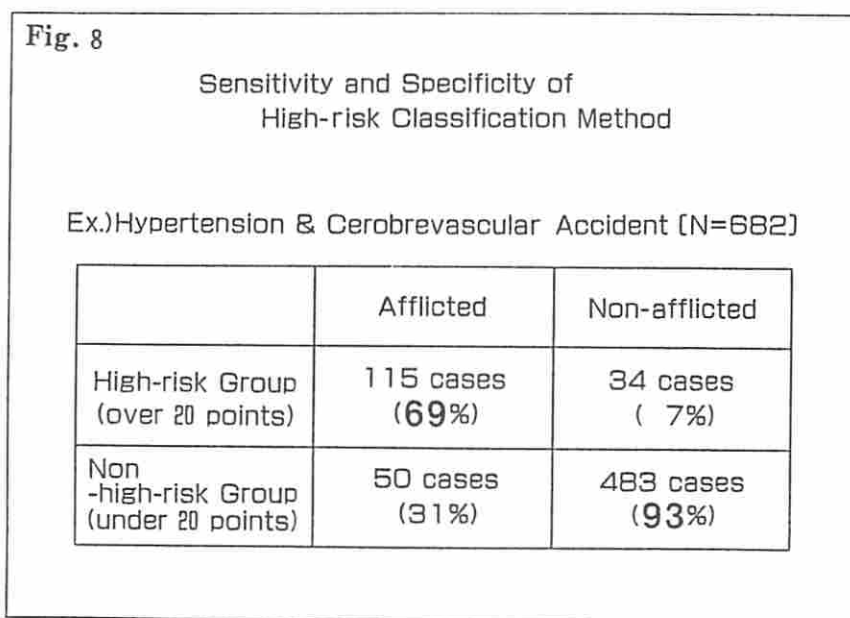
Assuming the high-risk group for hypertension and cerebrovascular accident covers those



who scored 20 or more points, we also studied the probability of afflicted individuals being included in the group, or to put it another way, at what probability level non-afflicted individuals were excluded from the high-risk group. In other words, it was a study on sensitivity and specificity of the high-risk group classification method.

As Fig.8 shows, the outcome was that the proportion of afflicted individuals included in the high-risk group with a total score of over 20 points, was 69 percent of the total afflicted individuals, while the proportion of non-afflicted individuals excluded from the high-risk group was 93 percent of the total of non-afflicted individuals. In other words, the sensitivity of the classification method was 69 percent, and the specificity is 93 percent, which was regarded as being at a relatively high level.

From the above mentioned two results, a computer program on high-risk classification for hypertension risks was assessed to be fairly appropriate. Regarding ischemic heart disease and also diabetes, it was judged after study, that the program was appropriate. While, as for malignant neoplasm, amount of cases for each malignant disease was too small to be judged its appropriateness.



### Summary

The health control according to the computer-aided high-risk classification method we independently developed, was demonstrated as being a powerful means of making a concrete reflection on an individual's life style, and making future provision for prevention of adult diseases, as well as instilling in residents an awareness of health care.

No doubt it is most important to carry out a medical examination of residents continuously. However, when we try to improve the ratio of individuals being examined, problems of manpower and finance are commonly experienced by the examining organization. Consequently,

in order to carry out health examinations bearing in mind these difficulties, it is an opportune time for us to positively consider implementation of health examinations for high-risk individuals targeted at high-risk groups, and this indicates a future direction.

Finally, it has long been pointed out that health examination and health guidance conducted for the prevention of adult diseases are becoming a formality. Therefore we have developed this high-risk classification method as a fresh, accurate and stimulating method. In the future we intended to promote health examination of these high-risk groups, and continue our efforts to improve further the accuracy of the high-risk group classification method.

### References

1. Koichi Ogino : Risk Factor Viewed from Epidemiology Medicina, 15 : 2411, 1978
2. Hideo Ueda et al : Principle of Guiding the Life of Adult Diseases Patients  
Tokyo Igakusya : 1982
3. Tsuneo Tanaka et al : Public Health Nursing, Note III Publishing Association of the  
Japanese Nursing Association
4. Index to Welfare : Trend of National Health 32, 9  
Special Edition 1985
5. Manabu Yamanaka et al : Examination of Adult Diseases Clinical Examination Mook, No.  
7
6. Tomio Kameya et al : Study of Risk Factor on 109 cases of Cardiac Infarction Patients  
Heart, 11 : 179, 1979
7. Ryoichi Shimatani : Actual Condition and Origin of Pultaceous Scleroma of Arteries of the  
Japanese Nichiroishi, 11 : 238, 1974
8. Masaaki Teranaka : Obesity in Women in the Mountain Village Area and Their Diet  
Condition.  
Toyama Prefecture Village Medicine Study Group 13, March, 1982