(表3).

われわれはRTTのCSFで微量アミンとして知られているβ-フェニルエチラミン（PEA）に着目した．PEAはphenylalanineから芳香族アミノ酸脱炭酸酵素でphenylethylamineになり，MAO-Bでさらにphenylacetic acidに，dopamine β-hydroxylaseでphenylethanolamineに代謝される（図1).

PEAをRTT17人で測定し，対照群の41%と著明な低下を示し，精神遅滞にてんかんを伴うもの，精神遅滞を伴う自閉症では対照群と差を認めなかった[16]（表4).

前脳基底部，Mynert核やアセチルコリンに関係した論文では，Kittらはコリン作動性ニューロンが前脳基底部で神経細胞の数，サイズの減少を報告し，大脳新皮質，海馬，被殻，視床でもcholine acetyltransferase（ChAT）活性の減少，前頭葉～側頭葉の大脳皮質の容量の減少などが報告されている[17]．また興奮性アミノ酸のグルタミン酸がRTTのCSFで増加していることが報告され，さらなる神経障害が推定されている[7].

神経ペプチドからみたRTTの研究ではβ-エンドルフィンがRTTのCSFで上昇し，剖核脳で免疫染色性増加が報告されているが4)，β-エンドルフィンの拮抗剤であるnaltrexonが治療に無効であることから2次的な変化であろうと推定される．またわれわれは20人のRTT患者でCSFのサブスタンスPが対照群の51%と著明に低下し，自律神経症状（便秘，冷たく小さい足，呼吸異常その他と関連していることを報告した[5]（表5).

その後，Deguchi, Armstrongらは14人のRTTの剖検脳，脊髄でサブスタンスPの免疫染色性が脊髄の背側部，中間外側部，三叉神経，孤束核，橋網様核，青斑核で著明に低下，黒質，中脳の中心灰白隆起，前頭葉，尾状核，被殻，淡蒼球，視床で低下が証明された[18]．神経栄養因子からのアプローチとして，RiikonenらはCSF中の物質をELISAで測定し，神経成長因子の著明な低下を報告した[6].

3. Rett症候群の動物モデルの開発

RTTの遺伝子異常がMeCP2の変異であることが報告され[2]，そのノックアウトマウスが2001年英国，米国のグループから報告された[19][20]．いずれもヒトのRTTのphenotypeと類似の症状を示し，生後一定の無症状の後に症状出現．呼吸異常，体重増加不良，不活発，limb-clasping，歯ならびが不揃い，雄では停留睾丸が認められ一般に生後5週までは正常，6～12週で死亡することがわかった．Mutantでは脳重量，神経細胞のサイズ減少があり，神経変性や構造異常はなく，海馬，大脳皮質，小脳が小さいことなどが見つかっている（表6).

Ⅱ Rett症候群の展望

動物モデルとヒトのRTTの症状および神経伝達物質の関連およびX-染色体の不活化の程度との差をみ

表4 Rett症候群の脳脊髄液β-phenylethylamine (PEA)[16]

	N	PEA (pg/ml)	Range (pg/ml)
Rett症候群	17	387.2 ± 285.9	24.1- 978.0
てんかん+精神遅滞	4	612.2 ± 221.1	299.8- 792.5
自閉症	5	570.6 ± 441.6	158.3-1,424.5
対照群	13	936.2 ± 519.1	404.6-1,902.0

表5 Rett症候群の脳脊髄液substance Pの検討[5]

Group	N	Age(yrs)	Substance P (fmol/ml)
小児Rett	16	5.1±2.8	4.2±1.7
小児コントロール	11	5.9±2.6	8.3±0.9
成人Rett	4	27.8±5.0	2.6±2.4
成人コントロール	17	33.2±8.4	7.0±1.1
精神遅滞	7	5.0±2.4	11.0±3.1
てんかん	4	6.3±4.2	8.3±3.3
Guillain-Barré症候群	3	4.4±1.5	8.0±0.8

表6 Rett症候群の動物モデル[19][20]

- A mouse MeCP2-null mutation causes neurological symptoms that mimic Rett syndrome
- Deficiency of methyl-CpG binding protein-2 in CNS neurons results in a Rett-like phenotype in mice
- 生後一定の無症状の後に症状出現
  呼吸異常，体重増加不良，不活発，limb-clasping，歯ならびが不揃い
  雄では停留睾丸
- 生後5週までは正常，6～12週で死亡．Mutantでは脳重量，神経細胞のサイズ減少，神経変異や構造異常（－），海馬，大脳皮質小脳が小さい

表7 Rett症候群の展望

- MeCP2遺伝子変異のタイプ
  X-染色体不活化……神経伝達物質
- MeCP2ノックアウトモデル動物 ……遺伝子治療
- 治療的試み
  Substance P, PEA，他の神経栄養因子

るMeCP2ノックアウトモデル動物を使った遺伝子治療の試みと，サブスタンスPやPEAをはじめとする神経伝達物質，神経修飾因子および神経栄養因子を用いた創薬の可能性について今後の検討が必要である（表7）．

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Neuroimaging and Neurochemical Studies of Rett Syndrome

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We review here the current status of neuroimaging and neurochemical research on Rett syndrome (RTT), with reference to neurophysiological, neuropathological, and immuno-histochemical changes previously described. Abnormalities have been reported in the intermediates of the biogenic amine neurotransmitters/receptor systems, and of β-phenylethylamine (PEA), an endogenous amine synthesized by the decarboxylation of phenylalanine in dopaminergic neurons of the nigrostratal system. We also discuss the roles of other neurotransmitters including β-endrophin, substance P and neurotrophic factors including nerve growth factors. Recently, mutations in the gene encoding methyl-CpG binding protein 2 (MeCP2), mapped to Xq28, have been identified in patients with RTT. Multiple abnormalities in various neurotransmitter/receptor systems may accounts for the pervasive defects in RTT.

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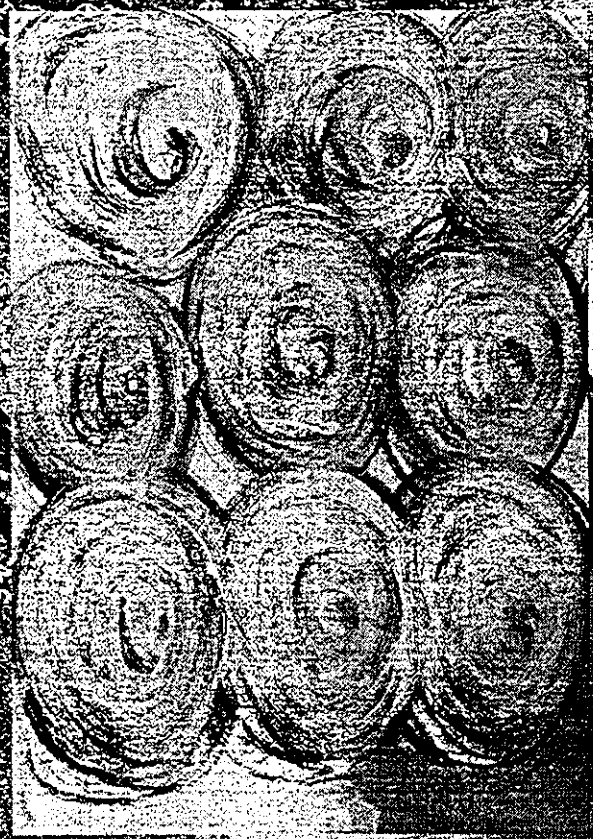

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People with Mental Retardation Living in Kurume City, the Southwestern Part of Fukuoka Prefecture, Japan. – The Current Status of the Health, Welfare and Employment –

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Introduction

Since the concept of "Normalization" has been proposed, many professionals from medicine, education, and social welfare have argued the importance of providing flexible support for people with mental retardation (MR) in order to improve and fulfill their lives. The phrase "Normalization" has been described as a human service principle that advocates that service should be provided to mentally retarded people in the same manner as to non-retarded people.(1) MR has been defined as "subaveraged intellectual functioning" and "concurrent deficits or impairments in present adaptive functioning". (2) DSM-IV (Diagnostic and Statistical Manual of Mental Disorder – IV) has established the diagnostic criteria of MR as follow: A) IQ below 70; B) adaptive failure; C) onset before age of 18 (3).

As has other countries, the Japanese government has enacted laws regarding social welfare, with local governments taking on the role of organizing and providing such services as issuing a mental disability handbook, a physical disability handbook, giving monthly allowance, and other welfare services. Medical service is indeed essential for people with MR because quite high proportions of people with MR are affected by epilepsy (4)(5) and other diseases during their lives. And, it is often the case that pediatric neurologists give treatment despite them having reached the age of 20 because MR is often a childhood-onset disability except in the case of acquired brain injury and other accidentally acquired disease, and the parents and people with MR tend to prefer the physicians who had seen them since they were young(6). The educational situation for people with MR has changed, and most of elementary and junior high schools in Japan are now equipped with special classes in which people with MR can be taught at their level.

Although the government and local authorities have appointed social and welfare services for people with MR, there seems to be a discrepancy between "theory and reality". That is, despite the presence of fully equipped services, they seem to be underutilized because of many restrictions, e.g. a certain service cannot be used because of the age of the individual with MR is under 18. In terms of medical and educational services for them, to the best of our knowledge, the actual circumstances have not been revealed and examined scientifically.

Due to such circumstances, we strongly consider is necessary to clarify the current status of the everyday life of people with MR. On the basis of such clarification, we furthermore need to establish a

support system, which functions effectively. Thus, we have begun a three-year project investigating the current status of the health condition, welfare, and educational support of people with MR living in Kurume city, Fukuoka prefecture, Japan. Previous works have revealed the prevalence and risk factors of MR in Kurume city; we have thus already acquired the regionally specific factors of people with MR.

In the first year of the project, we investigated the number of people with MR who visited the Division of pediatric neurology between January 2002 and January 2003. This is the second year of the project, and we have created a well-structured questionnaire form specific to this study. We have discussed and designed the content of the questionnaires with professionals in the area of medicine, education, and social service. We are currently conducting a pilot study using the questionnaires, and we are planning to provide them to hospitals, schools, and institutions with them by the July 2003.

In this proceeding, we will report the number of the patients and etiology of MR at our university hospital between January 2002 and January 2003 and show how the questionnaire has been designed. Previous works on people with MR in Kurume city will be shown in the following paragraph.

Shiotsuki, et al (1984) conducted a study investigating the prevalence of MR in Kurume city, Fukuoka, Japan. It was carried out in order to determine the prevalence rate and etiology of children with MR who had been born between 1969 and 1974. The results of the survey showed that the prevalence rate was 7.1/1,000(7). In addition, Matsuishi (1984) conducted a retrospective study investigating possible risk factors and signs of MR for its early detection, intervention, and prevention. The results of the study showed risk factors, such as asphyxia, birth weight of less than 2,500g, poor sucking, floppy infant with little activity, poor response to the human voice, difficulties with eye to eye contact, delayed head control and delayed walking with support (8). Furthermore, in Kurume city, a high prevalence of infantile autism was confirmed in 1987(9).

As stated as above, these studies revealed epidemiology of disorders in Kurume city and suggested possible ways of early intervention, thus furthering our understanding of these disorders.

Methods

Investigation of the number of people with MR who visited Kurume University Hospital

In order to understand how many people with MR have received medical care, we examined the records of Kurume university Hospital between 2001 and 2002. Because people with MR have received several diagnoses, e.g. autistic disorder, Down's syndrome, etc, we thus carefully scrutinized the ID numbers of the patients in order to exclude duplication.

Questionnaire

We designed and created a questionnaire specific to this study.

Since last February, we have held committee meetings every two months, of which members consist of pediatric neurologists, a care manager of social services, the head of the Institute of Education for Preschool Children, the headmaster of the school for children with mental retardation, the head of the City Welfare and Public Health Office, and a manager of the City Committee of the Board of Education. In the meeting, relevant information regarding medical, educational and social services, which those

with MR had received was gathered in order to create an effective questionnaire. According to the information gathered, the questionnaire was outlined. We also considered findings from previous studies. For instance, although the families of people with MR play a key role in supporting their everyday life, research findings suggest that families with a member having MR report significantly great stress (10). The condition of family members would be significant when clarifying and coming to understand the living conditions of people with MR. Thus in the questionnaire we included a section entitled 'patients and family'

Results

A total of 1456 patients with MR visited Kurume University Hospital between January 2002 and January 2003. Most of them, 1173 (80%), MR with unknown etiology. 113 (7.8%) were patients with autistic disorder, 104 (7.1%) were those with Down's syndrome, and 38 (2.6%) were those with Rett syndrome (Table 1).

Table 1. The Number of Patients with MR who visited the Pediatric Outpatient, Kurume University Hospital between January 2002 and January 2003

Diseases/Disorders	No. of Patients
Mental Retardation (cause unknown)	1173
Autism	113
Down's syndrome	104
Rett syndrome	38
Williams syndrome	11
Tuberous Sclerosis	7
Prader-Willi syndrome	8
Angelman syndrome	2

As shown in Table 2, the questionnaire consists of five sections. Three types of responses are provided: 1) yes or no; 2) multiple-choice style; 3) fill in a blank. In addition, in order to reveal problems and difficulties of families and persons with MR, a blank space is included in the end of each section. Also, "self-completion of life stage flow chart from birth to the 30s" with four arms of 'hospital', 'welfare', 'educational and training center' and 'school' was inserted at the beginning of the questionnaire, which are horizontally divided by age. Prior to answering the questions, families or residence staffs will be asked to fill space in the self-completion life stage flow chart if there are any events, e.g. the first visit of the hospital, elementary school enrolment and so on. The first section contains questions regarding the family and its member with MR. This section was designed to create a basic portrait of the family and its member with MR, e.g. the individual's age and sex, his or her main care providers, and other family members who require special care. The second section contains questions regarding hospitals where people with MR have visited, e.g. age of first visit, costs, prescriptions and degree of satisfaction with the hospital. The third section asks questions regarding an

educational and training center for physically and mentally disabled people that people with MR have visited. As in the second section, we have included questions regarding age of first visit, cost of the visit, and degree of satisfaction with the center. In the fourth section, questions regarding the schools the individuals have attended. Questions are about the types of schools, e.g. mainstream or special needs school, consultation prior to enrolment, seizure during the school hours, and degrees of understanding of teachers when needed to visit the hospitals and the training center during the school hours. In the final section, questions regarding social and welfare services are introduced. Questions such as identification pocketbooks, pensions, life support services, the newly introduced support budget system, and degree of satisfaction with social and welfare services are included.

Table 2. Outline of the Questionnaire

1. Questions regarding patients and family
    - Date of birth
    - Family structure
    - Diagnoses
    - Main care taker
2. Questions regarding hospitals patients visited (still visit)
    - Age of fist visit
    - Age of diagnosis
    - Frequency of visit (times / month)
    - Regular prescription
    - Cost per visit (transportation and medicine)
    - Degree of satisfaction
3. Questions regarding the educational and training center patients have visited (still visiting)
    - Age of the first visit
    - Cost per visit (transportation and payment for the training)
    - Still visiting or not
    - Degree of satisfaction
4. Questions regarding schools patients have attended (still attending)
    - Whether consulted choice of school
    - Seizure during school hours
    - Teachers' acceptance when patients visit doctors during school hours
    - Degree of satisfaction
5. Questions regarding social services used by patients (still using)
    - Possession of mentally and (or) physically disable handbook(s)
    - Pensions
    - Life support service
    - Supporting budget system
    - Degree of satisfaction

Discussion

In the first year of the project, we had examined the number of patients with MR who visited Kurume University Hospital between January 2002 and January 2003.

As shown in the result section, 1173 patients with MR of unknown etiology visited the hospital. This large number may be due to the fact that the child neurology clinic at Kurume University Hospital was visited by people with MR not only from Kurume City but also from nighboring areas. In regard to patients with autistic disorder, it should also be mentioned that quite a high percentage of these patients visited the clinic. This result was in line with Matsuishi's findings; that is, high prevalence of infantile autism was confirmed in Kurume city. In addition, there are trained pediatric neurologists for autistic disorders at the child neurology clinic, and thus many patients with autistic disorder come to see the doctors at Kurume University Hospital. Another reason for this finding may be a paucity of psychiatrists specializing in child neurology. Also, the number of patients with Rett syndrome was 36, which was high in comparison to the prevalence rate of 1.13/10.000 (11). Having stated that, it is rational because the child neurology clinic at Kurume University has a central function of diagnosis and treatment of Rett syndrome in Kyushu Island. Thus, almost all the patients with Rett syndrome in Kyushu Island visit Kurume University Hospital. As well, 104 patients with Down's syndrome visited the hospital, this also being an unusually large proportion in regard to the general population. Like the patients with Rett syndrome, the child cardiology clinic at Kurume University Hospital is visited by many with Down's syndrome because it contains a center for cardiovascular disease where trained child cardiologists practice. As a whole, the number of patients with MR who visited the university hospital was quite high.

In the second year, we designed a questionnaire specific to this study. Because we have been conducting a pilot study, any critical comments on the contents of the questionnaire can not be mentioned. However, we can point out several aspects of this specific questionnaire.

First, this study aims to clarify the status of the health condition, welfare, and educational support which people with MR have been receiving since they were diagnosed. In this respect, this questionnaire has been designed to focus on the lifespans of people with MR and to reveal problems in terms of their medical, educational and welfare support they have.

Secondly, the questionnaire was designed for completion by both family members and residence staff of residence. Thus, no technical terminology was used, with each item being described in a simple manner.

Thirdly, the contents of the questionnaire would be retrospective for most of the families and staff. Thus, we have introduced a self-completion flow chart, which would help the respondents recollect the past history of people with MR.

Finally, the questionnaire has been designed to provide us with both quantitative, e.g. scores on 'yes-no' questions and qualitative data, e.g. contents in a blank space at the end of each section. This is intended to facilitate and enhance our understanding of the condition of the everyday life of people with MR.

Conclusion

To summarize, we have conducted the following: 1) examination of the number of people with MR who visited the pediatric division at Kurume University Hospital between January 2002 and January 2003; 2) designed and created a questionnaire specific to this study. As soon as the pilot study is finished and the reliability and validity of the questionnaire are confirmed, we will begin conducting a questionnaire survey at several institutions after obtaining informed consent. In the third year, the obtained data will be analyzed, and we intend to establish a support system based on our findings.

We would like to emphasize that people with MR and their families have a right to expect any related services and for support to be flexible and practical; yet the reality of these expectations remains controversial. Our regionally specific survey would elucidate problems and difficulties people with MR have, and we would like to use this project to improve and enrich current medical, educational, and welfare support.

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A Comprehensive Approach to the Behavioral Problem of the Adults with Autism and Severe ID

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Introduction

A majority of people with autism have intellectual disability (ID). These people frequently show behavioral problems such as self-destructiveness, aggressiveness, restlessness after graduation from schools of special education. If they have severe behavioral problems for long time, these problems make their caregivers so exhausted that they cannot continue to live ordinary life. Sometimes they attend to the adult psychiatrists and are prescribed much tranquillizer.

There are some evidences that these behavioral problems can be decreased by finding and diminishing the factors of inducing these behaviors. TEACCH program is famous one which decreases the behavioral problems. Ohta staging (Table 1) and cognitive developmental therapy (Ohta`s program) is made for children with autism to facilitate their cognitive developments, but it is sometimes useful to switch the problematic behaviors to non-problematic ones.

We have applied the Ohta`s program to the patients with autism and severe ID who had behavioral problems and have done a comprehensive approach affecting both clients and caregives to change the problematic behaviors into non-problematic behavior. Our approach has been effective to some clients. So we introduce this approach.

Table 1 Ohta staging

Ohta staging	differentiation between means and names	understanding the name of things	understanding the comparison of the size	understanding the spatial relationship	understanding the conservation of quantities
I－1	－	－	－	－	－
I－2	±	－	－	－	－
I－3	＋	－	－	－	－
II	＋	±	－	－	－
III－1	＋	＋	±	－	－
III－2	＋	＋	＋	±	－
IV	＋	＋	＋	＋	－
V	＋	＋	＋	＋	＋

Methods

The number of clients is 6. Three are male and the others are female. Their ages on the first visit were distributed from 19 to 31 years old. All of them were diagnosed as autism and severe ID according to DSM-IV. One lives in a facility for ID, and the others live at home. One does not speak, but the others can speak sentences. Follow up period of each client varies from 2 years 6 months to 8 years 1 month.

The staffs of this approach comprised medical doctors, psychologists and, if necessary, medical social workers.

Each client was evaluated during the first to the third session. They were asked their personal history and the situations when their behavioral problem occurred, then they received physical and neurological examinations to find physical factors that could induce behavioral problems. And then, they received Language Decoding Test (LDT) to determine Ohta staging and, if possible, IQ test. We also evaluated their communication skill, Wing subgroup and favorite activities through the tests.

Table 2 shows the sex, age on the first visit, places of living, Ohta staging and follow up periods of each client. Ohta staging were Ⅲ-1 in four and Ⅲ-2 in the others. On Wing subgroup, two people belong to aloof type, passive type and active-but-odd type respectively.

Table 2 Profile of the clients

client No.	sex	age on the first visit	residnce	Ohta staging	Wing subgroup	speech ability	follow up period
1	male	29	resident	Ⅲ-2	aloof	sentence	3 years 3 months
2	female	39	home	Ⅲ-1	aloof	sentence	2 years 6 months
3	male	31	home	Ⅲ-2	active-but-odd	sentence	2 years 6 months
4	male	29	home	Ⅲ-1	active-but-odd	sentence	2 years 4 months
5	female	23	home	Ⅲ-1	passive	sentence	3 years 6 months
6	female	20	home	Ⅲ-1	passive	no speech	8 years 1 months

After the evaluations the clients received psychotherapy based on Ohta`s program and they were prescribed some medicines. The caregivers were informed how to prevent severe behavioral problems or how to change these problematic behaviors into non-problematic one by psychologists and/or medical doctors. These sessions continued on the regular basis; once or twice a month. Table 3 shows behavior problems, medication before the approach, psychotherapy and the advice to each caregiver.

Table 3 Behavioral problems and approach to the clients

client No.	behavioral problem	medication before the approach	psychotherapy	advice for the caregivers
1	self-injury, challenging behavior, obsessive compulsive behavior, breaking things	triazolam, flunitrazepam, amobarbital, bromovalerylurea, levomepromazine, promethazine hydrochrolide, carbamazepine, haloperidol	providing an activity which he is satisfied with and which make interpersonal relationship	visualizing the information, to accept some of his obsessive compuslive behaviors unless they disturb other persons

2	self-injury, collecting garbage, challenging behavior, obsessive compulsive behavior, breaking things , screaming	none	providing an activity which she is satisfied with by accomplishing it for stabilize her emotion	advicing the ways which change her obsessive compulsive behaviors to harmless for others, providing an activity whi she is satisfied with
3	challenging behavior, violent languages to the others, escaping from the day service center, refusing to attend the day service center, undressing in public	none	providing an activity which he is satisfied with	advicing the way keeping the circadian rhythm, to inform him daily activity a visual manner, make a place or time he can escaj from his tasks when he g tired
4	challenging behavior, breaking the things, screaming, obsessive compulsive behaviors, going out without telling in advance	none	providing a chance to participate the activity she likes with the others, to induce her expression	counseling his mother anc stabilize her emotion
5	self-injury, refusing to attend the day service center, decreased speed of work	none	providing activities which she is satisfied with, and she is praised	moving her interest from self-injury to another activity, make an extra holiday, to make a conversation about the theme she likes
6	self-injury, challenging behavior, obsessive compulsive behavior, odd posture, excitement	none	providing activities which she is interested in for stabilizing her emotion	slowing down the pace of daily life, not to make her hurry

Results

Medication was decreased in one client, and was started in four. The behavioral problems have been diminished in one client, decreased in the other 5 clients. It took from 2 months to 9 months to the effects appeared. Challenging behavior tended to decrease easily and obsessive compulsive behavior tended to remain. Besides the decrease of behavioral problem good result for the clients` life were seen in two.

During the follow up period the behavioral problems was easily reappeared with their environmental change. So we had to keep in touch with the clients and caregivers to find their emotional change early and to assure that our advice had been continued to carry out. The result of each client is shown in Table 4.

Table 4 Results

client No	time until beginning of effect	remained behavioral problem	good effects	medication
1	4 months	self-injury, obsessive compulsive behavior,	increase of communication with caregivers	brotizolam, fluvoxamine malate, pimozid, haloperidol (side effect has been diminished)
2	2 months	collecting garbage, obsessive compulsive behavior,		fluvoxamine malate
3	3 months	escaping from the day service center, refusing to attend the day service center		haloperidol, pimozid
4	4 months	challenging behavior, screaming, obsessive compulsive behaviors, going out without telling in advance	starting to go to day service center regularly	haloperidol, levomepromazine
5	6 months	none		none
6	9 months	self-injury, obsessive compulsive behavior, odd posture		pimozid

Discussions

It is very difficult to cope with behavior problems of people with autism and mental retardation. Bhaumik et al. made a population based study on autistic traits in adults with learning disabilities and concluded that the relationship of autistic traits and challenging behaviour had major implications in service planning and delivery.

Treatment and education of autistic and related communications handicapped children (TEACCH) method is very famous for effective approach to decrease these problems. Cox et al. and Van Bourgondien et al. used THACCH method to the aggression and self-injurious behaviors in persons with autism and made good results.

On the other hand, serotonin related medicine such as paroxetine or risperidone were revealed to be effective in the behavioral problems recently. McDougle et al. reviewed treatment of aggression for youngsters with autism and conduct disorder and concluded that the optimal clinical management involved both behavioral and pharmacologic intervention strategies.

In Japan TEACCH program has been adopted by many facilities, but it is not spread all over the nation. A number of adults with autism and severe ID and their caregivers suffered from the behavioral problems. Kobayashi et al. researched 201 young adults with autism and reported 31.5% had shown marked deterioration during adolescence.

Ohta et al. produced a method to evaluate the cognitive functions of children with autism. It is so simple that it takes short time to evaluate the clients. They divided the cognitive developmental process into 8 stages through the LDT. Then they produced a cognitive developmental therapy program for children with autism on each stage. This program is composed of individual / group psychotherapy to the clients, the way of control the behavioral problem, home program and social skill program.

We applied this Ohta program to adult clients in combination with pharmacologic treatment. We think our approach is effective in the behavior problems of adult with autism and severe ID. But the number of clients is very small and the Clients` Ohta stage was limited to only Ⅲ-1,or Ⅲ-2. So we should increase the number of the clients and should spread the clients to another Ohta stage.

Compared to TEACCH method, this approach is still not so systematized that there may be some difficulty in carrying out at first. But our program is simpler and easy to be adopted, because LDT is simple.We assure that our approach is worth while trying for behavioral problems of peoples with autism and severe ID.

Conclusion

Our comprehensive approach using Ohta program is easy to be adopted and effective in some kinds of behavioral problem. We assure that our approach is worth while trying for behavioral problems of peoples with autism and severe ID.

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Treatment for Obesity in Persons with Intellectual Disabilities.

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Introduction

Obesity is defined as Body Mass Index (BMI) ≧25, calculated as weight (kg) /stature (m)^2, and contributes to various diseases such as hypertension, diabetes mellitus and hyperlipidemia, which are risk factors of myocardial infarction or apoplexy (Fig. 1, Table 1).

Persons with intellectual disabilities (ID) have above-average obesity, and those who at home often have severe obesity. They are unable to carry out any strenuous exercise or dietary practices. Familial and other environmental factors also have an influence on obesity. Some syndromes, such as Down syndrome and Prader-Willi syndrome, involve both ID and obesity. Patients with Down syndrome occasionally or Prader-Willi syndrome usually show both. The Down syndrome patients are less active and spend more time indoors (Sharv, 1992). Prader-Willi syndrome is a multisystem disorder with obesity due to eating control disorder (Holland, 1995).

Many regimens to control weight in persons with ID, including caloric restriction, exercise, and combinations of diet and exercise, have been attempted. The caloric restriction is divided into three stages (1600-1800 kcal for mild 1000-1600 kcal for moderate, and 600-1000 kcal for high).

Although our medical center is an institution for persons with severe motor and intellectual disabilities (SMID), we sometimes admit obese patients with ID to apply the highly reduced calorie dietotherapy and maintain their health.

Figure 1. Relationship among obesity and complications

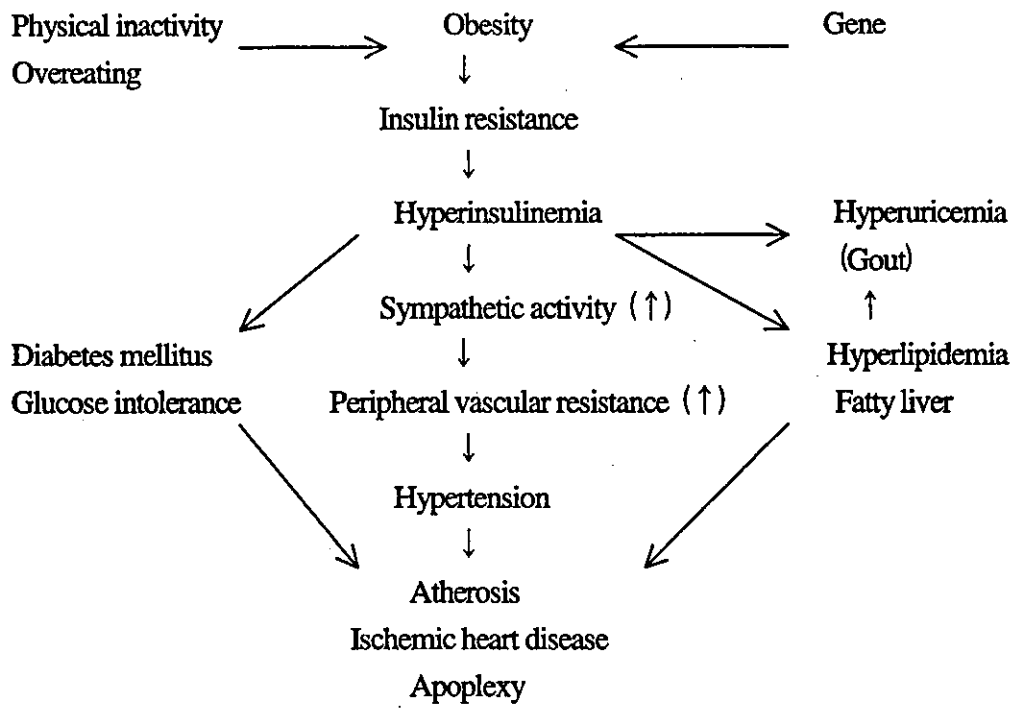

Table 1. Compications of obesity

circulatory system	cardiac hypertrophy, chronic heart failure, ischemic heart disease, hypertension, atherosclerosis
respiratory system	hypoventilation, Pickwickian syndrome
endocrine system	diabetes mellitus, hyperlipidemia, Hyperuricemia (gout)
nervous system	stroke
liver system	fatty liver, cholelithiais
urologic system	chronic nephritis, proteinuria
motor system	lumbago, leg-pain

Subjects

25 persons with ID participated in this study (Table 2). They were 11 males and 14 females, and their ages ranged from 13 to 52 years old. BMI ranged from 28.1 to 57.9. Their background diseases were mental retardation (MR), epilepsy, autism, brain tumor (postoperative), Down syndrome, Prader-Willi syndrome, and Bandet-Biedle disease. Period of hospitalization was from one to three months. Four patients were hospitalized 2 times, and one patient was 3 times, and 5 patients gained weight again. Therefore, the total number of hospitalizations was 31.

Methods

1. Investigation of past history.

We investigated the past history of all patients from their hospital records and families. The body weight from childhood, and familial environmental factors were clarified as contributing factors.

2. Blood tests and other examinations.

We performed blood and urine tests, ECG, Chest X-ray, CT scan at the level of the umbilicus, and abdominal echogram. These were performed once a month.

3. Introduction of reduced calorie diet and exercise program.

The diet was introduced at 1200–1800 kcal/day, and decreased gradually with balanced nutrient content and adequate protein intake. Non- or hypo-caloric foods were used to control hunger.

For exercise, walking is the easiest and most important exercise. Walking on the ground or in a pool, and going up and down steps were performed 2–3 times a week under supervision by a physical trainer. In planning exercise programs, the cardiovascular and respiratory capacities were considered.

Results

1. Change of body weight (Table 3)

Many of the subjects began to gain weight between the ages of 10 and 15. After leaving high school their weight gain accelerated. This acceleration was due to the reduced physical activity.

2. Family environmental factors

11 patients had obese parents. At least one parent showed diabetes mellitus in 2 families. Twenty patients had brothers or sisters, and could take snacks and juices anytime. Some parents gave them snacks to control their panic attacks.

Table 2. Informations of the subjects

Case	Age/Sex	Disease	Hospitalization (months)	Change of BMI	Weight Loss (kg)
1-1	13/F	MR, Epi	3	30.5→ 24.4	81.0→64.8 (-16.2)
1-2	15/F	MR, Epi	3	33.3→ 26.4	88.4→71.6 (-16.8)
2	15/M	MR, Epi	1	29.7→ 26.5	91.0→81.2 (- 9.8)
3	16/F	MR, Epi	3	38.9 → 33.0	91.0→77.2 (-13.8)
4	17/F	MR, Epi	2	37.0→ 32.7	99.5→88.0 (-11.5)
5	19/F	MR, Epi	1.5	30.8→ 28.0	72.2→65.5 (- 6.7)
6	20/F	MR	3	43.6→ 39.0	102.0→91.2 (-10.8)
7	22/F	Autism, MR	3	38.4 → 30.6	102.0→81.4 (-20.6)
8-1	23/F	MR	3	33.3 → 28.5	76.5→65.0 (-11.5)
8-2	25/F	MR	3	31.6→ 28.6	72.0→65.2 (-6.8)
9-1	23/M	Autism	3	31.9→ 24.8	99.5→77.4 (-22.1)
9-2	24/M	Autism	1	28.9 → 26.8	90.0→83.6 (- 6.4)
10-1	24/F	Autism, MR	3	37.7→ 32.5	93.0→80.0 (-13.0)
10-2	24/F	Autism, MR	3	31.8 → 27.2	78.5→67.0 (-11.5)
10-3	26/F	Autism, MR	3	33.7 → 29.2	83.0→72.0 (-11.0)
11	27/F	MR, Epi	3	34.3→ 31.2	86.6→78.8 (- 7.8)
12	27/F	Brain tumor (post ope.)	3	32.7→ 27.7	75.6→64.2 (-11.4)
13-1	27/M	MR	3	35.8 → 28.7	97.6→78.0 (-19.6)
13-2	28/M	MR	1.5	29.2→ 27.2	79.4→74.0 (- 5.4)
14	28/M	MR	1	39.5 → 36.5	98.5→91.0 (- 7.5)
15	28/M	DS	3	41.3→ 36.4	95.4→84.0 (-11.4)
16	29/M	PWS	3	50.5→ 43.1	113.0→96.5 (-16.5)
17	30/M	MR	3	31.8→ 28.4	64.2→57.4 (- 6.8)
18	30/M	MR	3	57.9→ 50.3	152.0→132.0 (-20.0)
19	34/M	Autism, MR	1	36.8→ 33.2	117.8→106.4 (-11.4)
20	35/F	DS	3	34.3 → 30.3	66.2→58.0 (- 8.2)
21	40/M	MR	3	52.0→ 43.4	121.8→101.6 (-20.2)
22	41/F	MR	2	36.2→ 32.2	73.0→65.0 (- 8.0)
23	49/M	Bardet-Biedle disease	3	47.3→ 40.3	115.0→98.4 (-16.6)
24	52/F	MR, Epi	1.5	28.1→ 26.5	64.0→60.4 (- 3.6)
25	52/F	MR	2.5	32.3→ 30.0	71.8→66.6 (- 5.2)

MR; Mental retardation, Epi; Epilepsy, DS; Down syndrome, PWS; Prader-Willi syndrome.

Table 3. Accelerated weight gain

10-12 years old	10 cases
13-15 years old	6 cases
16-18 years old	4 cases
over 19 years old	3 cases
unclear	2cases

3. Complications of obesity (Table 4)

The main complications were fatty liver (40.0%), hyperlipidemia (36.0%), and hypertension (32.0%). Patients with Prader-Willi syndrome and Down Syndrome showed many complications.

Six patients (case 1, 3, 6, 9, 14, and 17) had no complications.

Table 4. Complications (includes overlapping cases)

Hypertension	8 cases
Ischemic heart disease	1 cases
Fatty liver	10 cases
Hyperlipidemia	9 cases
Hyperuricemia	6 cases
Diabetes mellitus (Impaired glucose tolerance)	6 cases
Sleep apnea	3 cases
None	6cases

4. Weight reduction (Table 2, 5)

During hospitalization, weight reduction ranged from 3.8 to 5.1 kg/person/month, which brought improvements in blood and other laboratory tests. Breathing disorders such as snoring and sleep apnea syndrome decreased, as did fat distribution in the abdominal area as measured by abdominal CT scan at the umbilical level. The findings of CT scan were very useful to explain the effects of weight reduction to families.

In hospitalization for three months, the maximum amount of weight reduction was 20.2 kg (case 21). This patient's starting weight was very high and he adapted to life on the ward quickly.

Table 5. Amounts of weight reduction

period of hospitalization	number of patients *	mean weight reduction (kg/month)
1-1.5 months	7	5.1
2-2.5 months	3	3.8
3 months	21	4.8

* Some patients were hospitalized more than once.

Discussion

1. The effect of dietotherapy

Table 5 shows that weight reduction was 3.8–5.1 kg/ patient/ month. We consider that these values are acceptable amounts for dietotherapy. Many of 25 patients were able to adapt to life in our institution by staffs' efforts, but three patients (case 2, 14, and 19) dropped out after one month.

2. Maintenance

The importance of both caloric intake and physical activity in weight control is well known. It is especially important for persons with ID to maintain daily physical activities. Families and staff in schools or care facilities for developmentally disabled people must provide a stimulating environment with such activities as walking, swimming, ball games, and aerobics.

Familial factors are very important in controlling caloric intake. Obese parents have been shown to have obese children. Because persons with ID often overeat and eat compulsively, families must restrict the access to food severely. It is necessary to teach low-calorie diet preparation to families and counsel them.

3. Prevention of obesity

In children with Down syndrome or Prader-Willi syndrome, prevention of obesity from childhood is an especially important matter of concern. The establishment of generalized life-style activities during childhood is most effective in preventing weight gain. Families, school teachers, health service staff, practitioners, and nurses need to work in partnership and make a network.

3. Usefulness of abdominal CT scan

It has been reported that the complications of obesity are related to regional fat distribution in the intra-abdominal area especially. The distribution of fat was determined by CT scan at the level of the umbilicus. A visceral fat / subcutaneous fat ratio of not less than 0.4 reflects increased chance of metabolic disorders (glucose intolerance and hyperlipidemia) (Fujioka, 1987).

Conclusion

The following are necessary to prevent obesity in children with ID: 1. Improvement of the home environment, 2. Family guidance for low-calorie diet preparation, 3. Family counseling, 4. Improved inter-hospital and inter-institutional networking.

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