Motivated exercise: a paradigm change in medical rehabilitation

Motivative exercise: a paradigm shift in medical rehabilitation

I join here from Japan, a super aged society.
The super aged society is becoming increasingly severe as my generation,
and the baby boomers, grow older all over the world.

From Super Aged Society,

Japan

This study began with the discovery of a fact.

(Taki) Takizawa, Shigeo, MA. (Founder / Inventor)
President, International Biophilia Rehabilitation Academy
Professor, Biophilia Institute, The Designated and Registered Institute by the Japanese Ministry of Education, Culture, Sports, Science and Technology

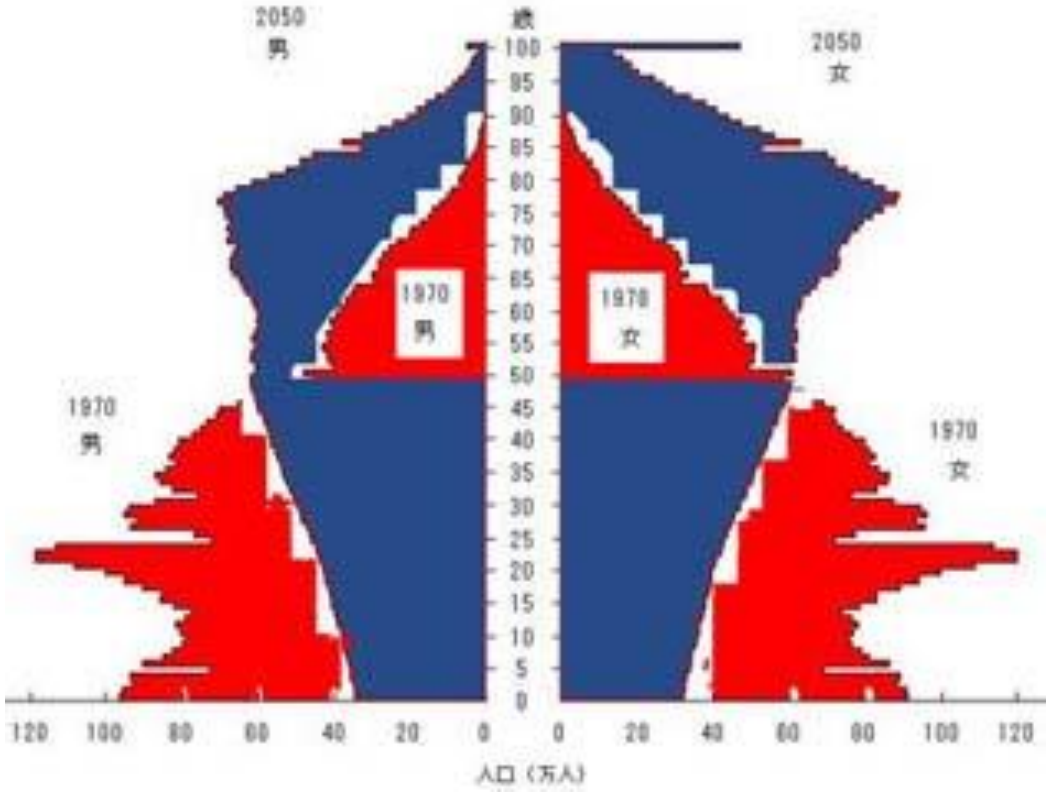
Japan is a super aged society

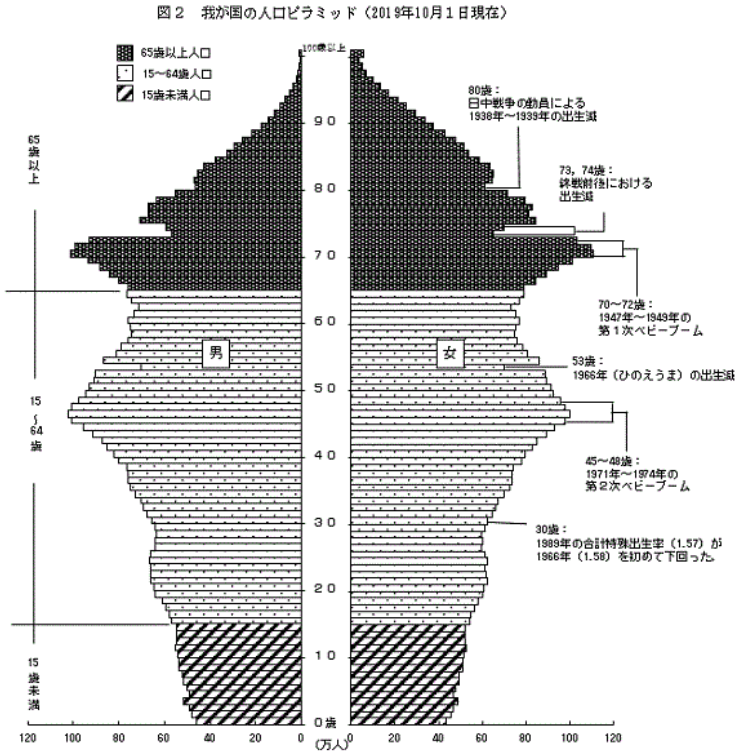
- According to rough estimates as of January 1, 2024, the total population of Japan is 124.09 million.
- While the total population is decreasing, the elderly population is 36.27 million, and the percentage of them in the total population is 29.1%, the highest ever.

Year	Population	Elderly	Percentage
2000	126,930	22,040	17.30%
2022	124,710	36,270	29.10%
Number of Elderly: 1.7 times			

Population pyramid of Japan

This state of demographic transition manifests in the form of an inversion of the artificial pyramid.





- Statistics Bureau, Ministry of Internal Affairs and Communications of Japan: https://www.stat.go.jp/data/topics/topi1321.html

Global trend

- The Aging Future, Peter Peterson“
- For now, it remains to be seen whether humanity will be able to adapt to the new realities brought about by the population transition.“
- The "older elderly" (85+) are growing.
- Much faster than the "younger elderly," the number of elderly between 65 and 84 is expected to triple, and those over 85 will increase sixfold in the next 50 years.

- Reference: UN World Population Prospect The 1998 revision.

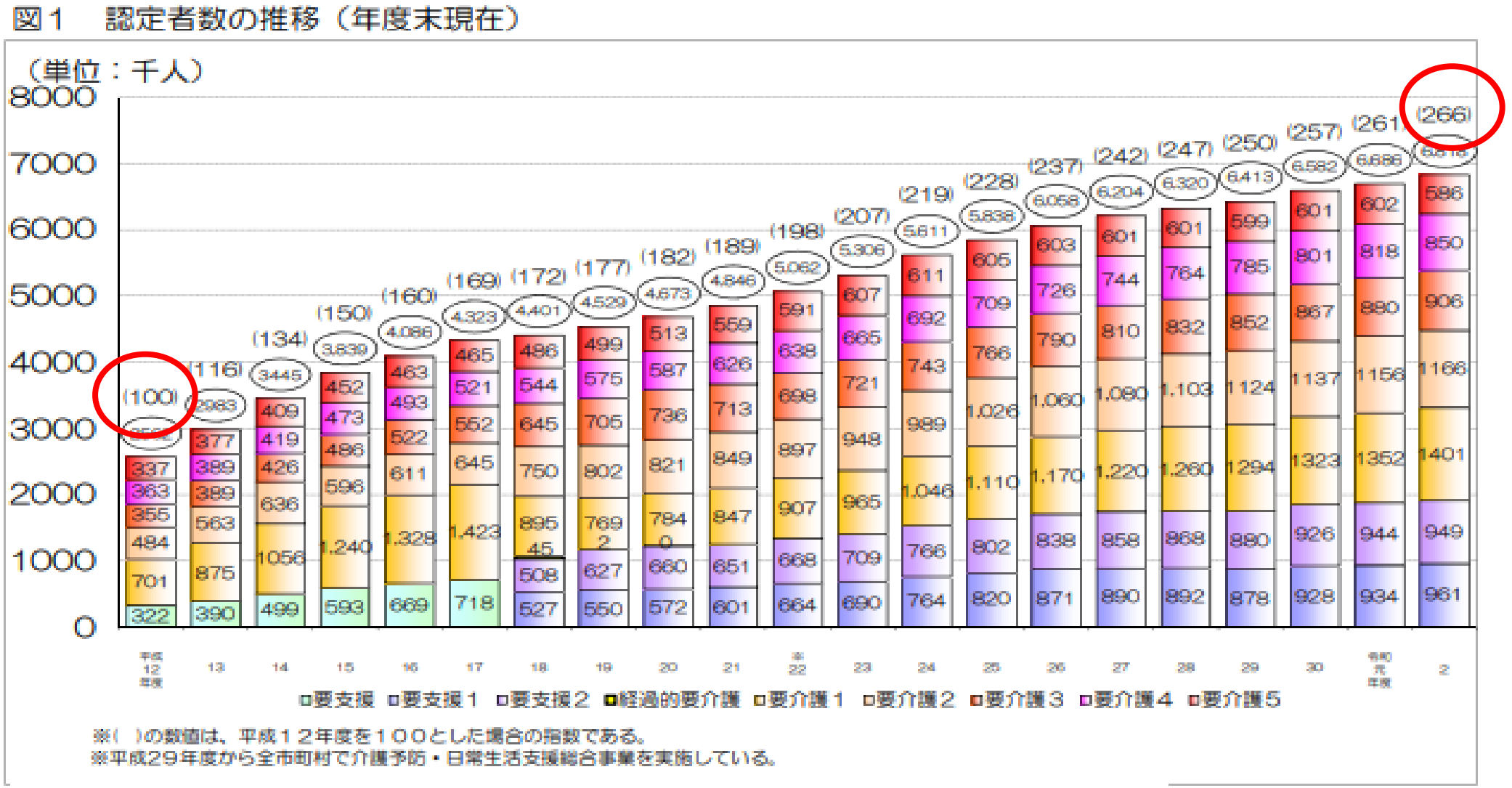
Purpose and inception of the Biophilia Institute

- Currently, there are 124.09 million people in Japan, 29.1% of whom are 65 or older.
- We are concerned that the younger generation may not be able to bear the cost of supporting the elderly.
- Our research, a paradigm change in medical rehabilitation, began with how we can reduce their burden.
- To do the study,
- In 1987, I created the Biophilia Institute,
- In 2006, the Institute was approved as The Designated and Registered Institute for Kaken by the Japanese Ministry of Education, Culture, Sports, Science and Technology,
- In 2003, the Society for Domestic Biophilia Rehabilitation Academy,
- In 2008, the International Biophilia Rehabilitation Academy with Professor Pokorski, all those continuing.

Result of medical rehabilitation in Japan

- The universal national health insurance system in Japan provides 100% of necessary medical care.
- Of course, 100% of necessary medical rehabilitation care is also provided.
- After a patient is out of medical care on the insurance system, there is a long-term care insurance system in Japan. The insurance is designed to care for those who need nursing care after receiving necessary medical treatment.
- As mentioned, people who have received 100% of the necessary rehabilitation medical care are insured with long-term care insurance, and between 2000 and 2020, the number of people being cared for increased 2.6 times, as shown in the following Fig.
- The change in the percentage of elderly people during this period was 1.7 times.
- The number of people receiving necessary medical rehabilitation but requiring nursing care increased by 153% compared to elderly people.

The number is shown in this table.



Ministry of Internal Affairs and Communications of Japan:

- The number of physical therapists involved increased from 23,303 in 2000 to 192,327 in 2021, an 8.2-fold increase, and the number of rehabilitation specialists tripled from 810 to 2456 in 2019.
- The introduction of robots and medical equipment, as well as advanced team medicine, has been promoted. This increase was expected to reduce the number of people requiring nursing care.
- However, the increase in their number is high compared to the increase in the number of elderly people and those requiring care.

50% of bedridden patients had reacquired ambulation

- Our study published the fact that 50% of bedridden patients in a bedridden hospital, which only admitted patients who had become bedridden in other hospitals, had reacquired ambulation in the Journal of the Japanese Clinical Orthopaedic Association in 1998 as the original article titled “Our recommendation for rehabilitation and related training devices - rehabilitation for gait re-acquisition in a hospital for bedridden elderly" with the ex-president of the society, doctors in Fujisawa and me.
- We described the methods and progress in order to have the methodology adopted as an intervention in rehabilitative medicine.
- We presented it titled “The Development of Devices for the MOTIVATIVE Exercise of Impaired Extremities” at the Center On Disabilities, Technology And Persons With Disabilities Conference 2000, Fifteenth Annual International Conference "Technology and Persons with Disabilities" (CSUN 2000) in English. It had been published as a peer-reviewed English paper in our Biophilia journal with permission from the proceeding publisher.
- We hope you will find it of interest.

- Kijima H, Kanai S, Takizawa K, Takizawa S, et al. Our recommendation for rehabilitation and related training devices - rehabilitation for gait re-acquisition in a hospital for bedridden elderly. Journal of the Japanese Clinical Orthopedic
- Association. Vol. 23. NO. 2 JUNE. 1998: 186-191.

MEANING OF THE WORDS

- This presentation informs you our research to introduce new intervention into rehabilitation medicine.
- My presentation is based on the method that has not been utilized before as shown by the related patents, so it is not written in the Medical Subject Headings 2024.
- So we require new words, that I will introduce you the meaning of the words that we coined and utilized.
- We frequently use them in our study and my presentation, so I described the words.

PATENTS

- In today's lecture, sharing with you about; our study to date and
- show you how we can make the super-aged society sustainable, and
- a new intervention method in rehabilitation medicine is shown to realize it.

1	**Takizawa S, US.PAT. 7153250 Method for managing exercise for function recovery and muscle strengthening, 26, DEC. 2006**
2	Takizawa S, US.PAT 7481739B2 Lower limb function training device、2009-01-27
3	Takizawa S, US.PAT. 6780142 Lower limb function training device, 24 AUG. 2004
4	Takizawa S, US.PAT. 7322904 Lower limb function training device
5	Takizawa S, US.PAT. 3978497, Motivative exercise and lifting aid dual device, 27, DEC. 2005
6	Takizawa S, US.P A T 7641591 LOWER LIMB FUNCTION TRAINING DEVICE
7	Takizawa S, US.PAT. 6978497 Motivative exercise and lifting aid dual device
8	Takizawa S, US.PAT. 6625846 Caster for robot

A paradigm change- a paradigm shift : in medical rehabilitation

- It is of utmost importance that we do not exacerbate the conditions of care and that the disability be overcome if not hopefully restored.
- I hope this presentation will be of help in this regard.
- Now, I want to rephrase the title from "Motivated exercise" to "Motivative exercise" and a "paradigm change" to "paradigm shift" in medical rehabilitation, but here's the secret.
- My lecture starts for revealing the secret.
- We have patented the entire method described in the previous page because it is a method that has never been used before in the concept of rehabilitation medicine. We named it the "Takizawa Method.

◎ グリップが握れない人には、最初はお手伝いし、
その内自分でつけられる補助具を使ってください。

◎ 下の表のように
運動回数を書いて車椅子につけておくと
誰でも簡単に補助することができます。

様

運動の種類	運動量
パタ・コロ	回
ベルト	kg × 回
プーリー	回
ホットパック	前腕 肩関節 膝関節 腰部
平行棒	前方歩行 後方歩行 横歩行
階段	昇段 降段
動木体操	
こんにちわ	

◎ 下肢の運動器具の上に立ち上がらないでください。
◎ 上肢の運動のとき、ロープにぶら下がらないで下さい。

クッションで座位を取る

◎ クッションを用いて座位を取ります。
車椅子や椅子から滑り落ちないように
工夫してください。
◎ 両膝が開くようなときは紐で開かないように
してあげると運動しやすくなります。

パタ使用

プーリー使用

ローラー使用

おもり使用

元気よく声を掛けて
あげましょう。

こんにちは：体幹訓練

始めはお手伝いして動かします。

平行棒内訓練

歩行訓練は前に歩く、後ろへ下
がる、横にカニのように歩く、
の3種類です。
トーリフターをつけることもあ
ります。

歩行器歩行訓練

歩行器は立位訓練にも利用します。

Method for managing exercise for function recovery and muscle strengthening　US7153250, 26, DEC. 2006

Preface “,”Love to the life which exists still more in us many” (Biophilia),

- Biophilia: When I started using the term, Google searches showed only six results.
- In 1975, I read "Revolution of Hope" by Erich Fromm, a German-born philosopher who worked in the United States and Mexico.
- He states;
- We can shift to the first action that mobilizes our latent powers when a risk of one’s life has been recognized.
- The heart and will which we continues hope to live as independent human being, just when one becomes a disabled person.
- "No matter how unlikely social reform may be, one should stand for it with hope.

BIOPHILIA

- I was not a doctor, researcher, or engineer.
- When I was 23 years old, in 1971, as a young man aspiring to become a politician, I recognized that a large number of disabled elderly would be born when baby boomers became elderly.
- It is important to motivate people with disabilities to remain independent, contribute to society, and create a society where overcoming impairments to realize, and people can live independently.
- We needed words that embody people's will and lives and reinforce their will to live in society.
- The word "biophilia" is used to describe this.

Takizawa Method

US.PAT. 7153250 Method for managing exercise for function recovery and muscle strengthening,

Fig. 1. Cushion.

It is a method that has never been used before in the concept of rehabilitation medicine. We named it the "Takizawa Method.

Fig. 5. Flexible leg brace.

Fig. 2. Training device.

Fig. 3 Pata

Fig. 4. Koro

Knee extension and flexion training devices

Fig. 4. Koro

Ankle plantar flexion exercise

Fig. 6. Raku walker, the shower chair combination.

Motivated exercise- Motivative exercise:

- At the time we started our research, the director of the Japan National Rehabilitation Center Hospital for the Disabled instructed that "moving a disabled upper limb with the non-disabled hand is called self-training, but it is impossible to train a disabled lower limb as self-training, and a physical therapist is needed for that training.
- Therefore, we coined “Sodo 創動 “ as the Japanese term and "Motivative exercise" in English to describe self-training to move the affected leg with the healthy leg. It has two meaning in it;
- 1. doing it by the patient's own will is important, and the patient wants to do it himself, and
- 2. a therapist encourages the patient to do it by oneself with his or her help.
- This exercise has been the core of the Takizawa Method.
- It is easy to train using the device developed and achieves results for anyone, anywhere.

Fig. 3 Pata

Knee extension and flexion training devices

Fig. 4. Koro

Fig. 4. Koro

Ankle plantar flexion exercise

Follow up study 1:

Japanese national foundation TechnoAid Association funded

- Re-acquirement of Walking from Bedridden by the Motivative Exercise and Takizawa Method and Proposition of the Solution to the Aging Crisis
- S. Takizawa , T. Kimura, H. Kijima, Y. Okamoto, K. Nagaoka, Y. Morita, S. Endo, H. Nagasawa, M. Makita, K. Takizawa
- Author information
- Keywords: biophilia rehabilitation, motivative exercise, Takizawa method, care-independence, ready-made rehabilitation
- JOURNAL FREE ACCESS

- 2015 Volume 2015 Issue 1 Pages 12-18
- DOI https://doi.org/10.14813/ibra.2015.12

- Statistical Evaluation of Rehabilitation to the Disabled Elderly Based on the Takizawa Method
- Kenji Ushizawa, Shigeo Takizawa , Hiroshi Nagasawa, Mitsuyo Makita, Tetsuhiko Kimura, kyoko TakizawaAuthor information
- Keywords: Statistical evaluation, Takizawa method, Disabled Elderly, Rehabilitation, FIM (Functional independent measure)
- JOURNAL FREE ACCESS

- 2015 Volume 2015 Issue 1 Pages 19-27
- DOI https://doi.org/10.14813/ibra.2015.19

- Details

Abstract

- Elderly cases offered Takizawa method as one of the rehabilitation techniques at the Shonannooka. where a new facility of elderly were evaluated statistically in 2002.
- Initially we clarified the characteristics of the total FIM (Functional Independent Measure) score and the relation between the number of improved items and of worsened ones. Furthermore, we investigated the multidimensional relevance of 18 FIM items to explain the characteristics of improvement or aggravation clear, and obtained four factors by factor analysis and classified into six groups by cluster analysis, and then extracted some specific cases.
- Finally, we statistically verified the effect about the 18 FIM evaluation items using the t-test, a sign test and the Wilcoxon signed rank sum test, and walk and toileting in the FIM were turned out to be significantly effective.

Table 5. Test result of effect on improvement -all the examples

FIM Item	existence of improvement			the degree of improvement		test					
	−	0	+	mean	S.D.	*t*	*p value*	*Sign*	*p value*	*Sgn Rank*	*p value*
(self-care)											
A. Eating	5	34	5	−0.07	0.95	−0.48	0.636	0	1.000	−2	0.865
B. Grooming	8	29	7	−0.41	1.83	−1.48	0.146	−0.5	1.000	−18	0.317
C. Bathing	9	21	14	0.36	1.78	1.36	0.182	0.25	0.405	50	0.122
D. Dressing − upper body	8	26	10	−0.05	1.52	−0.20	0.844	1	0.815	3.5	0.881
E. Dressing − lower body	8	26	10	0.11	1.78	0.42	0.674	1	0.815	10	0.674
F. Toileting	4	28	12	0.25	1.75	0.95	0.350	4	0.076	24.5	0.214
(toilet)											
G. Bladder management	9	28	7	−0.32	1.23	−1.71	0.095	−1	0.804	−29.5	0.118
H. Bowel management	3	28	12	−0.16	1.65	0.65	0.520	4.5	0.035	21.5	0.233
(transfer)											
I . Bed, chair, wheelchair	9	22	13	0.34	1.57	1.44	0.157	2	0.525	38.5	0.204
J. Toilet	9	24	11	0.18	1.57	0.77	0.448	1	0.824	24	0.378
K. Tub, Shower	9	31	4	−0.20	1.19	−1.14	0.262	−2.5	0.267	−14.5	0.326
(move)											
L. Walk	2	27	15	0.57	1.68	2.25	0.030	6.5	0.002	48	0.023
M. Stairs	5	36	3	−0.16	0.91	−1.16	0.254	−1	0.727	−7.5	0.375
(communication)											
N. Comprehension (auditory)	1	36	7	0.30	1.07	1.83	0.074	3	0.070	12.5	0.102
O. Expression (verbal)	5	33	6	0.00	1.57	0.00	1.000	0.5	1.000	0	1.000
(social cognition)											
P. Social interaction	3	39	2	−0.16	1.20	−0.88	0.384	−0.5	1.000	−3	0.500
Q. Problem solving	4	31	9	0.07	1.42	0.32	0.752	2.5	0.267	13	0.390
R. Memory	5	29	10	0.00	1.22	0.00	1.000	2.5	0.302	4.5	0.829
FIM total	16	5	22	0.88	12.83	0.45	0.654	3	0.418	58	0.407

Follow up study 2: founded by;
Japanese national foundation the Welfare And Medical Service Agency

- Construction of Community Biophilia Rehabilitation Network for the Disabled Elderly
- Shigeo Takizawa, Yoshiyasu TakeFuji, Tomoji Ishimaru
- , Rika Wada, Hajime Takada, Tetsuhiko Kimura
- BIOPHILIA
2015 Volume 2015 Issue 1 28-35
Published: April 30, 2015
Released on J-STAGE: July 10, 2015

- DOI https://doi.org/10.14813/ibra.2015.28
- JOURNAL FREE ACCESS

Abstract

Bungo Ono-shi in Kyusyu in Japan, June and July 2005

- We enforced the construction of a community rehabilitation network for the autonomous rehabilitation of the disabled elderly by the official grant.
- We distributed the prepared manual and devices developed for subjects in order to perform the rehabilitation exercises. 47 disabled elderly 13 Aftereffect of cerebrovascular accident.（9 hemiplegia left. 3 hemiplegia left and one another）. 8 knee osteoarthritis, 7 lumbar spinal stenosis and 19 others were involved as subjects.
- The change of a body situation depended on the Long-Term Care Insurance Survey (LTCIS) including the Degree of Independent Living for the Disabled Elderly (DILDE) was analyzed with changes in the level of care.
- As a result, the sitting ability with both feet on Ground has improved significantly ($P<0.05$).
- From these research findings, it is thought that the possibility of enforcement of the autonomous rehabilitation and home implementation of it has been specified for the disabled elderly.

Result

- Items to check effect for using **DLIDE, independent living was set to "9", and C2 of the minimum level was replaced and evaluated to "1" in order of J1, J2, A1, A2, B1, B-2, C1, and C2 as a numerical classification. The first time evaluation carried out at the time of an experiment start (January, 2006) and the last time evaluation completed three months after (April, 2006).
- 1 person of independent living by the first time evaluation value increased in number with 6 persons by the last time evaluation value.
- The subject's number of J2 came in lower numbers as shown in Fig. 3, and they improved to independent living and J1, and
- the Degree of independent has improved significantly (P=0.017). Evaluation of "2-3 sitting with both feet on Ground" has also improved significantly (P=0.044).

Follow up study 3

- Implementation of rehabilitation Service in the Outpatient Facility
- Rika Wada, Shigeo Takizawa Author information
- JOURNAL FREE ACCESS

- 2017 Volume 2017 Issue 3 Pages 90
- DOI https://doi.org/10.14813/ibra.2017.90
- Details

- There have been 74 outpatients total number in 2010 since 2003 opening, who used and continued for one year or more, and got evaluation one year after were 43 persons, and who did for 2 years or more, and evaluated annually were 20 persons, for 3 years were 7 persons and for 4 years was 1 person. We assayed change of 67 persons' degree of care, and change of 414 persons' the degree of care of a University bulletin.
- Hypothetical: -- the method and improvement factor of the rehabilitation medical treatment and improvement factor are independent (there is no difference in an improvement factor during two methods)
- The result of the chi-square test; The hypothesis was rejected by 1% of the significance level as a result of official approval.
- We authorized there is no difference in an "improvement" by the numerical value, and there is the difference in "maintain the degree of care" and "pejoration."
- It is effective that the method introduction maintains the degree of care and stops a pejoration. We reported the fact to the Japanese Health, Labour and Welfare Ministry[5)] .

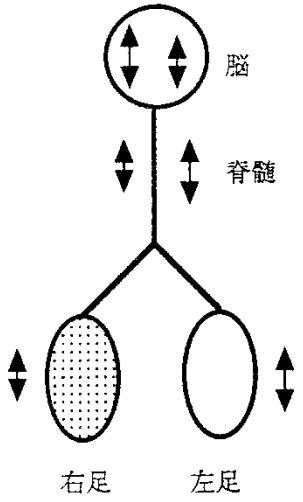
Need to clarify the mechanism

- It is not too late after the appearance of spasticity
- Motivative exercise based on the Takizawa method alternates stimulation of the working and antagonist muscles.
- Ia fibers secrete inhibitory substances from the end of inhibitory neurons just before the synapse where the Ia fiber connects to the α-fiber.
- In addition to suppressing spasticity, the action and antagonist muscles are innervated by opposing innervation and inhibitory mechanisms.
- Consider that spasticity can be inhibited

- 機序を解明する必要
- 痙性が出現してからでも遅くない
- タキザワプログラムに基づく創動運動が，刺激を動作筋と拮抗筋に交互に与える
- Ⅰａ繊維がα-繊維につながるシナプスの直前で抑制ニューロン末端から抑制物質を分泌させる
- 痙性を抑制するだけでなく，動作筋と拮抗筋の相反性神経支配と抑制機構をうまく利用
- 痙性出現を抑制し得ると考察
- 努力と参加を依頼

Our postulated mechanism

Figure 1
Self Training possible on the affected side



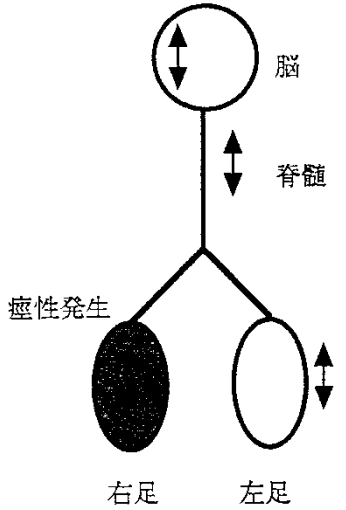
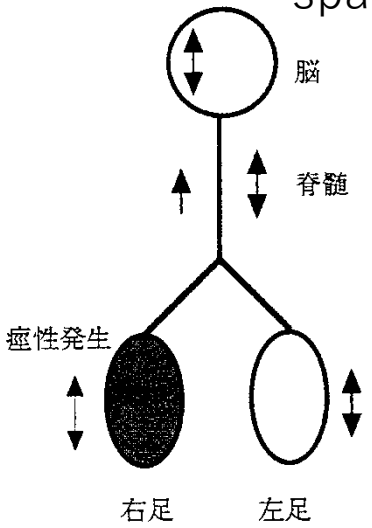


Figure 2 Self Training impossible on the affected side

spasticity occurring

Figure 3
passive exercise on the affected side



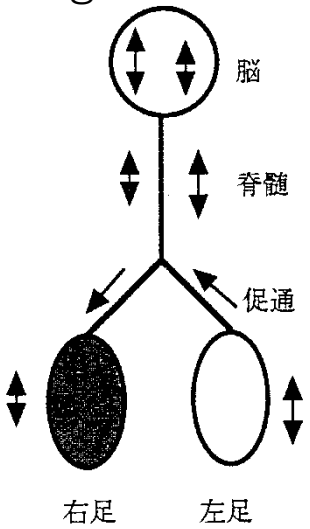


Figure 4
motivative exercise on the affected side

MECHANISM RESEARCH 1

- **Brain Activity during Motivative Exercise Versus Passive ROM Exercise by fMRI**
- Yoshiko Morita, Shigeo Takizawa
- BIOPHILIA
  2013 Volume 2 Issue 1 35-40
  Published: February 13, 2013
  Released on J-STAGE: January 21, 2014

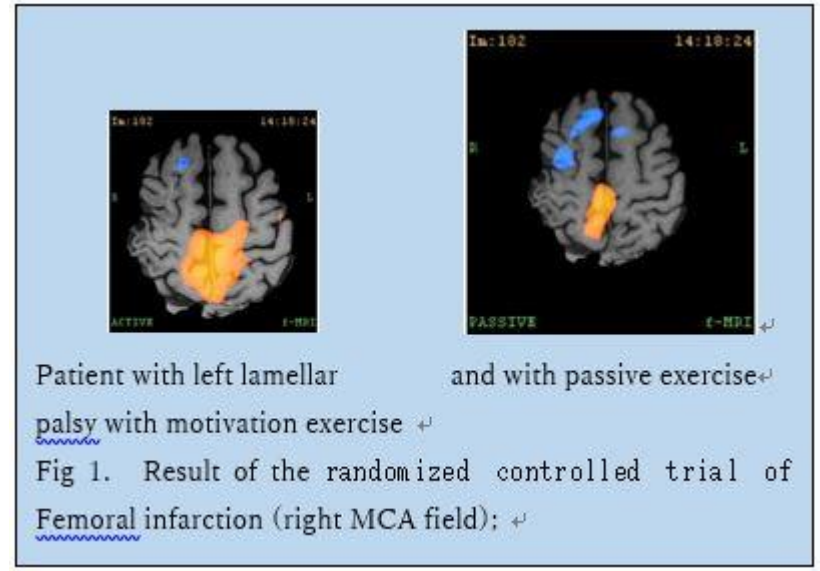
- DOI https://doi.org/10.14813/ibra.2.35
- JOURNAL FREE ACCESS
- Acknowledgement
- This work was supported by JSPS KAKENHI Grant Number 21249036.

SignaHD x 3.0T (GE)

- 2. Materials and Methods The Ethics Committee of the Okayama Rehabilitation hospital permitted this study, and the registered clinical trial number is UMIN000006559.
- 2.1. Subjects Subjects are chronic stroke patients. All patients attend a day care program belonging to my hospital, using Care Insurances Day Care Services. 13 patients: consisting of 4 female, 9 male. Ages: 54 to 83 and average is 67y-o. Locomotion ability; all are house-ambulatory, and some of them community walkers. The duration from the onset of disease is from 5months to 11 years, the average is around 5 years.

- 3.1.1. The 1st case The 1st case is a 69 year-old-female, the left hemiplegia suffered from cerebral embolism in right MCA with a wide infarction of right temporal lobe (Fig. 2A).
- The onset of her illness was Dec.13, 2008 when she was 68. The wide orange area activated with Motivative Exercise by brain function can be recognized both in the affected right parietal and non-affected left lobe (Fig. 2B).
- In passive ROM exercise, there is less orange area than in the Motivative Exercise (Fig. 2C). Fig. 2A. Wide right temporal infarction Fig. 2B. Active ex. with Pata Fig. 2C. Passive ROM to left ankle joint by PT

Fig. 2A. Wide right temporal infarction　Fig. 2B. Active ex.with Pata　Fig. 2C. Passive ROM to left ankle joint by PT



Patient with left lamellar palsy with motivation exercise　and with passive exercise

Fig 1. Result of the randomized controlled trial of Femoral infarction (right MCA field);

Other case

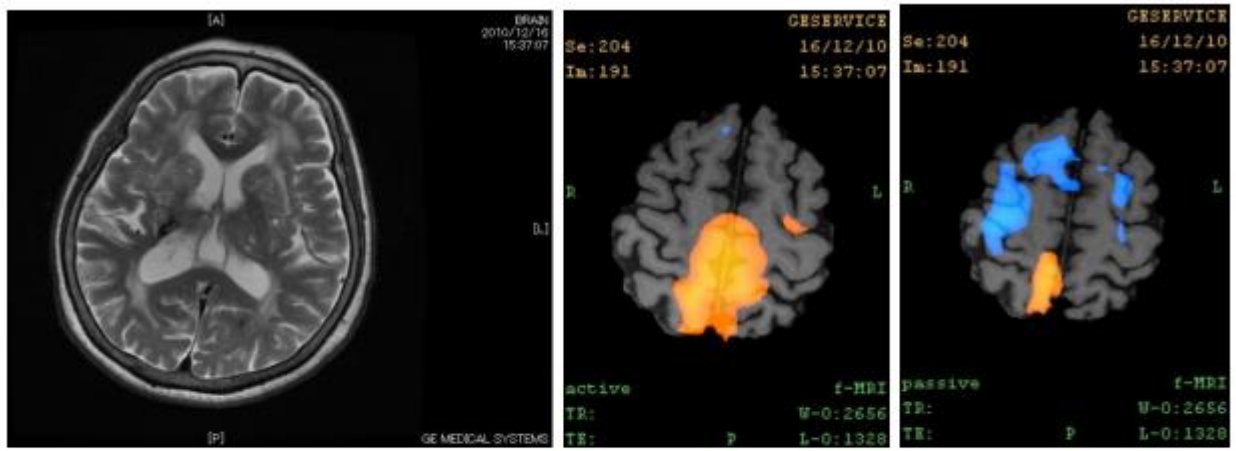
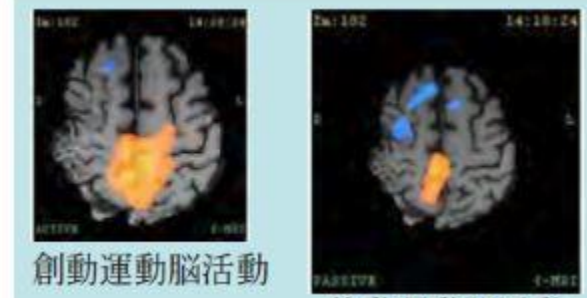


Fig. 5A. Right thalamic bleeding　Fig. 5B. Motivative Exercise　Fig. 5C. Passive ROM ex.



創動運動脳活動　他動運動脳活動

左片麻痺患 脳梗塞(右MCA領域) fMRI評価4) (活性状態を橙色で示す。) 基盤 (A) (21249036) の研究状況

図1 fMRIによる脳機能の活性化状況

- 省略可
- 3.1.4. The 4th case The 4th case is 72-year-old female whose left hemiplegia suffered from right thalamic bleeding (Fig. 5A). The onset of her illness was Nov. 12, 2006 when she was 69.
- A wider orange area of activated brain function in not only the unaffected but also the affected right lobe can be recognized in the Motivative Exercise (Fig. 5B).
- Much less orange area in the right affected parietal-occipital lobe during passive ROM exercise (Fig. 5C) can be recognized. Fig. 5A.
- Right thalamic bleeding Fig. 5B. Motivative Exercise Fig. 5C. Passive ROM ex.

MECHANISM RESEARCH 2

- **Effect of Motivative Exercise Studied by fNIRS: Introduction to the Rehabilitation Day Care Users**
- Shigeo Takizawa, Shuji Kawai, Yasuhiro Matsuo, Yuka Deguti, Hiroyoshi Yamamoto, Yoshiyasu TakefujiAuthor information
- Keywords: Motivative exercise, Effect evaluation, Home rehabilitation, Prevention, Care level
- JOURNAL FREE ACCESS

- 2013 Volume 2 Issue 1 Pages 25-34
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- Details

NIRS（near-infrared spectroscopy）FOIRE-3000 (Shimazu)

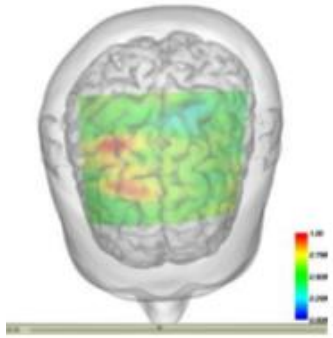


Fig. 3D. Motivative exercise 30 min. past, Test cord 823

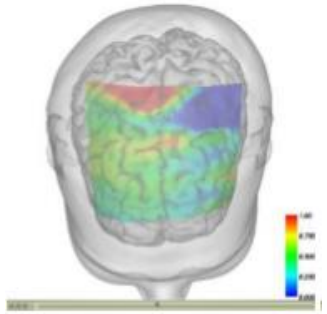


Fig. 3B. Passive exercise 30 min. past, Test cord 825

fNIRS result

Effect of Motivative Exercise Studied by fNIRS: Introduction to the Rehabilitation Day Care Users, BIOPHILIA Vol. 2 (2012) No. 1 p. 25-34 http://doi.org/10.14813/ibra.2.25

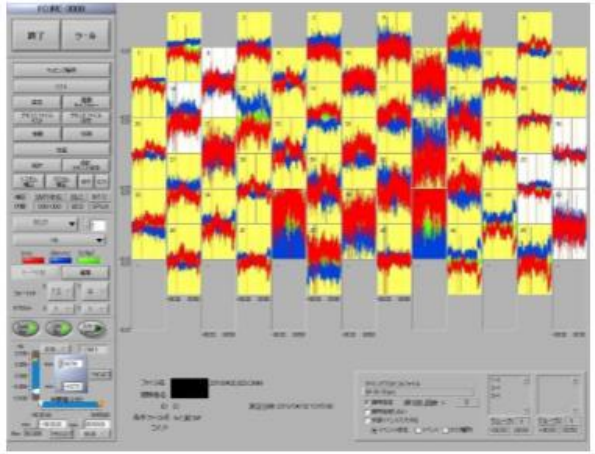


Fig. 4C. Motivative exercise with reciprocating motion in a cross direction for knee extension and flexion, Test cord 823

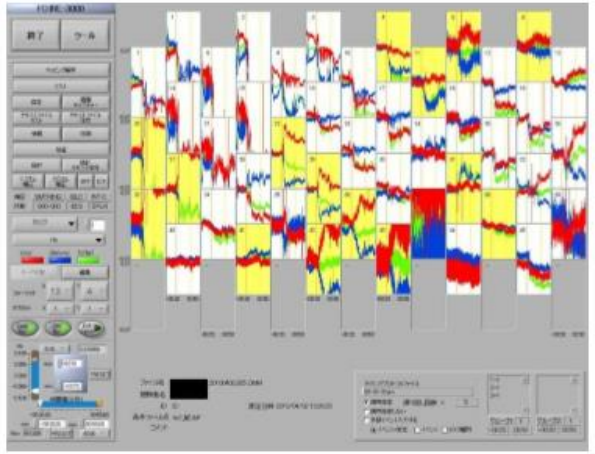


Fig. 4D. Passive exercise for the knee extension and flexion,, Test cord 825

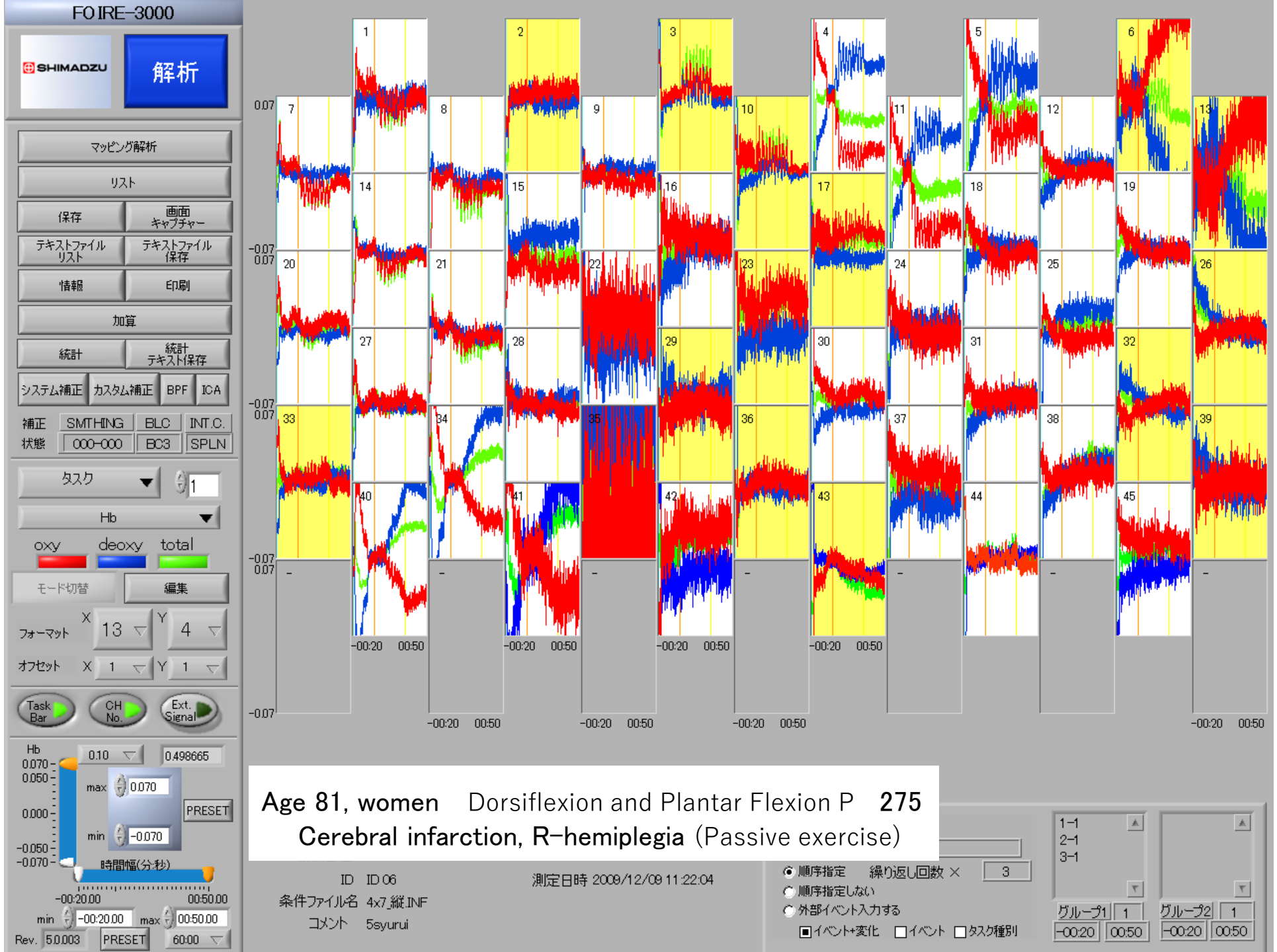
- The main objective of the Geriatric Health Service Facility (GHSF), which focuses on the care and rehabilitation of elderly people, is to enable the disabled elderly to return home.
- To achieve this, we rehabilitated in and out patients to assist them in acquiring the ability to do so.
- The main method medical treatment for in and out patients of the Medical Corporation Wakakoukai, GHSF Tatsumanosato Rehabilitation Center (the facility) is rehabilitation with self-action or assistive exercises.
- All users in this facility are practicing the rehabilitation exercise with simple devices such as a bicycle exercise, pulley, muscle exercise with weights, walking exercise with assistance and walking steps up and down in order to keep their activities of daily living at home.

Abstract

- Motivative exercise was introduced into the Geriatric Health Services Facilities and the evaluation of both motivative exercise and passive exercise were compared by functional Near-InfraRed Spectroscopy
- (fNIRS) in 11 subjects in March, 2010. Moreover, the randomized controlled trial (RCT) in two groups: 13 subjects with motivative exercise and 15 subjects without it for three months.
- In the brain fNIRS, motivative exercise for both knee extension and plantar flexion showed a significantly more activation than passive exercise (p0.05).
- Though the effect on the lower limb ROM was seen in two cases,

there was not any significant difference between the motivative exercises introduced and not introduced groups by RCT showing improvement within muscular force and contracture,

lower limb ROM, MMT, Barthel Index, Hasegawa screening test and the Brunnstrom stage.


FOIRE-3000
SHIMADZU
解析
マッピング解析
リスト
保存
画面キャプチャー
テキストファイルリスト
テキストファイル保存
情報
印刷
加算
統計
統計テキスト保存
システム補正
カスタム補正
BPF
ICA
補正
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BLC
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状態
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BC3
SPLN
タスク
Hb
oxy
deoxy
total
モード切替
編集
フォーマット
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Y 4
オフセット
X 1
Y 1
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繰り返し回数 × 3
イベント+変化
イベント
タスク種別
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2-1
3-1
グループ1
グループ2
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0.000
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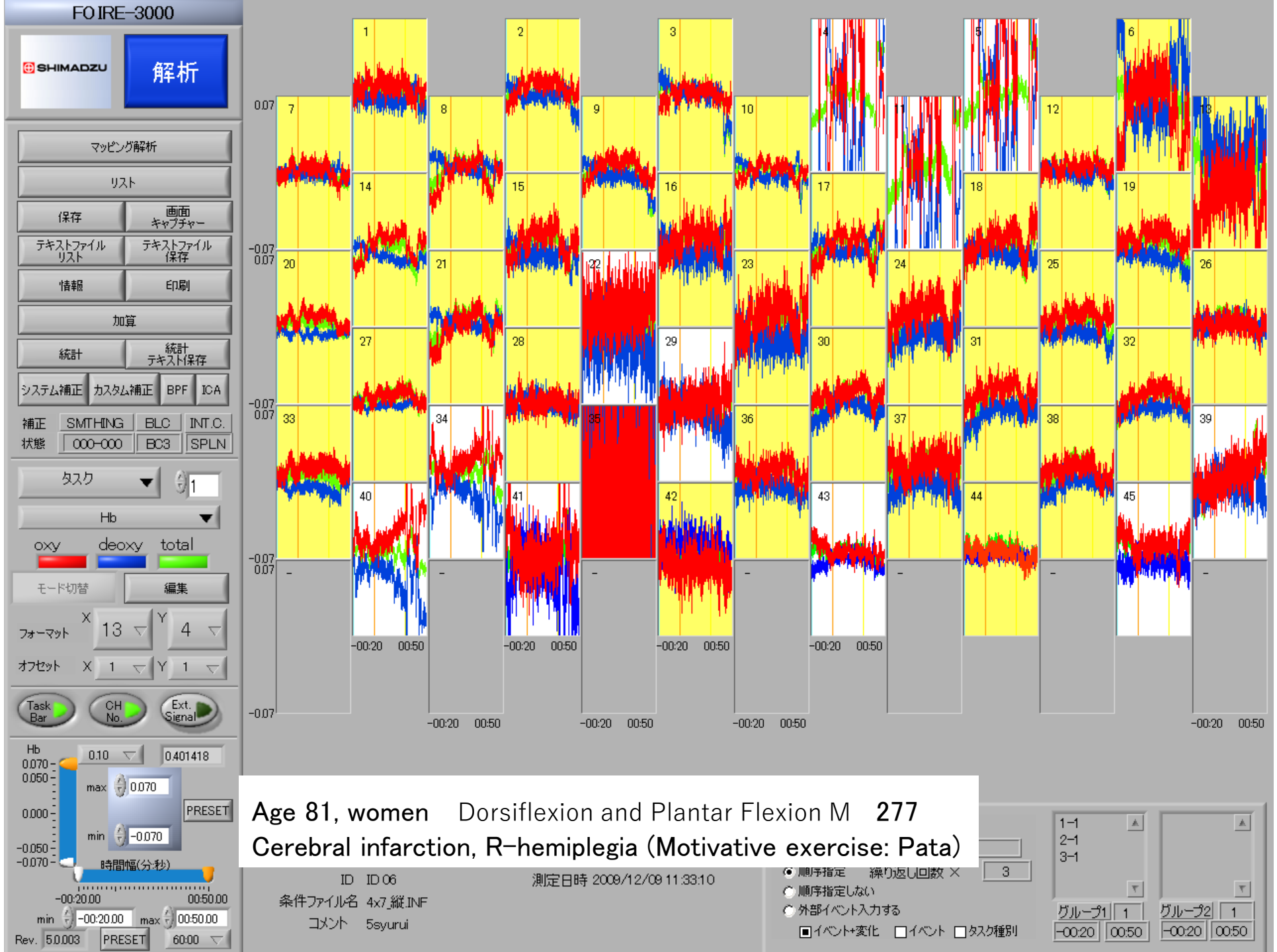
FOIRE-3000
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X 13
Y 4
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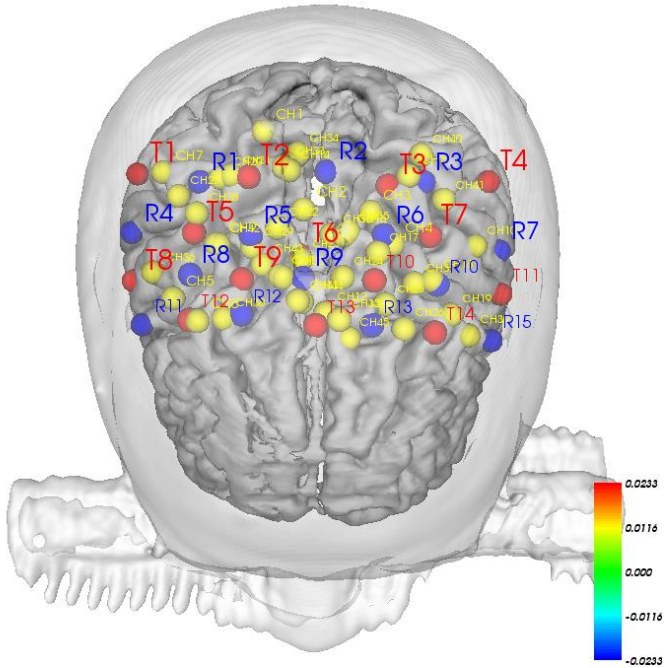
順序指定しない
外部イベント入力する
繰り返し回数
イベント+変化
イベント
タスク種別
グループ1
グループ2

- 2.1. fNIRS test Comparison of changes to the oxyhemoglobin in the brain with the time of rest and task of the passive exercise and the motivative exercise were examined in this test by Near-InfraRed Spectroscopy (fNIRS) test with the FOIRE-3000 by Shimazu Corporation. The 14 sets of Light Sources and Detectors measuring 45 channels were used shown in Fig.1. The Light Sources No. 7 (middle of a channel 10-23) was set at the center crown of the head (Cz) for the measurement.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R1
T2
R2
T3
R3
T4
R4
T5
R5
T6
R6
T7
R7
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T9
R9
T10
R10
T11
R11
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R12
T13
R13
T14
R15
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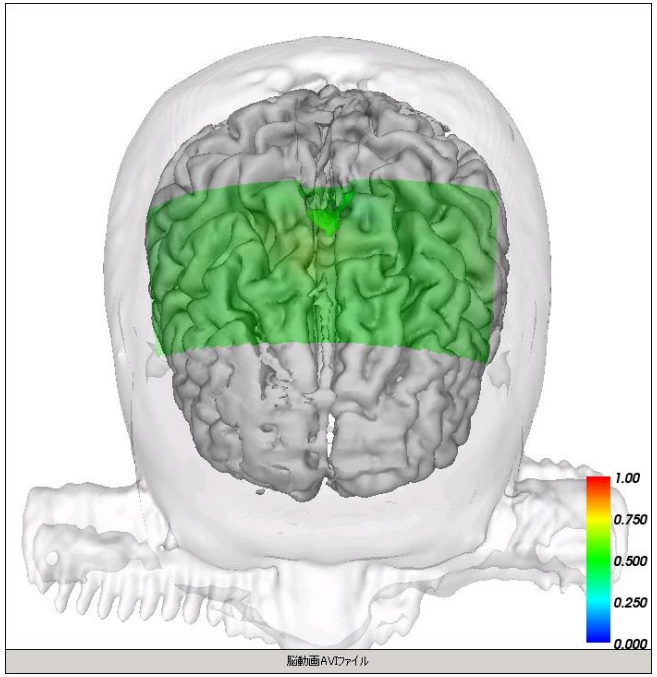
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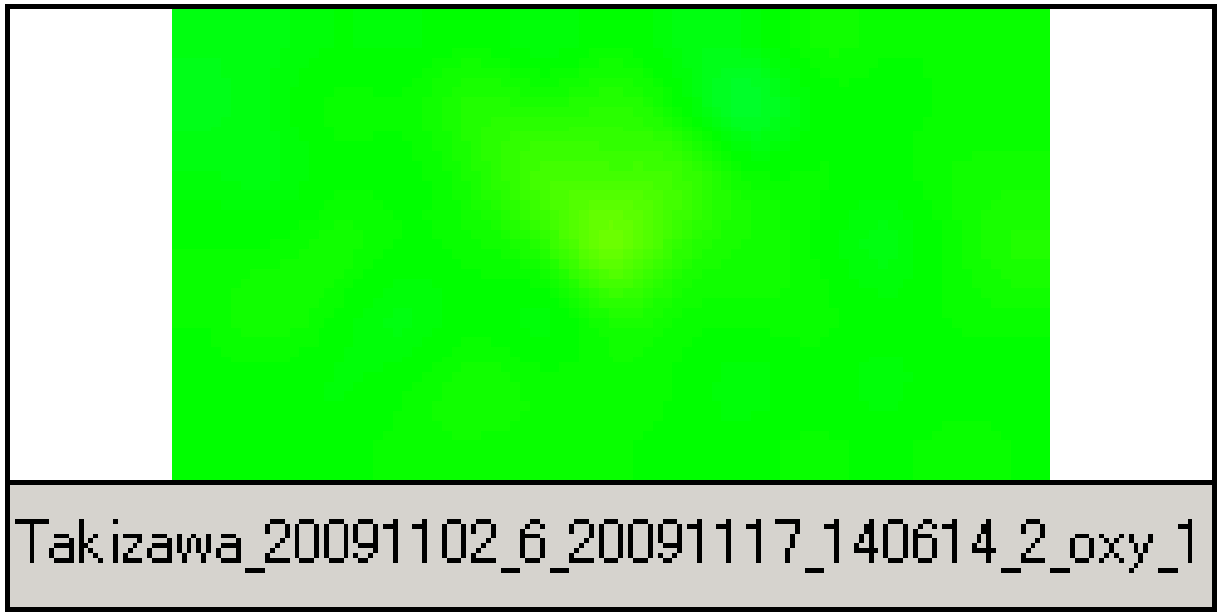
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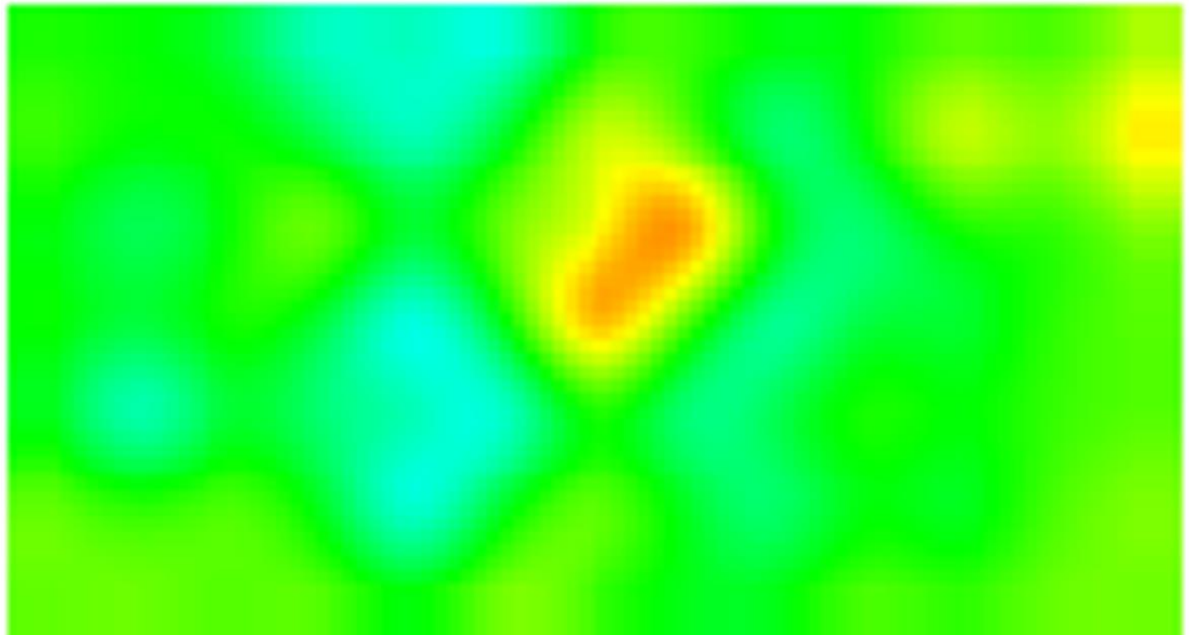


Your participation to our study
to realize **a paradigm shift in medical rehabilitation**

1 .It was approved as a medical device because it substitutes for the physiotherapist's passive exercise.
We must offer this product to the market as soon as possible.

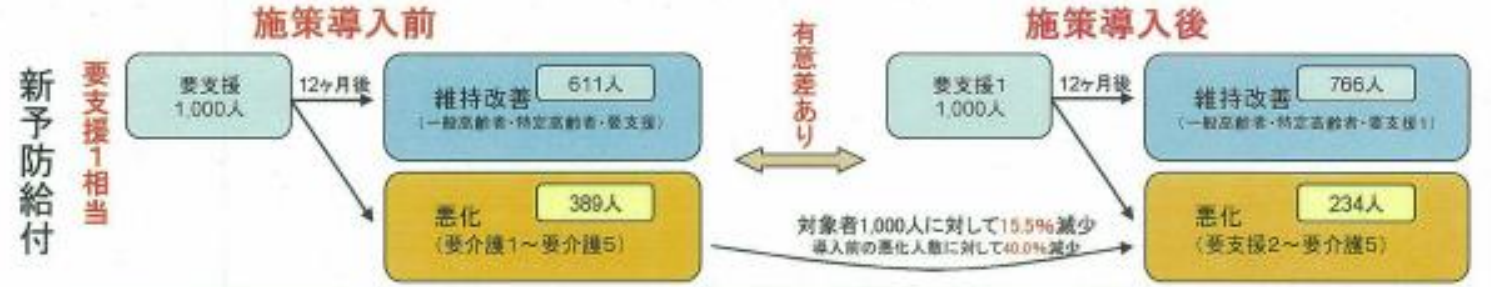
2 .An automatic judging device of the physical condition for the user for the optimal exercise information by the motivative exercise.
By the correlation of the statistics analysis became clear about the nursing-care-insurance level to the Japanese Insurance.

We want to ask for your participation in a paradigm shift to sustain a super-aged society by doing the study with us.

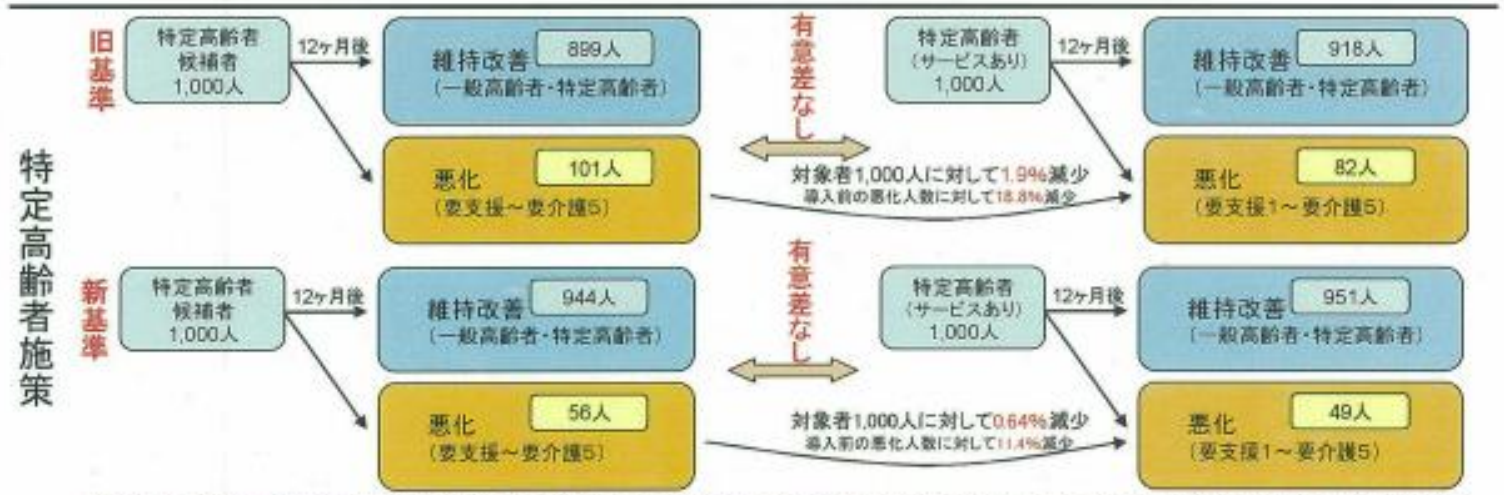
- Physical therapists perform services on a one-to-one basis, but they can perform them on a one-to-many basis with this introduction.
- We will spread this method throughout the world; then, the elderly will be able to overcome their disabilities and live independently in a super-aged society based on the results of their implementation,
- Please **consider** your participation to our study to realize **a paradigm shift in medical rehabilitation**.

ジ ンクイヤ　ザ　ウバゲ

「要介護度が悪化した者の発生率」を用いた介護予防サービスの効果分析の結果について（概要）



1,000人を1年間追跡（12,000人月）した場合、要介護度が悪化した者の割合は、統計学的に有意に以下の結果となり、介護予防効果が認められた。
対象者1,000人に対して15.5%（155人）減少し、コントロール群の悪化人数(389人)に対して40%(155人)減少した。
※性・年齢調整を実施



施策導入前と導入後の対象者の属性の違いを調整しないで（※）分析したところ、以下の結果となったが、新基準・旧基準とも、統計学的有意差は認められなかった。 ※性年齢調整のみ行い、特定高齢者候補者と、サービスを受けている特定高齢者の属性の違いは調整できなかった。

1,000人を1年間追跡（12,000人月）した場合、要介護度が悪化した者の割合は、
旧基準では、対象者1,000人に対して1.9%（19人）減少し、コントロール群の悪化人数(101人)に対して18.8%(19人)減少し、統計学的有意差は認められなかった。
新基準では、対象者1,000人に対して0.64%（6人）減少し、コントロール群の悪化人数（56人）に対して11.4%（6人）減少し、統計学的有意差は認められなかった。

（参考資料4）