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Basic and Clinical Subjects of Myofunctional Therapy Using a New Oral Rehabilitation Apparatus

Part . 2 Evaluation of Chronological Changes of "Labial-Closure-Strength"
from Youth to Adults

NORO Akio, HOSOKAWA Souhei*, TAKAHASHI Junichi**,
AKIHIRO Yoshiaki***, NISHIMOTO Yukihito*, HOSOKAWA Ihei,
MAKIISHI Takemi and HIRAI Yoshito

The Third Department of Conservative Dentistry, Tokyo Dental College
(Chief: Prof HIRAI Yoshito)

1-2-2 Masago, Mihama-ku, Chiba 261-8502, Japan

*Department of General Practice, Tokyo Dental College, Suidobashi Hospital
2-9-18, Misakicho, Chiyoda-ku, Tokyo 101-0061, Japan

**Department of General Practice, Tokyo Dental College

1-2-2, Masago, Mihama-ku, Chiba 261-8502, Japan

***Department of Dentistry, Tokyo Dental College, Suidobashi Hospital
2-9-18, Misakicho, Chiyoda-ku, Tokyo 101-0061, Japan

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Research was carried out to measure the chronological changes of L-C-S (Labial-Closure Strength) with aging. Numbers of subjects were 3,172 youth (2 to 19 yrs old), 761 adults (20 to 59 yrs old), and 170 elderly (60 to 89 yrs old), for total of 4,103 subjects. L-C-S is fully developed at the age of about 18-20 yrs for both males and females. L-C-S was 14-16 N for males and 10-12 N for females. These numbers showed little change until age 60, but there after the strength declined gradually with increasing age. L-C-S at age 80 was 5 to 7 N, which was almost the same as at age 3, LCS of healthy

youth and adults, both males and females, in every age group, were 3 - 4 N higher compared with youth and adults who had diseases. Starting to train the oral cavity muscles with the use of the oral rehabilitation apparatus LIP TRAINER "Patakara®", from around age 60 will increase the L-C-S, and is effective in terms of health maintenance. L-C-S appears to be a useful parameter that shows the status of the respiratory organs and immune related disease, indicating the health status of the oral cavity environment.

(Request original article reprints to Dr. NORO)

Preface

There are some aged people who have growing difficulties to make use of artificial denture due to serious deterioration of oral myofunctional ability although they feel imminent necessity of artificial teeth because their force of mastication is becoming weaker and weaker by losing their permanent teeth mainly in aging process. In addition, weak strength of labial closure leads to inefficiency of closing mouth cavity so that a growing number of aged people suffer from deterioration of oral cavity environment due to perpetual evaporation of saliva.

Some people may suffer, by the subsequent complications of cerebro-vascular disorder, from such sequelae as glossa-motor functional disorder / mastication, ingestion, swallowing disorders / articulation disorders / facial nerve palsy / drooping corner of the mouth / face deformation, sagging / watering and what is worse, some of them might even have got senile dementia concurrently.

On the other hand, it is observed among youth that there are growing numbers of young people who do mouth breathing due to deteriorated labial-closure strength caused by changes in eating habits. Some of them have discomfort in pharynx or oral cavity and develop symptoms such as xerotomia, glossalgia, mouth ulcer, gingivitis, periodontitis, ozostomia, adenoid growths, adenoiditis, and tonsillitis; others induce allergic diseases such as sinus, asthma, and atopy.

As for middle-aged and elderly people, this

weakening of labial-closure strength through overweight, insufficient exercise, drinking, and aging may outset sinking of tongue root during sleep, which eventually results in mouth breathing and snoring. It may well develop obstructive sleep apnea syndrome (OSAS) and it may also be a remote cause of lifestyle related serious diseases. From infant to aged people in large age bracket, diseases that may be developed by weakening labial-closure strength are as follows: ① Lifestyle-related diseases, the infarction, hypertension, diabetes) ② Adenoiditis, tonsillitis, inflammation of upper respiratory airway, synus, asthma, and tonsill focal infection syndrome such as atopic dermatitis and plantar pustulosis caused by mouth-breathing during sleep. factors of which are attributed to obstructive sleep apnea syndrome and snoring (ischemic heart disease, cerebral ③ Nonconformity/unsustainability/difficulty of upholding artificial denture, which is caused by functional deterioration of oral cavity, muscles with paralysis or sequelae or growing old. 4 Sicca syndrome, glossalgia, mouth ulcer, gingivitis, periodontitis, multiple tooth caries, ozostomia by deterioration of oral cavity environment with evaporating saliva.

Now that our society is rapidly aging, rehabilitation of motor functions of oral cavity muscle such as ingestion, swallowing and articulation is a prime task with a tandem study of disturbance of higher cerebral functions.

Through several conferences of Japanese conservative dentistry (from 112th to 116th), we

rehabilitation apparatus such as LIP TRAINER [Patakara®] (manufactured by "DENTAL YUMI CORP", Figure 1), labial closure strength indicator called [Lip DeCum/LDC-110] (made by Cosmo Instruments Co. Ltd. Figure 2) and a Lip-holder [DuClean] (made by C Instruments Co. Ltd. Figure 3), and at the same time, we have emphasized that the labial closure strength has its own characteristics from youth to aged people, and have highlighted its significance and evaluation.

In this article, we have carried out our research and have scrutinized how the labial closure strength [L-C-S] will develop or change from youth to aged people and we have investigated and analyzed how these chronological changes of L-C-S (Labial-Closure-Strength) are constructed in alignment with sex and age.

Finally, we have, through its significance and evaluation, introduced the standard value of L-C-S, which could be a reference parameter that indicates the status of oral cavity environment.

Subjects and Methodology

1. Subjects and Research methods

Numbers of subjects were constructed of 3172 of youth group (3 to 19 yrs old), 761 of adult group (20 to 59 yrs old), and 170 of elderly group (60 to 89 yrs old), which has totaled to 4,103 subjects.

As for the subjects of youth group, which consists of kindergarten, primary school, middle school, high school students, and universities, we have measured L-C-S at a regular health check at their institutions, and have collected interview sheets from each subject. For adults and elderly, the subjects were outpatients of SuidoBashi Hospital of Tokyo University of Medical & Dental, from whom we have collected the data in the same manner as the other groups.

The data collected in this research are those done through diagnostic consultations direct from those patients (not healthy people) or self-declared information from their family members. The patients or former patients are either suffering or

have suffered from mouth-breathing, tonsillitis, adenoiditis, atopy, asthma, synus, sneezing and lifestyle-related diseases or have a history of them. Evaluation in accordance with degrees of seriousness of diseases and symptoms was not carried out in this research because of consideration of individual variation. For users of artificial denture, who are, strictly from the dental point of view, considered as dental patients, are identified as healthy people unless they have above diseases or symptoms as described above. As for the classification of Healthy group and Patient group, we have segregated them into the two groups according to whether or not they have previous illnesses as stated above with assistance of the data collected, so that we could analyze in meticulous details the L-C-S status in relationship with the factors of age and genders by applying statistical methods.

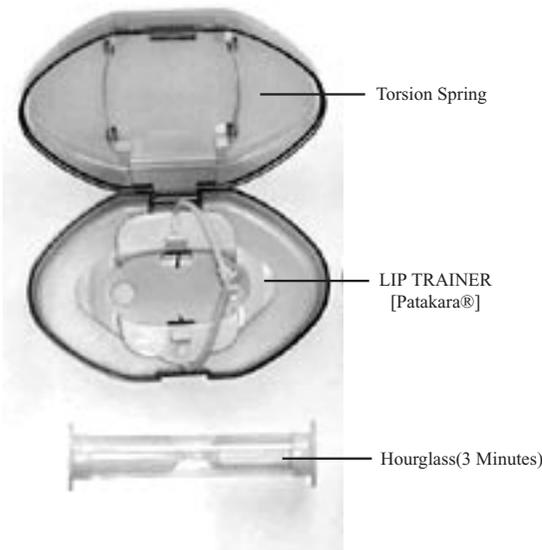
2. Method to measuring L-C-S values

After attaching the lip-holder [DuClean] to the sensor of L-C-S indicator [Lip DeCum] (Figure 3), we have measured L-C-S by asking subjects to hold it between two lips in upright sitting posture with FH-plane being parallel to the floor level and letting subjects to close upper-lip and lower lip with maximum strength without maxillomandibular teeth ever touched (Figure 4). This device has four sets of Strain Gauge in the sensor part and the main device will convert the measured values into loading value (N : Newton, 1N / 102g) and indicate the peak value with digital display.

Results

1. Evaluation of L-C-S in regards with age brackets and gender

According to age brackets, changes in average values of L-C-S are as follows (figure 5 to 6): From 3 to 4 yrs old, $7.0+2.0N$ (n=82) for male, $7.2+2.2N$ (n=100) for female. From 5 to 9 yrs old, $9.5+2.6N$ (n=247) for male, $9.2+2.4N$ (n=240) for female. From 10 to 14 yrs old, $12.2+3.2N$ (n=428) for male, $10.0+3.7N$ (n=713) for female. From 15 to 19 yrs old, $13.3+3.2N$ (n=434) for male, $10.7+3.2N$ (n=928) for female. From 20 to 24 yrs old,



Recommended LIP TRAINER [Patakara®]	Reference Value Of L.C.S
Rehabilitation	Less than 7 N
Soft	7 N ~ 14 N
Normal	More than 14 N

1 N / 102g

Strength Diagram of LIP TRAINER [Patakara®]

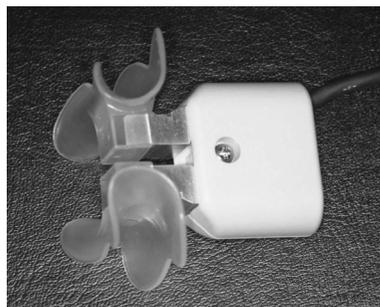
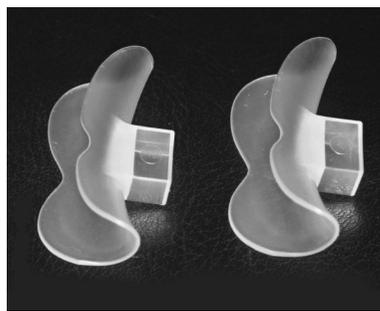
Purpose (Color) \ Strength	W/O Torsion Spring	With Torsion Spring
Rehabilitation (Green)	100g	300g
Soft (Pink)	280g ~ 300g	500g ~ 550g
Normal (Blue)	500g	780g ~ 800g

(Figure 1) Oral Cavity Rehabilitative Device LIP TRAINER [Patakara®]
Spring Force: Rehabilitation/Soft/Normal

Material of LIP TRAINER [Patakara®] : Highly elastic polymer plastic with rubber composite (Polyester elastomer)



(Figure 2)
Labial Closure Strength (L.C.S) Indicator [Lip DeCum®/LDC-110] with a Lip holder [DuClean®] mounted to the sensor .



(Figure 3) Upper Photo: Lip holder [DuClean®]
Below Photo: The Lip holder mounted to the sensor of the L.C.S Indicator
Holder Material: Polypropylene



(Figure 4) Sample photo of L.C.S data collection

To get ready for L.C.S Indicator [Lip DeCum®] with a Lip holder [DuClean®] mounted to the sensor, and have the subject bite the holder between upper and below lips. Then, you measure the L.C.S while the subject, sitting upright (with FH plane being parallel to the floor plane), shall close it's upper and below lips by the utmost strength, always with the upper and below teeth never touched. In a similar

old, 13.6+3.8N (n=45) for male, 11.1+3.3N (n=140) for female. From 25 to 29 yrs old, 14.8+3.1N (n=89) for male, 10.9+2.9N (n=71) for female. From 30 to 34 yrs old, 15.6+2.9N (n=50) for male, 11.0+3.6 N (n=25) for female. From 35 to 39 yrs old, 16.2+4.4N (n=51) for male, 11.1+3.4N (n=30) for female. From 40 to 44 yrs old, 15.7+3.7N (n=44), 11.6+3.2N (n=26) for female. From 45 to 49 yrs old, 15.5+3.1N (n=39) for male, 12.1+3.5N (n=35) for female. From 50 to 54 yrs old, 16.1+4.7N (n=40) for male, 10.2+2.8N (n=30) for female. From 55 to 59 yrs old, 14.4+4.3N (n=34) for male, 9.8+2.1N (n=21) for female. From 60 to 64 yrs old, 11.7+4.7N (n=21) for male, 12.0+5.3N (n=16) for female. From 65 to 69 yrs old, 11.2+5.0N (n=25) for male, 9.4+2.9N (n=22) for female. From 70 to 74 yrs old, 9.6+4.7N (n=21) for male, 7.3+2.9N (n=17) for female. From 75 to 79 yrs old, 6.7+3.1N (n=9) for male, 7.1+3.0N (n=12) for female. From 80 to 84 yrs old, 7.1+3.0N (n=12) for male, 5.8+2.6N (n=7) for female. From 85 to 89 yrs old, 5.8+3.6N (n=5) for male, 5.6+2.3N (n=6) for female.

2. Evaluation of L-C-S for Healthy group and Patient group

These subjects were divided into 2 groups. One is healthy group; the other is Patient group. Patient group is those people who have diseases or symptoms which are as follows; oral respiration, tonsillitis, adenoiditis, atopy, asthma, synus, snoring and life-related diseases.

L-C-S readings changed from 9.0±2.9N (from 3 to 9yrs old) to 16.8+3.9N (from 50 to 59 yrs old) for healthy male group, and those from 7.5±2.3N (from 3 to 9yrs old) to 14.1±4.8N (from 50 to 59yrs old) are for male patient group (Figure 7).

On the other hand, L-C-S reading changed from 9.3±2.8N (from 3 to 9 yrs old) to 12.4 ±2.1N (from 50 to 59yrs old) for healthy female group, and the readings from 7.7±2.5N (from 3 to 9yrs old) to 8.7±2.1N (from 50 to 59yrs old) are for sick female group (Figure 8).

We have here clearly recognized that there are significant statistical differences of L-C-S ($p < 0.05$,

Mann-Whitney test) among age brackets groups both in male and female genders of the two categories.

3. Proportional comparison by age & sex of Healthy and Patient groups.

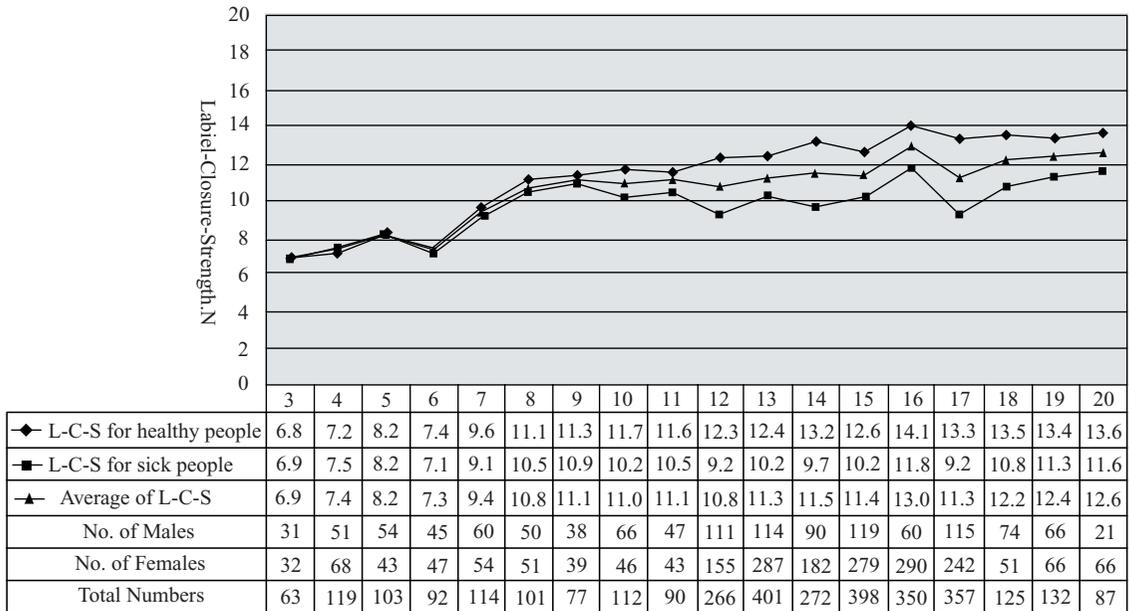
Proportions (Figure 9) of healthy people and sick people are as follows; As for male from 3 to 9 yrs old, 293 are healthy (89%) and 36 are sick (11%); 629 healthy people (73%) and 233 sick people (27%) for 10 to 19 yrs old; 107 healthy people (86%) and 18 sick people (14%) for 20 to 29 yrs old; 88 healthy people (87%) and 13 sick people (13%) for 30 to 39 yrs old; 67 healthy people (81%) and 16 sick people (19%) for 40 to 49 yrs old; 43 healthy people (58%) and 31 sick people (42%) for 50 to 59 yrs old.

For female from 3 to 9 yrs old, 283 are healthy (83%) and 57 sick (17%); 1,045 healthy people (64%) and 596 sick people (36%) for 10 to 19 yrs old; 113 healthy people (54%) and 98 sick people (46%) for 20 to 29 yrs old; 30 healthy people (55%) and 25 sick people (45%) for 30 to 39 yrs old; 36 healthy people (59%) and 25 sick people (41%) for 40 to 49 yrs old; 23 healthy people (45%) and 28 sick people (55%) for 50 to 59 yrs old.

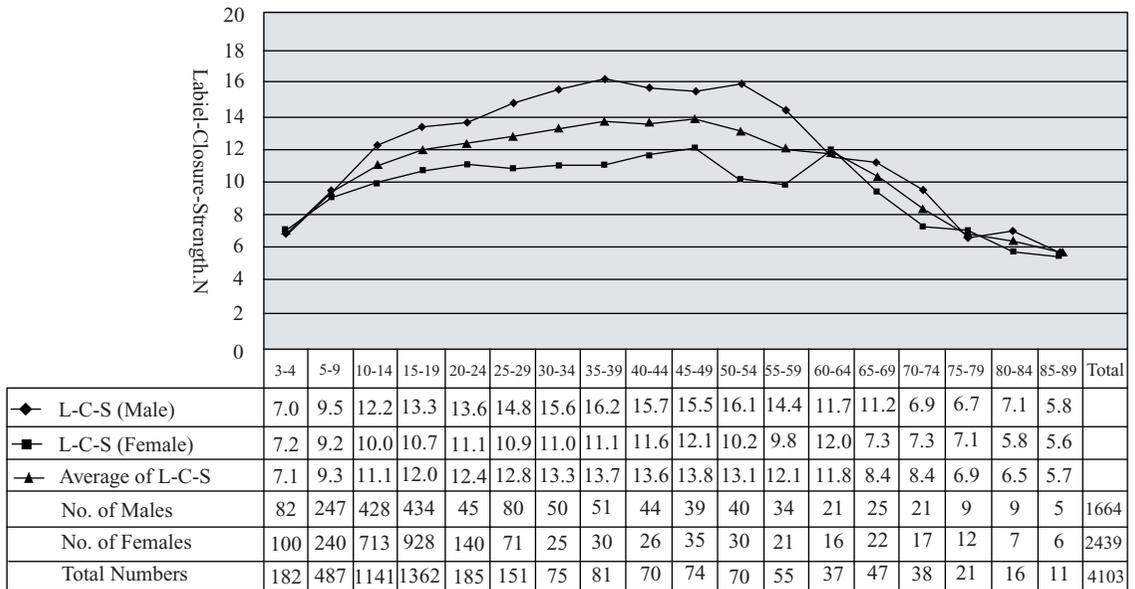
Observation

1. Evaluation of L-C-S Values by age and sex

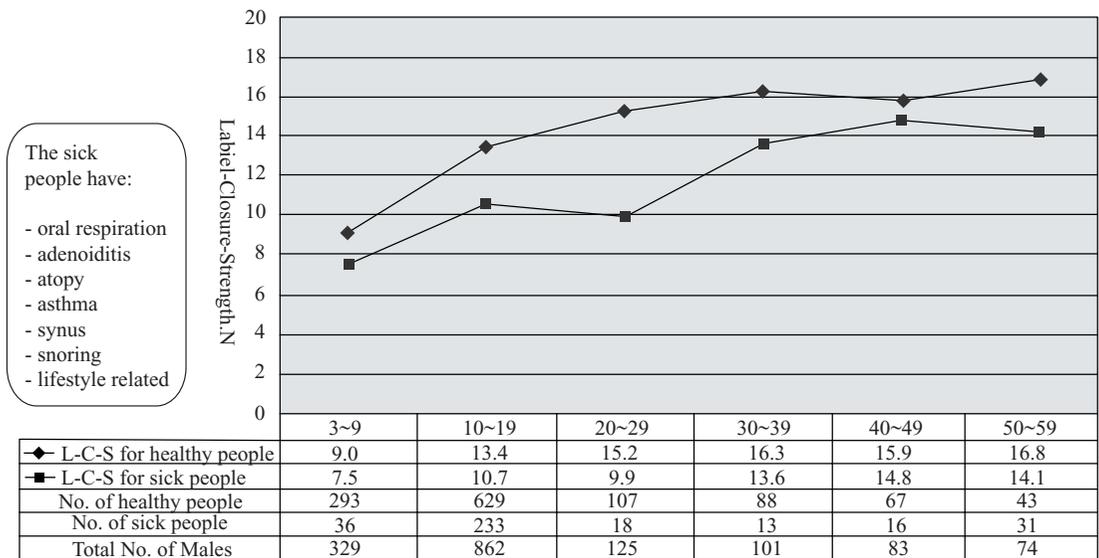
As for the transitional slope of average values of LCS (Figure 5) among both male and female youth, they have showed gradual increase (6 ~8N) from 3 to 6 years old. Afterward, male L-C-S keeps a position superior to female one, though, from 6 to 16 yrs old, both male and female L-C-S shows significant increase. As such, male and female L-C-S is most likely to develop up to age 18 to 20. We hereby presume that the value of L-C-S should reach very close to 14N and 12N for adult male and female respectively. We can also estimate that the L-C-S transition probably follow the pattern of human growth and development. The basis of this assumption that L-C-S is to reach its peak during a couple of years from 18 to 20 is we can substantially



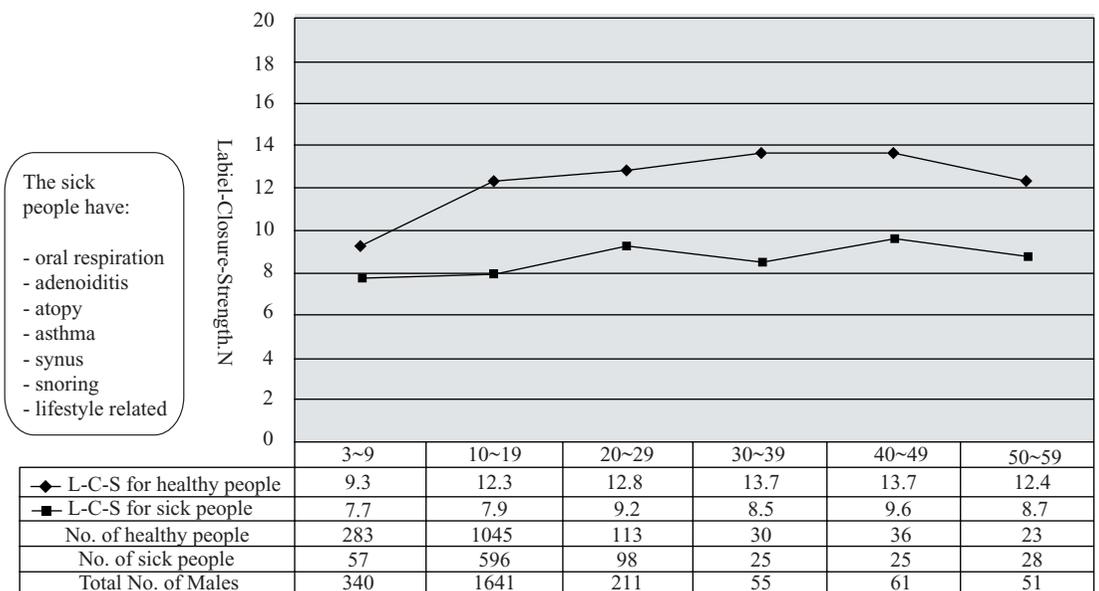
(Figure 5) Labia Closure Strength change for youth



(Figure 6) Labia Closure Strength according to age



(Figure 7) Changes of L-C-S in same age groups and differences between healthy people and sick people (male)



(Figure 8) Changes of L-C-S in same age groups and differences between healthy people and sick people (female)

data to which we have made access by this research, because our research have comprised no less than 3000 young people while the number of adult and elderly is slightly less than 1000.

As for the transitional change of the average values of L-C-S (Figure 6) seen in grown up adults, L-C-S of male in their 30s to 40s brackets has nearly climbed up to 16N. It seems to us that this phenomenon may have been caused by their eating habit at growth and developing period specific to their age brackets. However, it needs more verification to know if it can be seen, by following the same logic, in the L-C-S transition line change in the male age brackets of their 20's to 30's.

On the other hand, the female L-C-S does not seem to go up after their 30's. We, at this moment of time, presume that this is because female growth and development will come to a halt by their 20's. In addition, the decline, [or the increase, if any] of female L-C-S in their 40's and 50's could be explained by relatively smaller number of female adults subjects than that of the youth as well as relatively higher prevalent rate of sick female people among all subjects.

Last of all, we want to note that the growth and development of L-C-S will have completed most part of its activities around 18 to 20 yrs old for both males and females. In their 20's and after, the average L-C-S is observed as 14~16N for male, and 10~12N for female.

In aging process after, it changes by a certain ratio of its value unless they have serious diseases. We can now recognize that, before and after their 60's, there is a deteriorating tendency for L-C-S getting lower and lower due to aging. In 80's, people's L-C-S has decreased to 5~7N as low as that of kindergarten pupils.

2. Evaluation of L-C-S among healthy people and sick people

Healthy male adults have 14~17N of L-C-S while sick male adults have 10~14N of it.

On the other hand, healthy female adults have

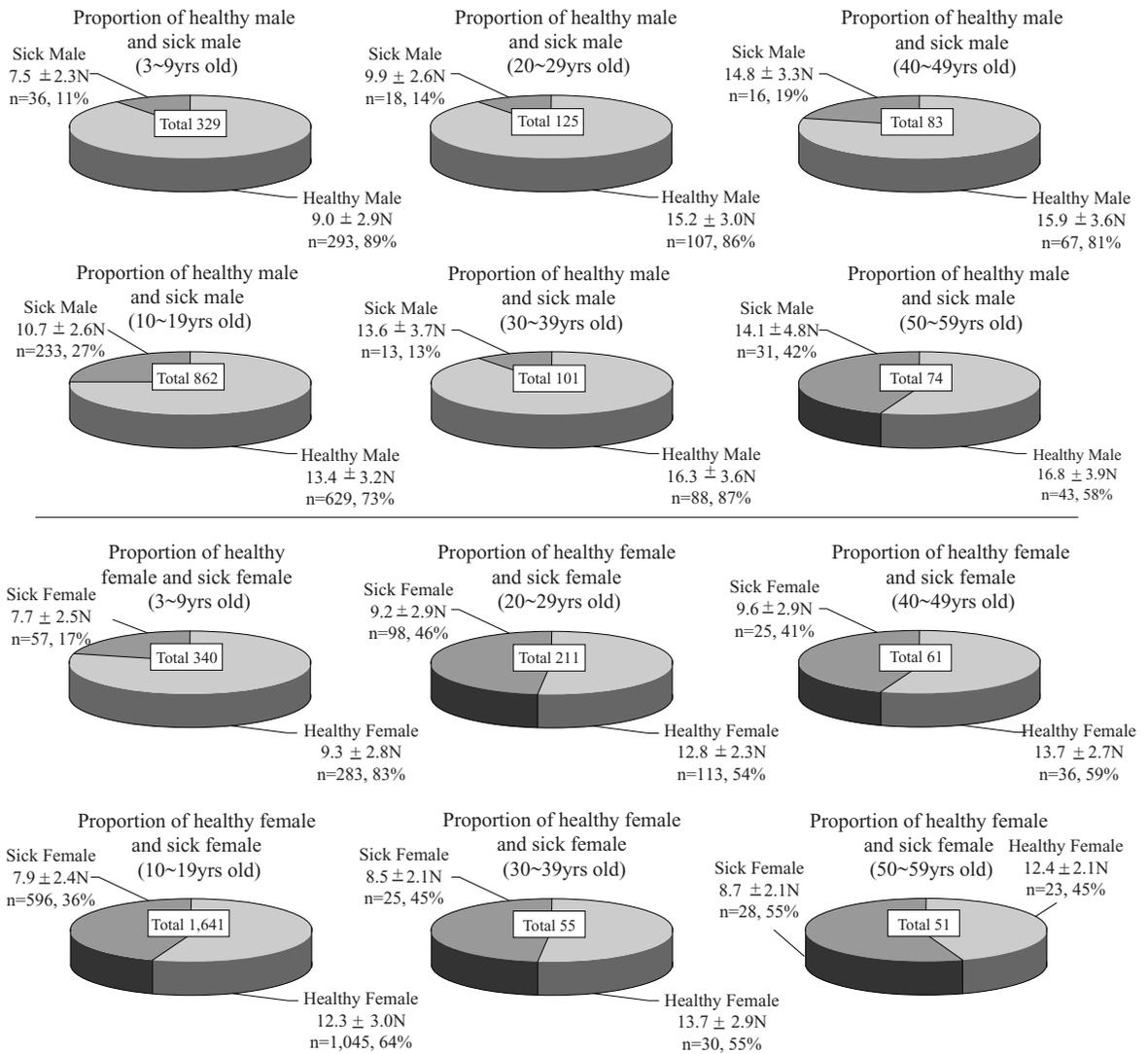
have 12~14N of L-C-S value while sick female adults have 8~10N.

Sick people (unhealthy people) are the people who have oral respiration, tonsillitis, adenoiditis, atopy, asthma, synus, sneezing and lifestyle related diseases or have a history of them. There has been observed a difference of about 3~4N in L-C-S value between healthy group and sick group (Figure7~8) in each age bracket of both male and female, and sick groups have a lower value. We can say that there exists significant statistical differences of L-C-S ($p<0.05$, Mann-Whitney test) between the two groups regardless of age and gender.

The implications behind this data, we have deduced, would expose as follows: that the diversity of lactation conditions during infancy (less than 1 yrs old) has left increasing numbers of infants to grow up without promoting their L-C-S due to insufficient labial movement of sucking practices at their mother's breasts. This inadequacy coupled with changes of eating habits as they grow up may well cause harm to the L-C-S of kindergarten pupils and young people. As a result, this deficiency of L-C-S will accelerate to use mouth-breathing during sleep, develop chronic inflammation of pharyngeal lymphatic ring, get lower self-immune resistance, and develop diseases or allergic disorder of oral cavity and pharynx for a number of people. And as for middle-aged and elderly people, factors such as overweight, less exercise, drinking, aging, decline of their physical strength due to diseases will make their L-C-S get lower. The deterioration of L-C-S will not only promote tongue roots to sink further, which directly causes mouth-breathing and snoring, but sometimes it will cause obstructive sleep apnea syndrome. It even can prove to be, at the same time, a remote cause to develop serious lifestyle-related diseases.

3. Prevalence rate among different age groups and gender

As for one of the young age brackets (3~19 yrs), we have carried out collection of data at schools by means of regular oral check-ups, so that there were many subjects (more than 3,000 subjects). On the other hand, the number of adult and elderly subjects



(Figure 9) Relationship of Prevalent Rate and L-C-S by age and gender (Upper Graphs: Male, Below Graphs: Female) In the above graphs is clearly observed Statistical implications ($p < 0.05$, Mann-Whitney test) between Healthy Groups and Sick Groups.

subjects (20~89yrs) was limited (no more than 1,000), because we could only collected the data of incoming patients to dental university hospitals. This may be one of the reasons of high proportion of sick people in adult and elderly age brackets. In terms of the ratio between healthy people and sick people, that of female sick people is always spotted much higher than that of male sick people in each age bracket. What is worthwhile noting here is that, regardless of male or female, 10 to 40% of sick people has always weaker L-C-S in all age brackets,

and as people get old, the proportion of sick people climbs up (Figure 9). In this research, we didn't carry out the individual assessment of L-C-S by diagnostic rating of diseases or symptoms, since it is varied by individuals. But in the near future we'd like to carry out these researches in more details by introducing certain correlation program which could bring forth to a decisive assertion in order to clarify its relationship to L-C-S.

4. Countermeasures for weak L-C-S

It became clear through diagnostic consultations during this research that a lot of people classified in the weak L-C-S group of young age brackets had oral and pharyngeal region disorders (oral respiration, tonsillitis, adenoiditis) as well as sequential symptoms of allergic disorders (atopy, asthma, sinus) with high incidence.

It has been reported for long that oral respiration was one of the factors to develop periodontitis. Oral respiration makes oral cavity dry and hinder sufficient work of physiological function of saliva, which, as a result, help dental plaque and dental calculi easily build up and finally induce periodontitis and teeth caries. In order to discourage oral respiration which is a major risk factor for periodontitis into nasal respiration, we should provide definitive therapy to eliminate the root factor. Though there has been so far introduced some treatments such as putting adhesive tape on nasal alar to enlarge nasal cavity and sleeping with adhesive plaster pasted over the mouth, they are only makeshift measures and not definitive therapy.

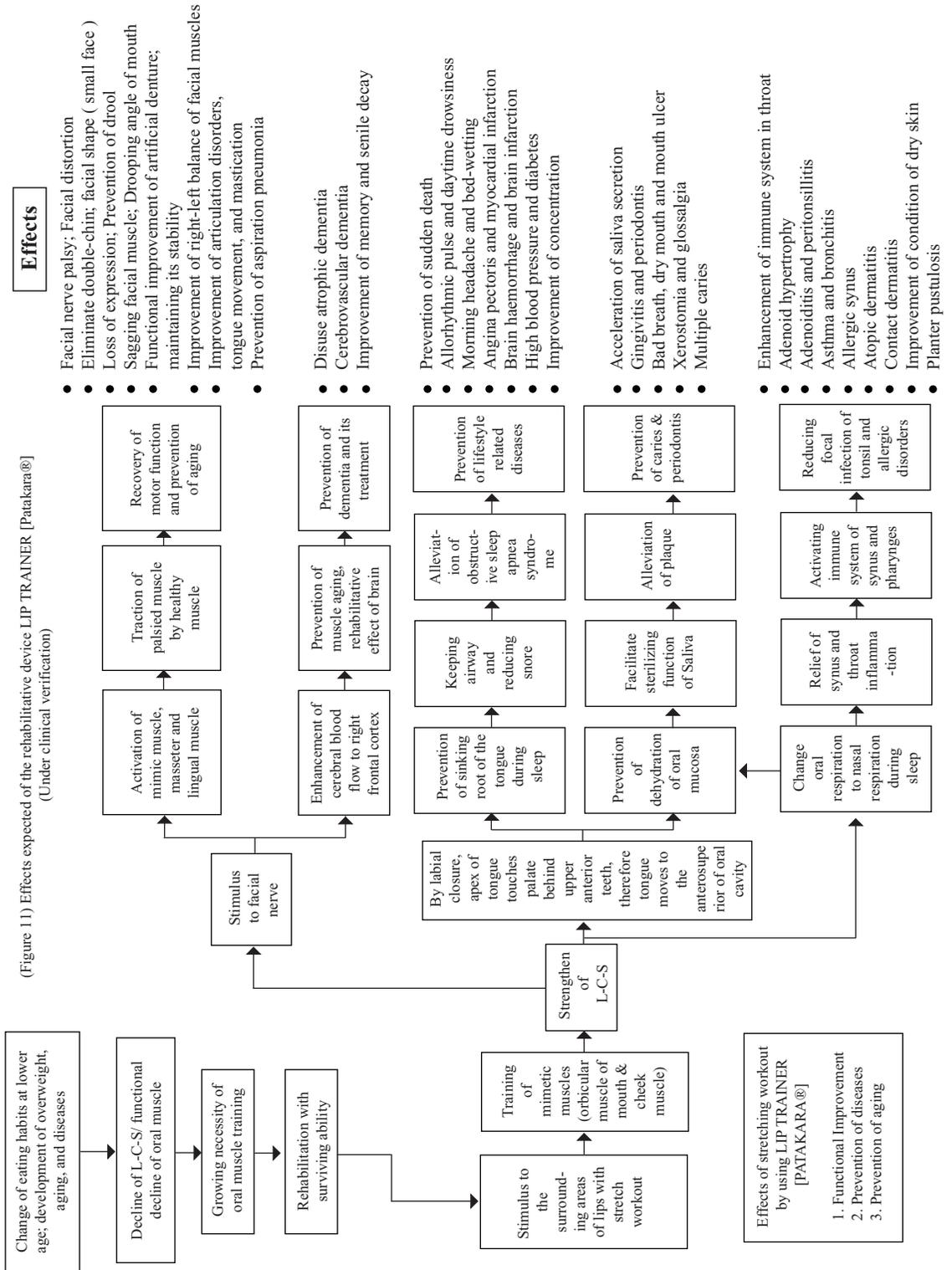
This newly developed oral rehabilitation tool LIP TRAINER [Patakara®] is designed to train oral muscle to increase L-C-S, we should say that it is a therapeutic apparatus that contribute to drastically reduce oral respiration during sleep. The author has reported several effects: that when the oral myofunctional training with LIP TRAINER [Patakara®] had been provided on people of all ages with lower L-C-S, then in a couple of months their L-C-S had increased; that loose mouth had tightened; that tongue sinking had disappeared; that habitual oral respiration during sleep had disappeared; that nasal respiration had stopped evaporation of saliva; that physiological function of saliva (Figure 10) had worked efficiently; that, therefore, various types of discomfort had been reduced.

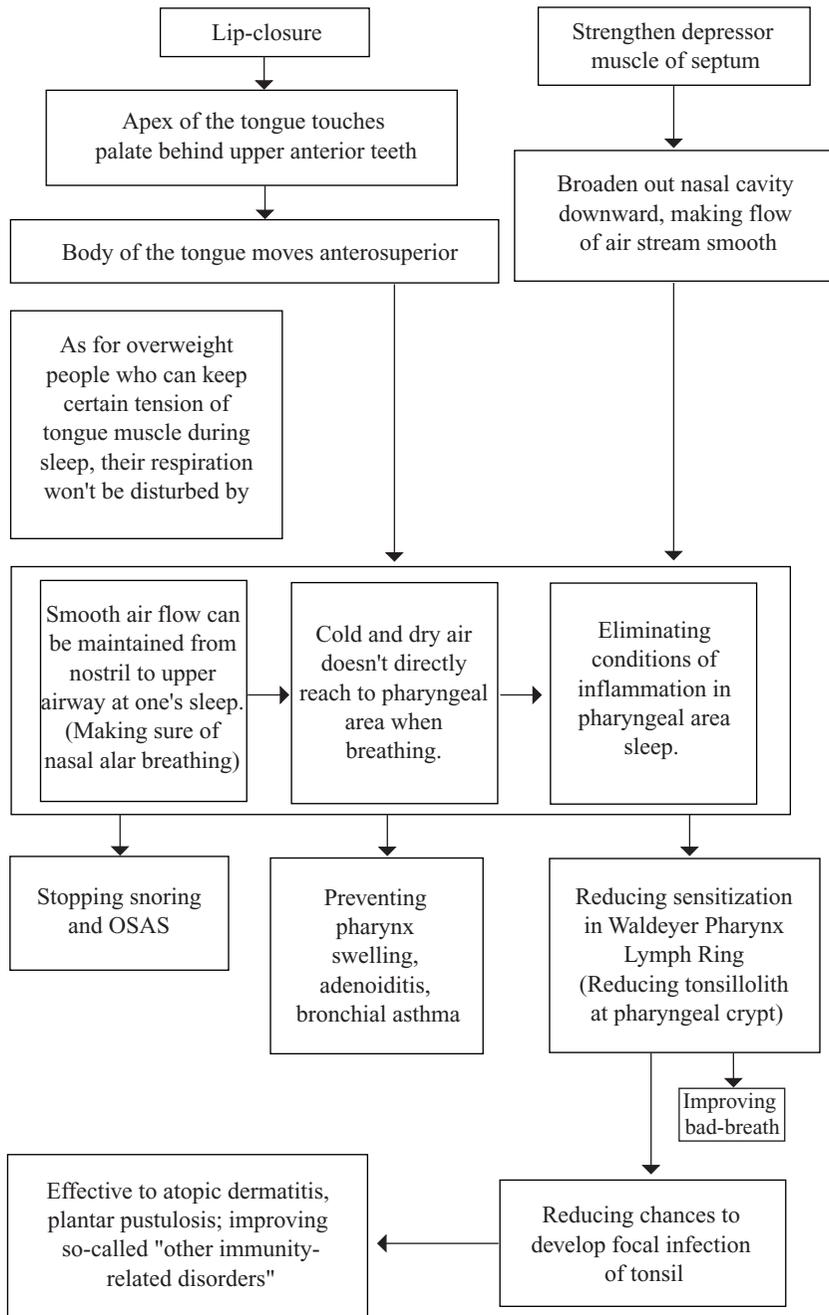
Listed up in the Figures 11 to 13 are the effects and mechanism of the stretch work-out induced by this device, which are based on one year data of monitoring patients.

1. Wetting and lubricating effect to mucosa tissue
2. Assistance of mastication, swallowing, articulation
3. Helping the digestion of food (digestive enzyme)
4. Solvent function for gustatory substances(Taste carrier to gustatory buds)
5. Protection of oral mucosa and pharyngeal mucosa
6. Disinfection, sterilization, and cleaning of mucosa
7. Excretion of bodily waste
8. Balancing the bodily fluid
9. Prevention of development of disorders in oral cavity (Tooth decay, periodontitis, mouth ulcer)
10. Improvement of stability of artificial denture

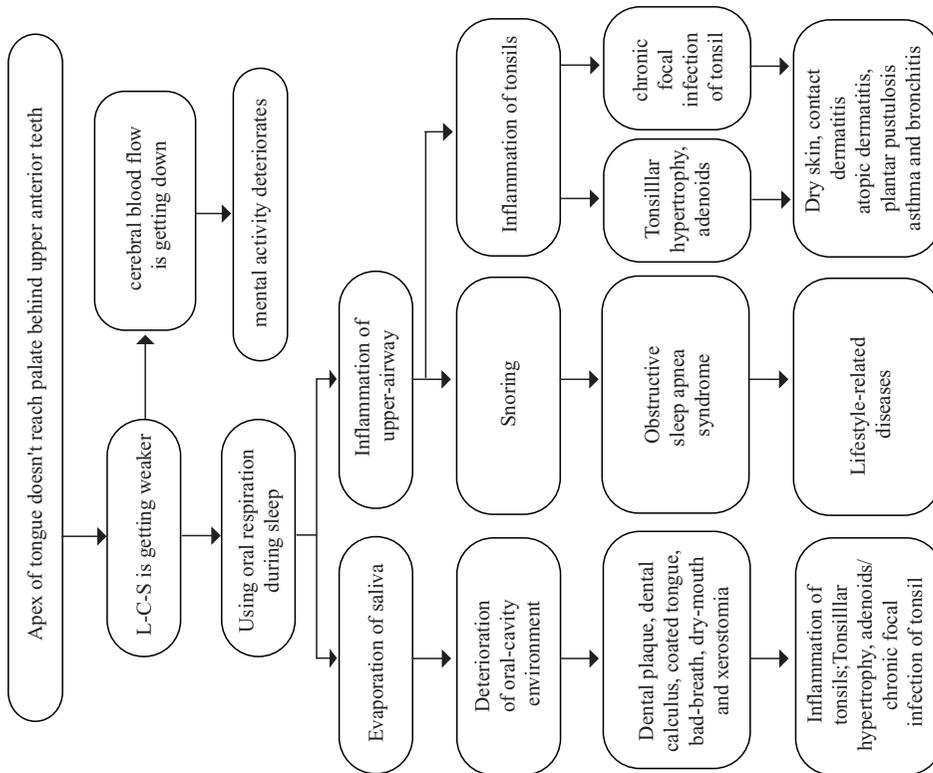
(Figure 10) Physiological functions of saliva

We'd like to report in this article that so far as young and middle-aged to elderly people are concerned, our device has succeeded in improving, though not perfect, oral respiration during sleep, snoring and obstructive sleep apnea syndrome and that it has ameliorated such diseases and symptoms related to oral cavity and pharynx that include xerostomia, glossalgia, mouth ulcer, ozostomia, periodontitis, adenoid, tonsillitis, adenoiditis and asthma. At the same time through this research, bit by bit, we came to know that this device could be an effective therapy for atopic dermatitis and carpedal pustulosis which are considered as chronic diseases. In addition to the above effects, the device has not merely proved that it would eliminate the wrinkles and distortions of facial muscles as well as double chin by overweight and aging process which are frequently observed among middle-aged to elderly people, but also that it could restore young looking, firm and pure face (small face). Other effects have been partly proved that, so long as aged people are concerned, it could probably ameliorate eating habit / swallowing / articulation disorder / tongue movement failure/mastication disorder/stability & maintenance of artificial denture/aspiration pneumonia/oral cavity peripheral muscle palsy / drool / rehabilitation of oral cavity / facial nerve palsy/dementia. (Figure 14)





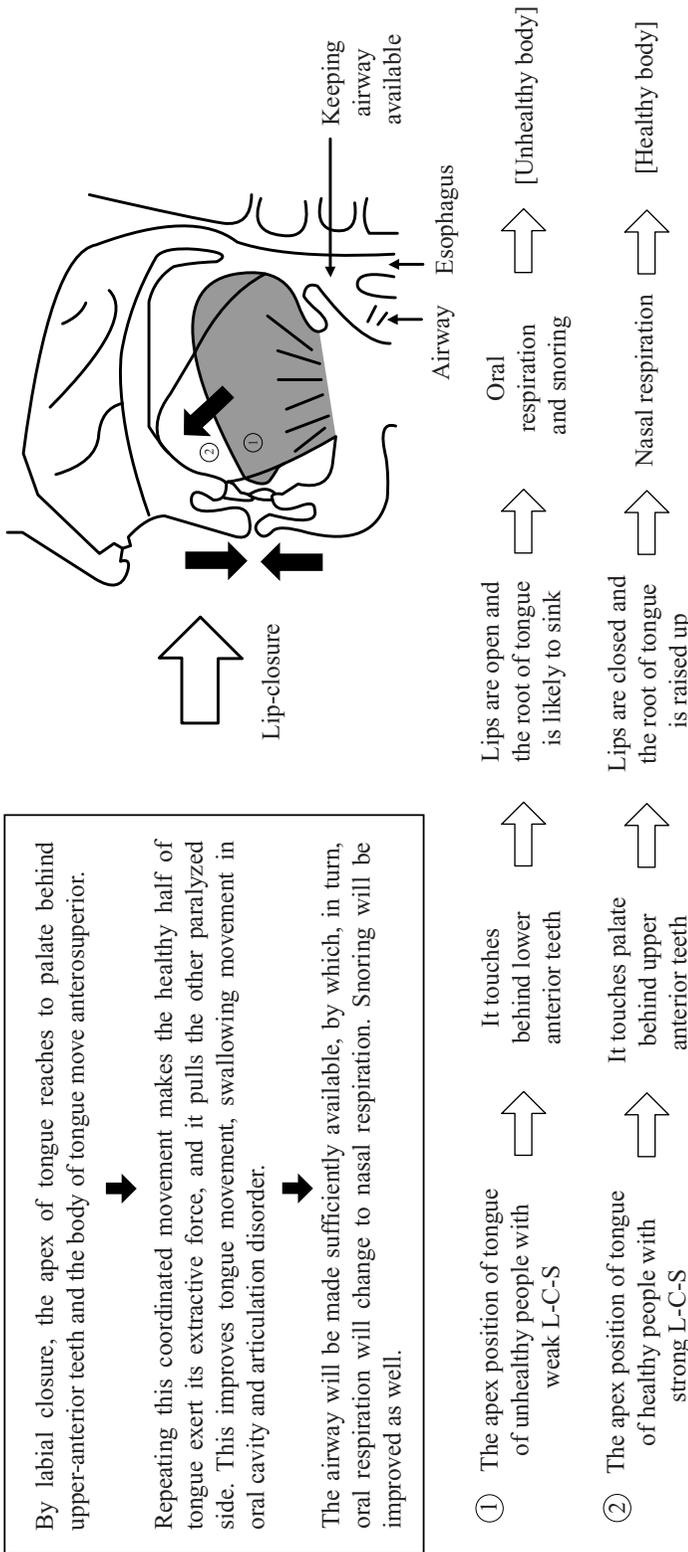
(Figure 12) Listed above are reasons why strengthened L-C-S will alter oral respiration into nasal-alar respiration during sleep, and then reduce discomfort in oral cavity and pharynx, which will subsequently help improve overall body conditions and symptom of diseases.



(Figure13) Diseases and symptoms which is developed by lower L-C-S

1. Helping to get higher L-C-S, improve loose-lip condition, and eliminate the habit of oral respiration.
2. Induce oral respiration to nasal-alar breathing, which results in recovering inflammation of throat and in promoting sound respirator system.
3. Prevention of dryness in oral cavity, which leads to improvement of periodontitis, ozostomia, mouth ulcer, glossalgia, xerostomia.
4. Promoting secretion of saliva as well as developing favorable environment for saliva to function, and maintaining oral cavity comfortable.
5. Training oral muscles, which results in better left-right muscle balance, and then ameliorating the sustainability, stability, functionality and mastication of artificial denture
6. Prevention of sinking tongue results in reducing snore and obstructive sleep apnea syndrome(Prevention of life-style related diseases)
7. Improving obscuration of pronunciation after cerebro-vascular disorder, twitching face, mouth corner drooping, and recovery of motor functions such as watering, eating and swallowing.
8. Promoting expressive countenance, improving sagging face, helping regain adolescent smile. (revitalization of mimic muscles)
9. Making mouth and face line firm and pure, removing double-chin which is leading to slimming down the face(small face)

(Figure 14) Effects of labial stretch workout by the rehabilitative oral device LIP TRAINER [Patakara®]



(Figure 1.5) The coordinated movement of Labial closure and tongue apex brought by enhancing L-C-S

Conclusion

1. It is observed that L-C-S shows positive development similarly for both male and female in their age bracket of 3~6 yrs old, however, the male subsequently develop higher L-C-S value than that of the female. The development of L-C-S continues, but halts by the time people reach at 18~20 yrs old regardless of gender. The values are close to 14N for male and 12N for female.

2. There have been observed 2 different peak values of the male L-C-S: 14N for the male in their 20's and 16N in their 30's~40's.

3. L-C-S starts to deteriorate around age 60 regardless of sex. It finally reaches 5~7N in their 80's, which is as low as the value for 3 yrs infant.

4. The average L-C-S value for healthy male adults is about 14~17N while that of the sick male adults is nearly 10~14N. As for the female adults, L-C-S for the healthy is about 12~14N while that of the sick is nearly 8~10N.

5. Each sick group in every age bracket between 3~59 yrs old, who has diseases or symptoms such as oral respiration, tonsillitis, adenoiditis, atopy, asthma, sinus, snoring and lifestyle-related diseases, indicates lower L-C-S value by 3~4N than that of the each healthy group respectively regardless of sex. We have here clearly recognized that there are significant statistical differences of L-C-S account for 10~40% of every age bracket, male and female irrespectively, and the prevalent rate goes up in accordance of age.

7. People who are suffering from severe illness show significantly lower L-C-S than the healthy others in the same age bracket.

8. L-C-S is an effective value indicator for the purpose of watching the conditions and risks of respiratory system and immune system. It has high potential to be one of the parameters to make assessment of the health of the oral environment.

For the first time, our research has not merely identified the standard values of L-C-S in every age

8. L-C-S is an effective value indicator for the purpose of watching the conditions and risks of respiratory system and immune system. It has high potential to be one of the parameters to make assessment of the health of the oral environment.

For the first time, our research has not merely identified the standard values of L-C-S in every age bracket of both genders but has also disclosed that the groups with lower values of L-C-S have contained, among themselves, a proportionally large number of people suffering from disorders in oral cavity and pharynx (oral respiration, tonsillitis and adenoiditis) as well as allergic disorders (atopy, asthma and synus). We are quite confident that Oral Rehabilitative Device LIP TRAINER [Patakara®] has high potential to prove it to be therapeutically an effective medical treatment (Figure 15) for those people who are suffering from many health problems which have mainly been induced by lower L-C-S.

The oral myofunctional rehabilitation by applying LIP TRAINER [Patakara®] will be an essential therapy which strengthens L-C-S. We hope that this device is going to be an indispensable tool for everyone that wishes to live a long and healthy life.

The average Japanese life span is now above 80 yrs and the society in Japan will be a hyper aged society in 21st century. Making a better life such as enjoying food and talking to all friends with smile is everybody's aspiration. The role which the medical dentistry should play in clinical fields will be so increasingly crucial in view of maintaining healthy oral functions such as smooth saliva circulation, appreciation of food taste, smooth mastication and swallowing.

Last of all, we appreciate it very much from the bottom of our hearts if many researchers and clinicians may further scrutinize and evaluate the significance of L-C-S in the near future.