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PRESENT THERAPEUTIC METHODS FOR LEPROSY.

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By

Dr. Yutaka Kamikawa.

(Director of the Rakuseiin Leprosarium, Formosa)

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Under the above title, I want to speak on an outline of the treatments on leprosy and criticize those somewhat newly used therapeutics of to-day together with my own experience.

Before proceeding to the subject, I want to say few words on determination of efficient therapy in leprosy because we have no specific remedy for this disease like the salvarsan for the syphilis, yet, we are piled with various kinds of methods and preparations that introduced as efficient therapeutics for the leprosy which confuse us to decide just which one is effective and which one is not. Take a certain preparation for instance, which is discarded as almost worthless in a certain leprosarium where a larger number of patients accommodated are severe cases, while on the otherhand, it is praised as effi-

cient curative agent in certain hospitals where the most patients cared are slight cases like in university clinic. I, therefore, devised a means of denoting the degree of case that respond to the treatment- Curative-Reaction Index (Table I). The cases of higher index generally respond well to any kind of medications and consequently it improve well too, but the cases of lower index do not readily respond to the treatment well as the former. Hence, if there is any true curative remedy, it should effect well even to the lower index cases without exception.

TABLE I. Curative-Reaction-Index

CONDITION OF DISEASE AND TYPE	STANDING OF DISEASE	AGE OF CASES	PHYSICAL CONDITION	HAVE HAD SAME KIND OR DIFFE- RENT KIND TREAT- MENT BEFORE
				Same kind...(±)..1
			Not good..(±)	Different.....(1)..2
		Old.....(±)		None .....(2)..3
	Old.....(±)	Middle...(2)	Good.....(1)	
Severe cases...(1) (Tubercular)	Medium.(1)	Young...(1)		
	Recent...(2)			
Moderate case	Medium.(1)	Young...(1)...	{ Not good..(±)...	Different.....(1)..5
			{ Good.....(1)...	Different.....(1)..6
Mild cases.....(3) (Macula-Neural)	Old.....(±)			
	Medium.(1)	Old.....(±)		
	Recent...(2)	Young...(1)	Not good..(±)	
		Middle...(2)		Same kind...(±)..8
			Good.....(1)	Different.....(1)..9
				None .....(2)..10

GENERAL TREATMENTS.

Leprosy is the disease that having an oldest history in medicine, so that countless remedies had been tried for the treatment.

1. Pharmaceutical treatment :- For the leprosy, almost all known remedies are used from primitive methods of ancient age to somewhat advanced Chinese herb treatment and up to present scientific medicine, but we are still not yet come across with anything like reliable specific remedy for this disease. Of course, occasionally somethings that seems hopeful had appeared but not one of them did met our expectation on the end. While the situation is as such, we after all have to rely upon chaulmoogra oil as the only remedy for

the leprosy which is used three hundreds years in our country. However, there are more than few remedies that beneficial adjuvants to the chaulmoogra oil treatment such as those gold preparations, non-reactive maxima dose of iodide, certain sulphur preparations, thymol, lipoid proteins and other various proteins, nonspecific immunological therapy, and etc. Moreover, many therapeutists in our country have employed various kinds of dyes intravenously and locally and some of them recommend methylen-blue but it is not likely so effective as they claimed. I have too, tried acridine derivatives and recently sulfonamid preparations, but found no curative effect on the leprosy of them. If we do not give up the hope and endeavour constantly for search, even in a pessimistic situation specific remedies for the leprosy right be found from those sources above mentioned.

2. Physiotherapy :- The X-ray, high frequency current, diathermy, radium, sun-lamp, carbonic acid freezing, moxa therapy, hot-spring therapy, etc. had been applied, but none of them answer favourably to the purpose.

3. Bacterio-Immunological therapy and Toxi-therapy :- In this line of treatment, there had been used numerous things such as the emulsion of leproma, vaccine of soidisant cultured lepra bacillus and other acid-fast bacillus or its toxoides, serum of animal immunized with those bacillus, etc. The Koch's tuberculin and B C G are too enthusiastically used. Furthermore, there are many reports concerning the use of Momose's autoserotherapy. Yet, none of them is able to satisfy us.

4. Dietetic treatment :- The dietetic treatment for leprosy heretofore, has been neglected or overlooked as it is not so important practice as in the tuberculosis, but recently begin to call the attention of therapeutists and its benefit is appreciated. As a resolution passed on the meeting of sectional committee of the International Leprosy Conference held at Cairo 1938, that leprous patients necessitate well balanced nutritious food rich in vitamins is to be sorted according to the taste, fresh outdoor air, and relieve associated complications. The nutritious food for leprous patients are the vegetable proteins, fresh vegetables, things that rich in vitamins, and adequate amount of meats.

TABLE II. Increase and decrease of fat in food of patients after admission and due fluctuation of symptoms of 576 cases.

Type of Cases	Amount of fat in food	Fluctuation of symptoms	Number of case	%	Ratio of those got worse after fat increased or decreased
Tubercular type (Totally 305 cases)	Increased	Better.....	5...	1.6	1:10.8
		Unchanged...	21...	6.9	
		Worse.....	54...	17.7	
	About usual	Better.....	7...	2.3	
		Unchanged...	23...	7.5	
		Worse.....	48...	15.7	
	Decreased	Better.....	15...	4.9	1:7.0
		Unchanged...	27...	8.9	
		Worse.....	105...	34.4	
(Aggravation of symptom is 3.8 times higher in increased fat)					
Neural type (Totally 271 cases)	Increased	Better.....	6...	2.2	1:2.2
		Unchanged...	33...	12.2	
		Worse.....	13...	4.8	
	About usual	Better.....	10...	3.7	
		Unchanged...	35...	12.9	
		Worse.....	37...	13.7	
	Decreased	Better.....	23...	8.5	1:2.7
		Unchanged...	51...	18.8	
		Worse.....	63...	23.2	
(Aggravation of symptom is 0.5 higher in decreased fat)					

It is generally known fact that an excessive fat given to patients, of tubercular type make their condition usually worse such as high fever attack and produce fresh nodules. Also it is commonly recognized that obese patients are prone to change into a tubercular type when the condition of the disease proceeds. These facts lead us to think there must be a close relationship between the fat and change of symptoms of leprosy. I, in the purpose to study this relation, provide fat reduced meal for 30 patients together with a statistical investigation on 576 patients for the difference in amount of fats in their daily food before and after the admission to the Rakuseiin (Table II), and proved that there is a certain causal relationship between the amount of fat in the food and the change of symptoms of the disease. That is, effect of fatty food in those two different types of leprosy-, tubercular and

neural leprosy-, manifest just vice-versa in progress of symptoms.

As shown in above table, on an increase of fat within a limit of an usual meal of Formosans, the symptoms of tubercular type tend to become worse while the symptoms of the neural type likely to become better. A decrease of fat shows an opposit effect upon those two types of leprosy.

CLINICAL TREATMENTS.

1. Surgical treatment :- There is nothing new in this section of treatment. For leprous ulcers, the skin grafting is advised (Sakakihara, Flarer-Grillo), and for the ulcers of the legs and perforation of the sole or for the obstinate neuralgia, the resection of parasympathic nerve, stretching of nerves, ablation of nerve sheath, conductive anaesthesia of nerve trunk, etc. reported beneficially (M. Bockhart, Ozawa, Nojima, Tashiro, Uchiyama, Wayson).

2. Ophthalmological treatment :- Among many indurable symptoms of this almost incurable disease, there is nothing like the affection of the eye that so obstinately resist to the treatment. Yet, a great majority such as 70—80% of patients in leper asylums are suffering from this leprous affection of the eye. However, it is of great regret that even in the present scientic progress nothing could be found for it. All we can do for it is just time-relieving symptomatic treatments.

3. Otorhinolaryngologic treatment :- Leprous affections of the nose and throat are just as miserable as that of the eye. And for this too we have nothing effective but symptomatic treatment and only watch the progress with caution. In patient, in which the throat is so difficult to breath, the tracheotomy is worth to try and it not only relieves the breath by tracheal canule but it also improves the general condition of the body.

4. Internal treatment :- This section of treatment is applied with all modern methods available to internal ailments due to leprous infection and associated complications.

CHAULMOOGRA OIL AND ITS PREPARATION TREATMENTS.

1. Chaulmoogra oil treatment :- This treatment in our country has been used for three centuries but we see no special improvement or advancement

nowadays. In order to make it easily absorbable by subcutaneous or intramuscular injection many mixtures are suggested, but none of them seems to have worth to speak of. However, I am using a mixture a half part of chaulmoogra oil $\frac{3}{5}$ part of olive, $\frac{1}{10}$ part of camphorated oil and $\frac{1}{20}$ part of Thymol for nearly twenty years.

2. Chaulmoogra oil preparation treatment :- Various preparations or derivatives of chaulmoogra oil has been produced and recommended, such as its soda, ethyl-ester etc. But we cannot say at present that its efficacy to the leprosy is superior to the chaulmoogra oil its self.

3. Local injection of chaulmoogra oil :- This is a recent method of using the oil. The method is an injection of chaulmoogra oil or its ethyl-ester intracutaneously in an affected area of the skin with a rather small needle. The dose is about 0.2 cc to a nodule or a maculate area and injection may be given to several different places at a time either alone or together with intramuscular injection. By this method of using the oil, the nodules, maculas, and infiltrations are likely absorb comparatively better.

According to Muir, an intracutaneous injection for macula infiltration should be smaller in dose such as the protuberant formed by injection ought not exceed 1 cm in diameter.

4. Intravenous injection of chaulmoogra oil :- The intravenous injection of liquid solution of hydriocarpus soda is tried by many authors, but it is now not so popular because of its disadvice of irritating the vein.

Recently, the emulsion of chaulmoogra oil have appeared for an intravenous use, but it requires further studies to make it more finer and absolutely harmless.

5. Comment on the treatment with chaulmoogra oil and its preparations :- The chaulmoogra oil is the only remedy for the leprosy to-day. But, how much we can expect on it? I, some years ago, observed patients treated by the oil in Kyushu leprosarium for the period of two years and witness that the 30% of them had improved by it. And I also treated over 500 patients in the Rakuseiin since 1930 to date and 56.7% of them were improved. Dr. Yoshinobu Hayashi of the Zensei-Byoin reported that the rate of improvement by this oil ranges from 50 to 80 per-cent.

The percentages given in above data are all improved cases, but not completely cured, but, among of them fairly number of cases are almost entirely discovered. However, according to Dr. Y. Hayashi, the continual use of chaulmoogra oil could hold patients an improved condition for about 7 years but afterwards it lost the therapeutic property. If so, even the chaulmoogra oil too cannot be excepted as a specific remedy for leprosy.

The opinions as to the therapeutic mechanism of the chaulmoogra oil, Adams and others explain that it is owe to chemical germicidal power of unsaturated fatty acid acts upon the *B. leprae*. And Rogers says that it is due to injected chaulmoogra oil, which promote the activity of fat soluble ferment in the body and act to dissolve the sebaceous substance capsule of the *B. leprae*. But I cannot agree with Roger's view, since I have learned that injected chaulmoogra oil in the body produce a certain antigen which act as somewhat a specific remedy. I am of an opinion, this mechanism plays important role in therapeutic action upon the leprosy and in this connection I reported it in the Kumamoto Igakkai Zasshi, 1929.

ON CURABILITY OF LEPROSY.

Our medicine of present age can sometime succeed in some mild and early cases to bring them to a cured condition, but in general, we have to admit that the leprosy is after-all incurable disease. The number in the Table III is improved patients (clinically healed) discharged from Rakuseiin out of 1200 inmates during the past 9 years.

TABLE III. Prognosis of the improved patients discharged.

Prognosis	Type	Number of case	%
Good progress	Tubercular	♂ ..... 5 } ♀ ..... 2 }	75.0
		7 }	
	Macula-Neural	♂ ..... 16 } ♀ ..... 19 }	
		35 }	
Relapse or readmission	Tubercular	♂ ..... 3 } ♀ ..... 3 }	19.6
		6 }	
	Macula-Neural	♂ ..... 4 } ♀ ..... 1 }	
		5 }	
No information	Tubercular	♂ ..... 0 } ♀ ..... 0 }	5.4
		0 }	
	Macula-Neural	♂ ..... 3 } ♀ ..... 0 }	
		3 }	
Total		56	100.0

CONCLUSION.

The course of leprosy takes very slow and chronic progress so that the symptoms apt to fluctuate spontaneously better and worse in a long duration and it has a tendency to respond more or less to the most of medications for a time. Therefore, it is essential to take my Curative-reaction-index in account for determining the efficiency of newly appeared remedies for the leprosy. That is, anything that able to improve the cases below the index 3 of my curative-reaction-index, I consider it can be excepted as curative remedy.

All the methods of treatment of to-day, no matter what ever the kind, are still not superior to chaulmoogra oil yet. Nevertheless, in treatment of leprosy, necessitate hygienic daily life of patients, increasing the physical resistance by given the special diet, proper administration of chaulmoogra oil, together with adjuvant treatments of pharmaceutical, immunological, physiotherapy and with cautious watching for the fluctuation of symptoms.

However we cannot solely rely upon chaulmoogra oil as a specific remedy for the leprosy and even how far the researches may be proceeded on constituent of this oil hereafter, we perhaps cannot expect any more than what it is now. My wish is that a real specific remedy for this obstinate disease be discovered from other chemical sources by the endeavour of our fellow scientists and hope to see a glorious triumph in the field of therapia sterilisans-magna.

(Abstracted by author)