Lexical syllabus reconsidered as a course design for English language learning in Japan

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1.　Introduction

A considerable number of coursebooks have been organised chiefly in the light of grammatical and functional aspects of language. The fecundity implies that grammar and functions may be well equipped with the potentiality for organisation of a syllabus, which is in actuality the most influential factor in a course design. In the process of designing a course, whether it is based on grammatical or functional syllabus, little guidance is usually provided to vocabulary, except in the form of a word list.

Similarly in skill-based description of language vocabulary is ordinarily treated as an appendage to four skills. In the course of study for senior high schools, for example, merely the optimum numbers of words to be treated in various courses are stipulated but the words are not identified in it.

However, it would be impossible to teach grammar without referring to some vocabulary. It is not an organising force there, but it actually fleshes out the structural skeletons. It would be also quite difficult to understand a passage from a novel if there were more than two or three unknown words in every line.

Grammatical knowledge and contextual determinancy might be of considerable help to infer the right meaning, but these two factors and vocabulary are, in some cases, interdependent. They affect each other.

Willis (1990) suggests that a word can be a better unit as a syllabus design than structure. According to his argument, a word can be prior to structures in terms of meaning. This priority of vocabulary leads to the idea that the description of language which takes a word as its basis is more accessible to students than a structural description. This is where the idea of lexical syllabus starts.

To design a syllabus from the lexical viewpoint was an entirely new attempt. The present essay will first outline the notions and the criticisms of structural and notional/functional syllabuses and secondly, will introduce a variety of ideas which underlie lexical syllabus. And lastly I will show how these ideas are practically realised in course organization.

2.　Syllabus design

2.1. Syllabus and methodology

In order to avoid confusion, I think it will be better to begin by making clear what I mean by the notion of a syllabus. The main point to be clarified here first is that a syllabus is not either an approach or a methodology.

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It is in principle an inert collection of linguistic document which specifies what is to be learned, and the concept of an approach and a methodology tell how it is to be learned. This implies that it is a mistaken assumption that a notional/functional syllabus is synonymous with a communicative approach to language teaching. A notional/functional syllabus is of itself no more communicative and either is a structural syllabus. Communication is what is achieved through classroom activities. This means that there is no such thing as communicative syllabus. It should be thought of as a wrong collocation at least in the field of the English teaching. So, theoretically, it is quite possible to adopt a communicative methodology for a class designed along a structural syllabus, and vice versa. Teachers are not always bound to adopt the methodology in line with the syllabus intention. Instead, they are required to think what classroom activities are promoted most consistently with the design of the syllabus they have already employed.

2.2. Structural syllabus

Most of the coursebooks written on the structural syllabus share the common assumption that the mastery of language can be achieved by isolated mastery of its constituent parts, which are mostly grammatical items such as tense, voice, etc. This assumption means that language learning is viewed as the synthetic process of separate grammatical-items which are presented to learners separately but in a meaningful sequence.

But this type of syllabus organisation is not without a problem. According to this syllabus design, learners must store an enormous body of grammatical knowledge in such a way that they can act on it automatically. To achieve this, grammatical items must be ordered in a way which looks logical from learner's viewpoint, not from writer's viewpoint. It may well be that there is some criterion which is reasonable for course writers sake but that does not always means that their ordering are logical. If there were one fixed set of discretely ordered grammatical items which really helps learners synthesise each item, one by one, into a whole system, then would it be possible for learners to build up the same system by following another set? Or are they both logical? If a syllabus organisation based on structure is to be more satisfactory, it is reasonable to depend more on the research of second language acquisition.

2.3. Notional / functional syllabus and its criticism

Recently many course-writers have suggested that language-functions such as 'greeting', 'request', etc. should serve as the basis for a syllabus design which replaces grammatical items. It is said that the course books written along this design make it possible to teach the language in actual use, which grammatical syllabus fails to achieve. But this syllabus design is not completely free from problems, either.

The first argument to be made is concerning whether or not should it be possible to grasp the feature of language entirely in terms of the notion of functions. How many functions can an entire body of the linguistic activities be divided into? Even if it is possible, every function has a number of different ways in which it can be expressed. Then it follows that it is very difficult for a syllabus designer to order functional items per se, and also to order which phrase within the same functional category should be taught first.

Secondly, most of the functions are performed basically through grammatical use of language. Harmer (2015) concludes that "without some understanding

of grammar students would not be able to do anything more than utter separate items of language for separate functions and the expression of functional language is only possible through the use of grammatical language." Grammar is a primary step to be taken before functional use of language.

3. What does it mean to know a word ?

A syllabus is a document which provides the basis for a set of instruction in a coursebook concerning operations in the classroom. If we choose vocabulary as a starting point for a new way of syllabus organisation, a simple inventory of words was of little service to the purpose. In order to constitute an adequate syllabus, it is of paramount importance first to frame a definition of a word, then to make clear what it is to know a word, and, lastly, to set up appropriate criteria on which the matter of vocabulary selection depends.

3.1. A word and a word form

Generally in the sphere of foreign language teaching much argument has been made so far concerning grammatical structures, but there has been relatively little discussion about the nature of lexis from an empirical standpoint. This lack of discussion has made the concept of word unclear. According to the conventional view, the term 'word' tends to be inclusively defined as a unit if language comprising a base form and associated set of inflections. For example, the word 'give' is a base form, and its associated set of inflections are 'gives', 'giving', 'gave', and 'given'. In addition to these forms, the derivative form 'gift' can be included in some cases.

In computational linguistics, the term 'lemma' is more often preferred when this inclusive notion of words which consists of the base form, its inflected forms, and sometimes its derivative forms. In the example I have shown above, when we refer to the lemma 'give', it automatically refers to those forms subsumed under it.

This traditional view of the nature of a word often leads to the mistaken idea that all forms of words are equally important and that all will behave in the same way regardless of different syntactic environments. Some people only intuitively tend to believe that all forms including the base form should be counted as one word. This is why most of the course books are not always consistent concerning which form should be included, and should be excluded from the vocabulary lists in them. Such inconsistency has resulted form the lack of consideration not only of what word forms occur in natural use, but also in what forms and in what patterns they typically occur.

Textual evidence shows that word forms often behave quite differently from each other in terms of meaning and usage. These forms should be considered as essentially different word forms, and treated as such in a syllabus. The morphological pair 'certain' and 'certainly' is a typical example in this case. According to an analysis based on computer-corpus operation, the primary meanings and central patterns of usage occurring in these two words are as follows:

'certain'

Function 1. (60% of occurrences) Determiner, as in:
/ a certain number of students/ in certain circles/

Function 2. (18% of occurrence) Adjective, as in:
/I'm not awfully certain about.../ We've got to make certain/

Function 3. (11% of occurrence) Adjective,

in phrase 'A + certain + noun', as in:
/ has a certain class ring / there is a certain
evil in all lying/

'certainly'
　Function 1. (98% of occurrence) Adverb, as in:
/ it will be certainly interesting/
/ He will almost certainly launch into a
little lecture.../

These examples of the usage patterns clearly show that 'certainly' is not in the same relation with 'certain' as 'quick' is 'quickly'. It has turned out to be more than a mere adverb of 'certain'. If it can be used as an adverb of 'certain', it should be replaceable by the adverbial phrase 'for certain'. But we can not say "I know it certainly" instead of saying "I know it for certain." In one of the word-lists used by the Japanese high school students as a preparation for the entrance examination to universities, the word 'certain' is given only with the meaning of the second function shown above. This treatment of these two words result from the objective analysis based on the accurate collection of the lexical data. Anyway, it is desirable to treat these forms as independent words and to list them with their syntactical environment in the lexical syllabus.

3.2. What is it to know a word ?

Knowledge of a word exists on various levels, which seems to be language universals. Sapir and Wharf hypothesised that people do not have the exactly same picture of the universe unless their linguistic backgrounds are the same. To put it briefly, it can be paradoxically said that culture is language. Though I am not sure that this linguistic view was the product which was brought about by the shift in philosophical trend from ontology to epistemology, their hypothesis,

in its extreme form, would lead to the view that perfect translation is impossible. Then, how is it made possible for speakers of different linguistic backgrounds come to understand one another? The answer to this question includes an important key role to the identification of the notion of a word.

3.2.1. Signification and indexical value

To begin with, it will be useful to make a distinction between the two major dimensions which are thought to be attributes of a word. They are technically called 'signification' and 'indexical value'. Signification is defined as a linguistic symbol recorded in the dictionary, while indexical value is a function which is attributed to a linguistic sign by the language user when it occurs in a certain context. The following text taken from one of the Japanese English textbook will serve as an example:

Punctuality is important in American business,
academic, and social settings. The importance
of punctuality is taught to young children in
school. Tardy *slips* and bells are used to teach
the child that punctuality and time itself are
to be respected.
Here is a recent newspaper article in which a
schoolboy's experience with time is reported.
(italic mine)
(*New Scope English CourseII*, Lesson 6 "Punctuality
is important")

Here, let us pick up the word 'slip' used in the text above as a example. The entry for the word in a dictionary includes a wide range of meanings: 'to move quietly and cautiously', to elapse or pass', 'to fall off from a standard', 'to cause to move slowly', 'a mistake in judgment', 'a leash', 'a small piece of

paper', etc. All of these meanings stand for the total set of signification of this word as a codified abstract which is conventionally established. Only one of these meanings, however, has the value required in this text in question and the rest of them are discarded as irrelevant items. How is it chosen? If asked for the answer to this question in the classroom, most learners will surely say that the context makes clear which meaning is relevant to this text. In order to understand the meaning of 'slip' in this text, learners have to select a meaning by matching up code and context. There might be some cases in which learners don't know any of the significations of the word. Even then it is possible for some of them to derive the value from the context where it takes place if they know the signification of other words also in the same text. Actually in this text, the words 'punctuality', 'tardy', etc. help them to specify the value of the word 'slip' by offering a high degree of determinancy.

Similarly there are also some cases in which the value of a word is not achievable merely by selecting the relevant part of its signification. Let us pick up the word 'itself' out of the same text as another example. In this case, according to dictionary definitions, the following signification is given: 'that identical thing','its normal self', etc. It is easy to imagine that these items of signification are of little help to the understanding of the part of the text where the word is used. What learners want to know is a word or a group of words it actually refers to. Here it could refer to a combined notion of 'punctuality and time'. It is certain that this way of value recognition is possible only in a high degree of contextual determinancy.

As we have seen so far, a word is a twofold phenomenon which comprises signification and indexical value. Consequently it follows that knowing a word must imply to know not only its signification listed in a dictionary but also its indexical value which takes place in the context where the word is being used. In this sense, we can say that signification is stable while indexical value is protean in character and continually suffers some changes to suit the environment where it is placed. Moreover, it also seems that communication can be a process in which an addressor converts signification of a word into its indexical value by putting it into a contextual stream, and then leave the value to the procedure of the negotiation with an addresee.

3.2.2 . Context

The identification of the notion of context plays a key role in specifying the question of what it means to know a word. The idea of context is closely related to the process of the achievement of indexical value of a word. In other words, it is some pre-existing knowledge or some co-existing feature of the situation which sometimes acts upon signification, or sometimes is conversely acted upon by it, to achieve its indexical value. This indicates that a word begins to assume its indexical value simultaneously or approximately when its signification is associated with something relevant to aspects of the world outside language. In the case of the word 'slip', its signification is idexicalised into 'a small piece of paper' by means of the knowledge that the reader already has, or s/he can get out of the other words used in the same text.

People who have in common a particular knowledge and experience concerning this kind of 'slip' can easily manage to understand what the writer intends to convey in this part of text. This is the case which more often happens to the native speakers of English.

Conversely, the learners of English, in most cases, can not rely on particular instances of shared knowledge and experiences which constitutes the social environment where the language is actually used. In the process of vocabulary learning they must, though subconsciously, learn such attributes as the general and conventional assumptions and beliefs which shape the basic structures of a certain society where the target words are used. In this way the notion of context or contextual realities has proved to be relevant to what is called 'schematic knowledge'.

Here, we can say that indexical value is something that connects signification with its relevant aspects of schematic knowledge. Or it is better to say that it is a mental phenomenon which takes place only when signification is appropriately connected with its relevant aspect of schematic knowledge. This idea leads to the assumption that knowing a word is to know its signification on one hand, and to acquire its relevant schematic knowledge on the other. Practically in language learning, the former is actually itemised as follows:

　　to know its syntactic behaviour

　　to know its inflected forms

and the latter as follows:

　　to know its collocability

　　to know its limitations of use according to function and situation

　　to know its place in a network of associations with other words in the language

3.2.3. Citation form and modification

In the preceding section we have seen that the notion of a context performs an important function in the process of communication. This leads to the idea that knowledge of a word or a string of words refers not merely to its signification but also to its indexical value which changes continually to suit the circumstances in which it is being used. A word is semantically twofold. I think, however, that this view of a word is applicable not only to its semantic attribute but also to its phonetic aspect.

According to the rules in phonetics, the pronunciation of a word in isolation, which is technically called 'a citation form', shows a strong tendency to undergo some change both when it is used in a context and when it is combined with particular words in an utterance. This tendency is termed as 'modification'. Consider the following example:

　　　　I love you.

First, under ordinary circumstances, the word 'love' and 'you' are not explicitly pronounced as a separate word in this combination. In this case each of these two words is articulated in such an implicit way that they sound like one word such as 'loview'.

Secondly, we can give this utterance the context where a very shy person mumbles these words in the presence of his girl friend. These three words are probably stringed together as if they were one word, which would produce the pronunciation 'Aluview'. If she asks him for a clarification or a reconfirmation, he would have to say explicitly, 'I love you'.

It can be said that a citation form is to modification what signification is to indexical value. Citation forms are stable, explicit, and not difficult to decode, but they are rarely heard in a real-life language. It is modified forms which are common and convey messages to listeners. A word is also phonetically twofold.

3.3. From structure to vocabulary

As I have mentioned above, there are some occa-

sions where a word acquires a grammatical dimension in that it conveys a meaning when it is placed in the high degree of contextual determinancy. Let us have a brief look at the following example. The sentences here seem to be totally stripped of their grammatical appendages and reduced to three words:

farmer duckling kill

hunter lion kill

In the first example, one can guess the meaning out of a mere set of these words with ease. Similarly, it is not difficult to reproduce the original sentence. This is certainly because of the context of our world knowledge as well as the signified meaning conveyed by these three words. It is easy to envisage the situation where the farmer is an agent and the duckling is a patient in their relationship engendered by the value of the word 'kill'. Most people agree on the reproduced sentence: The farmer killed a [the] duckling.

Contrary to this, in the second example, it is impossible to set up the similar relationship between a hunter and a lion by employing the same process. For, here, a lion is indexically associated with a fierce propensity to attack a hunter and render him a victim of a killing process. This is schematised as a general knowledge. So, in this case, where there is no adequate support from the generally accepted ecological assumption of the animal, the mere assumption of the word will only ambiguously point to meaning. This is exactly where grammar comes in.

As is shown in the argument above, grammar turns out to be a secondary appendage specifically seen in terms of communication. At least it can be said that vocabulary is better equipped with a force which achieves a desire or need to induce learners to begin some linguistic activities.

4.　Which words should be learned ?

As I have shown above in the preceding chapters, words may serve as a better basis for syllabus design than the structure of language. This means that when we think about the criteria for word selection, it is inevitable to give some consideration to the factors such as syntactical patterns and collocability. And it is also necessary to adopt some effective measure which provides us with statistical evidence for the identification of this criterion.

4.1.　Criteria for inclusion of words into syllabus

According to the argument made by Sinclair and Renouf (1989) concerning this matter, it seems reasonable to put a main focus of language study on the following three points.

the commonest word forms

their central patterns of usage

the combination which they typically form

The second and third items are relevant not so much to the vocabulary specification as to that of syllabus content itself. The characterisation of the commonest word forms and the confirmation of their utility are the main target to be attacked in this section. Moreover, the research on the vocabulary frequency must be based on the statistical analysis of the data provided by as large a corpus as possible. The computational manipulation of the COBUILD main corpus will be an effective method to provide us with a reliable list of the word forms in the order of frequency.

The first point itemised above as a learning focus refers to the matter of frequency of word forms occurring in the texts. In the COBUILD main corpus the list of the 200 most frequent word forms are specified. According to the further information brought about

from the same database, the most frequent 700 word forms account for 70 percent of any text. The next 800 word forms cover a further 6 percent, and the next 1000 do no more than 4 percent. These figures show the great advantage of common words of English. They also mean that even if we have a vocabulary of more than ten thousand, seven out of every ten word forms we speak, listen, read and write are from those 700 most frequent word forms. What I have just mentioned above is, of course, is true of the texts and the discourse on a variety of general matters. In a highly specialised text such as genetic engineering, the data obtained through the same method will certainly show different figures.

Moreover, another important point can be drawn out of these figures. It is the rate of the acute decrease in respective percentage which denotes each coverage. It is amazing that there is a striking difference in coverage between first 700 word forms and the next 800 word forms. It is easy to estimate that the further 1000 word forms above these 2500 word forms will cover less than 4 percent. This analysis shows that utility also falls off generally in inverse proportion with frequency.

As is mentioned in the first chapter, the main focus of the lexical syllabus, which will be dealt with more in details later, is not on vocabulary learning in a conventional sense. It aims, however, to help learners to acquire central usage patterns of word forms along with the typical combinations they of ten make with other word forms. In other words, it is envisaged that it facilitates the process in which learners can implicitly internalise grammatical structures of language. This implies that the most frequently used word forms selected through objective analysis of COBUILD corpus are reliable enough to be included into the syllabus.

4.2. What is to be learned ?

As I have mentioned above from the theoretical point of view in the preceding chapter, knowledge of a word includes mainly the following two points: signification and indexical value. These items carry a considerable relevance to the two foci on language learning which are put forward by Sinclair and Renouf (1989). These are central patterns of vocabulary usage and its typically formed combinations. In order to specify common patterns and combinations, we need a thorough description of language based on objective analysis. This means that it is necessary first to see how words are actually used in sentences and in discourses, and then to arrange the type of patterns and combinations in the order of frequency. It is certain that the manipulation of the COBUILD database can provide statistical evidence of typical language use which occurs very frequently.

By running the programme to produce concordance for each word, we can get a list of the sentences with a target word exactly in the middle of each line. Let us look at the word "way." This word is the third most frequent noun and occurs with a frequency of about 7000 in the Main Corpus made up of 703 million words. A mere observation of this list will give the researcher the very useful information for specifying the commonest pattern of the usage of the word and its typical combination with other words.

If we look at this list, we will certainly notice that this word is mainly used in the following syntactical environment.

the way(s) of + -ing (846)

the way(s) + to infinitive or prepositional to (696)

the way(s) + in + which + clause (352)

the way(s) + that clause (279)

in + article + way(s) (136)

the superlative + way + be-verb (78)

(the number in each bracket denotes the frequency of occurrences)

The matter of typical combination are to be treated here partly in terms of common patterns. Though such combinations have sometimes grammatical restrictions, there are some which function almost like lexical items in themselves. In the case of the word "way," they are summarised as the following items:

by the way

no way

by way of

Additionally, the list of concordance can also enable us to build up an overall picture of the word from the angle of meaning, as well as from its syntactical patterns which are recurrent in naturally occurring texts and discourses. This matter, however, will be treated more in details in the next part of this chapter.

In this way, it can be said that the common patterns of usage of common words effectively serve as appropriate items to be included in the lexical syllabus.

5. The lexical syllabus and communicative methodology

As I mentioned in the first chapter, a syllabus is basically a collection of inert documents. We need an appropriate methodology in order to activate a syllabus as an organising force to design a coursebook which employs the idea of lexical syllabus as an organising force. This is where communicative methodology is recommended as the most complimentary mediator to the intention of the syllabus design. But in this chapter

before going into how the idea of the combination is realised the coursebook, I would like to show what I mean by the word "communicative" to have a common understanding.

5.1. Communicative methodology

First, I am going to begin by looking at the following discourse exchanged between a teacher and students.

Teacher: Right, open your textbooks to page 51 and 52. (1) We already finished the grammar practice last Tuesday, *didn't we?* Yes? Kanako?

Kanako: Yes.

Teacher: Then, (2) what pattern did we learn? Ikuyo

Ikuyo : will be ---ing.

Teacher: Good! OK, erm, let's have a look at the pictures with some words on it. (3)How many pictures are there? Hiroshi.

Hiroshi: There are three pictures.

Teacher: Good! Have a look at the first picture. (4) What will John be doing at noon tomorrow? Kenji.

Kenji : He will be driving.

Teacher: Excellent! (5)By the way, Kenji, are you interested in cars?

Kenji : No, no, no, I'm interested in motorbikes.

Teacher: Mhm... OK, let's go on to the second picture. (6)What will be Tom doing next Friday? Mai.

Mai : He'll be dancing.

This discourse is a typical example taken from what is thought to be a "communicative" activity in the class for communication in Japan. The teacher asks students six questions in the course of this procedure. In terms

of classroom discourse these questions can be divided into two groups. One is made up of the questions (1) and (5), and the other is of the questions (2), (3), (4), and (6). In what way are they substantially different from each other? The first group is a type of questions answers to which the questioner already know, while the second group is the one answers to which the questioner does not know the answer. The former type of question is technically called 'a display question', and the latter is termed as 'a referential question'.

The research results reported by Long and Sato (19 83) show that in informal conversations display questions rarely occurred and there was an over-whelming preponderance (1320 out of 1322) of referential questions. This data indirectly characterises an aspect of the teacher-student relationship where a teacher is not expected to receive any new or academic information from students.

As I showed in the preceding chapter, a word is a twofold phenomenon, in that it is a composite of sig-nification and indexical value. This promotes the idea that a sentence is a string of signification, and in the process of communication, it is converted into a string of indexical values which actualises a meaning as a whole sentence. This indicates that when we ask display questions, we merely try to convey signification. In this case the questioner has no genuine intention to know the answer, to share affective territory, to maintain rapport, not to achieve mutually acceptable state of mind. No schematic knowledge can be expanded either in the questioner or in the questionee. Only systematic knowledge is accumulated as part of schematic know-ledge, which is a grammatical knowledge that the form of "will + be + --ing", in our example, is used to describe the duration and certainty of an event at a specific time in the future. This grammatical knowledge is totally different form what is internalised as a system or competence for communicative resource in a native speaker's linguistic repertoire.

The general tendency to prefer display questions in classroom discourse shows that teaching is seen as a process achieved through the uni-directional flow of knowledge from a teacher to students. It is also a process of transmission, which provides both teacher and students with few opportunities for negotiation of meaning.

If properly handled, a display question might occu-py an important place in the stream of classroom pro-cedure. But it seems more likely that we must be aware that we can not achieve any exchange or negotiation of meaning solely by asking display questions.

5.2. Communicative Language teaching and its methodological cycle

In this section, I am going to observe in details how a coursebook as a whole should be organised.

First, Willis and Willis (2007), based on the view that people learn a language more effectively by using the language to do things, expands communicative me-thodology into a methodological cycle which compri-ses six stages of different components. All these stages can repeatedly appear more than once in each unit of the coursebook..

Introduction: This gives students initial exposure to target forms within a communicative context.

Task　　: This provides an opportunity to focus and realise target meanings. Students may begin to approximate to the target form or they may use quite different,

even ungrammatical forms.

Planning　: This is the stage where the teacher helps students to move towards accurate production, often by modeling the target forms for them.

Report　: Students have another opportunity to use target forms. Again, however, there is a focus on fluency as well as accuracy.

Listening/Reading:

Students have a chance to hear or read the target forms used in a context which has become familiar to them together their own attempt to form and report the task.

Analysis　: This is the stage for an awareness-raising exercise which gives the learners a chance to formulate generalisations about the language they have heard.

This methodological cycle should not always be conducted, exactly stage by stage, in the order shown above. There are some cases in which it is more effective to place Listening/Reading stage before the stage of Task. Additionally Willis(1990) continues that a great deal of responsibility concerning classroom procedure lies with students. This does not necessarily lead to the idea that the teacher's role in classroom activity lessens. It has the implication that classroom activities or classroom discourse should be conducted more in terms of interaction than of transmission. From this viewpoint the stage for Planning is not important because a teacher tends to be transmissive there and, as a result, restricts students' linguistic activities.

5.3. Statistical Analysis

In order to organise a unit, a huge amount of discourse concerning the use of target words must be collected as effective data. Then, through computational analysis based the mega corpus such as COBUILD Corpus and British National Corpus(BNC), specific word forms which frequently take place with the use of recurrent patterns of usage have been identified. In this way, the grammatical structure which is most complimentary to the commonest word forms and patterns is chosen for the unit.

Additionally, a task and a topic are deciding factor in the ordering of units. Along with these tasks, the most frequent words, graded according to the frequency in authentic discourses, have formed the design of a coursebook organisation for elementary learners. In such a grading system, students are, even from a false beginner level, exposed to 'real' language rather than an edited and simplified language. For example, in most conventional coursebooks, the past form of the word 'be' may not appear until its two present forms, which are actually 'is' and 'are', have been presented to students. Contrary to this, in the lexically organised coursebooks the introduction of the past tense does not seem to be so systematic as in the existing courses. This is because of the important fact that the word 'was' appears more frequently than the word 'is'.

Lastly, according to the data brought about by the COBUILD Corpus, "would" has slightly less than 15,000 occurrences. In around half of its occurrences the word is described as being used to indicate its hypothetical nature at the time being mentioned such as in:

The people of South Vietnam *would* receive

their conquerors with relief.

Only 1200 examples included in the COBUILD Corpus show that "would" is used with "if + clause." "Would" is far more frequently used without "if."

In fact, most of the coursebooks in Japan first treat this hypothetical "would" in a complex sentence with 'if + clause' and then go on to a simple sentence, but, from a statistical viewpoint, this strategy has proved to be ineffective. And also according to the corpus analysis, 'will' is rated below 'would' in the frequency list.

6. Conclusion

Some while ago I got a letter written in English from a boy in the sixth grade. Inaccurate words were strung together haphazardly. But after examining the letter for a while, I began to understand, as if I were deciphering a code, what the child was trying to say. He was trying to apply to letter-writing the great discovery that he had made in America – that when one can not compose a complete sentence, one can make oneself understood just by stringing words together. On year later, I was again astonished when I read a letter in English from that same child. There were grammatical mistakes, and the choice of words in several places left something to \be desire. But the letter was written in more natural English than an adult Japanese would be able to write. The child said that he had written abbot 80 letters during that one-year period. He sometimes borrowed the sentences form the letters that have come form America, changing the wording a little.

The letter written y this boy seems to suggest that even a string of words turn out to be a proper vehicle for conveying indexical value if it is fully contextualised. In his attitude for learning how to write a letter in English, there is no conscious attempt to learn the usage of grammar. He tried only to choose the right words, referring to the real letters form America. In the process he unconsciously acquired the patterns of usage of word forms he chose. Though I am not sure whether he has achieved the same degree of other abilities, what he did was nothing other than partial application of the lexical syllabus to his acquisition of letter writing skills in English.

Such examples as this boy's letter writing can be often found. But formally to realise an attempt to design a syllabus based on vocabulary need an enormous amount of linguistic data. It is corpus computing which has produced the idea of lexical syllabus.

Among various kinds of linguistic data given by the corpus, what is specifically worth attention is the one by the concordance programme. It is easy to emphasise the importance of showing the commonest patterns of the commonest word forms, but it is more difficult than is expected to obtain the idea of concordance and develop the programme for manipulation of the huge corpus. This programme has made it vastly easier to gain an overall view of both semantic and syntactic environment where a particular word form is used. This means that it can provide collocations, patterns of usage, and contexts of particular word forms at the same time. Such a high degree of utility of this programme actually makes it possible to realise the provision of the commonest patterns of the commonest word forms in authentic materials. The enormous scale of COBUILD Corpus and BNC had brought me the re-cognition of the English language as *lingua franca*.

Another impetus for the creation of this syllabus lies in author's desire to seek for an appropriate seedbed where a seed of communicative methodology

germinates and grows. The conventional syllabuses based on structure and function has been effective in producing students who knows about language. To teach grammar explicitly brings a mere accumulation of grammatical knowledge in their language repertoire. It only helps students to expand their schematic knowledge on grammar which they are not allowed to withdraw whenever they need it. It is the pet theory by Willis(2003) that grammar should be taught indirectly or implicitly to be habitualised as systematic knowledge. The lexical syllabus, which is the first attempt to realise this idea of grammar teaching, will turn out to be a sign post to guide teachers who are seeking for an effective way of grammar teaching.

In terms of its implementation in Japanese highs school language teaching context, the idea of authentic materials and task-based methodology should be realised specifically in the schools which has English and international courses. And, what is more important, it should be applied not to complete beginners but to false beginners who have already learned English to some extent. For, the lexical syllabus, even if it ins not realised in full scale as a course design, will make a great contribution to the teachers who attempt teach

English as a means communication by theoretically supporting their ideals as teachers of English.

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総　説

Effect of enteral nutrition with eicosapentaenoic and gamma-linolenic acids for preventing pressure ulcers in patients after neurosurgery

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SUMMARY

Background & aims: To explore the effect of enteral diets enriched with eicosapentaenoic acid (EPA) and gamma-linolenic acid (GLA) in the prevention of pressure ulcer formation and improving the outcomes of post-neurosurgical patients.

Methods: The prospective, randomized, controlled study was conducted in the department of neurosurgery of university-affiliated hospital. A total of 19 patients who have undergone neurosurgery for serious neurological conditions, were randomly assigned to two groups; one with a diet enriched with EPA・GLA, another with an isonitrogenous and isocaloric control diet, delivered for a minimum of 4 days and monitored for 14 days.

Results: Only a single new pressure ulcer was observed on day 7 in the EPA・GLA enriched diet group, showing apparently lower incidence of pressure ulcer compared to the control group, in which 2 lesions on day 4, 3 lesions on day 7 and 4 lesions on day 14 were observed. Those who received the study diet experienced significantly improved outcomes due to reduced incidence of new pressure ulcers.

Conclusions: Enteral diets enriched with EPA・GLA contributed to preventing pressure ulcers in patients after neurosurgery. The beneficial effect of the EPA・GLA diets was associated with a lower occurrence of new pressure ulcers in the clinical nutrition management of neurosurgical outcomes.

Key words：eicosapentaenoic acid, gamma-linolenic acid, enteral nutrition, pressure ulcer, decubitus

1. Introduction

Fatty acids are used not only as a source of energy and as a component of cell membranes, but also as physiologically active substances having anti-inflammatory effects within living organisms.[1] Fatty acids are classified by the presence or absence of a double bond (i.e. saturated or unsaturated) and by the length of chain (carbon number). Unlike mono-unsaturated fatty acids which have one double bond, polyunsaturated fatty acids which have two or more double bonds, need to be ingested as essential fatty acids, since they are not biosynthetically prepared in the human body. Polyunsaturated fatty acids are roughly

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divided into the categories n-3 and n-6, depending on whether a double bond appears on the third carbon atom or the sixth respectively, counting from the end where the methyl group is located. The former transforms from alpha-linolenic acid to eicosapentaenoic acid (EPA), and the latter transforms from linoleic acid to gamma-linolenic acid (GLA) and arachidonic acid.[2, 3]

EPA and GLA respectively have an anti-inflammatory effect, inhibiting the production of inflammatory eicosanoid.[4~6] Furthermore, EPA is known to reduce inflammatory mediators by competing with arachidonic acid.[7~10] In addition, GLA is reported to have a role in promoting the production of prostaglandin E_1 and improving blood flow.[11, 12]

In many cases of severely impaired consciousness, patients have to go through neurosurgery under general anesthesia for several hours, and are at risk of pressure ulcers due to long-term bed rest during pre-, intra- and post-operative duration, which limits changes in position. If pressure ulcers could be prevented by feeding an enteral diet enriched with EPA and GLA, which is highly likely to reduce symptoms such as inflammation, diminished blood flow and malnutrition leading to the occurrence of pressure ulcers, it can be supposed that this diet might make a great contribution to the improvement of many aspects of nursing-care and reduction of the costs. Because it could alleviate the burden placed on patients, reduce the burden placed on nursing and care staff, and in addition decrease the burden of medical expenses. In this study, therefore, we explored the effect of enteral nutrition enriched with these polyunsaturated fatty acids to prevent the occurrence of pressure ulcers in order to establish a method of proper nutritional management for perioperative duration.

2. Materials and methods

2.1. Subjects

The inclusion criteria were as follows;

1) Patients who have severely impaired consciousness after neurosurgery at a level of 8 or less on the Glasgow Coma Scale (GCS)[13] **(Table 1)**.

2) Patients who are required to undergo bed rest for 4 days or more after neurosurgery.

3) Patients suited to post-operative enteral diets.

4) Both male and female patients whose ages were 20 or more years.

5) Patients for whom written informed consent could be obtained from the patient themselves or their legal guardians.

The exclusion criteria were as follows;

1) Pregnant or breast-feeding female patients.

2) Patients under 20 years of age.

3) Patients with low life expectancy (less than 28 days due to chronic or terminal diseases such as unmanaged cancers).

4) Patients with uncontrolled diabetes.

5) Patients unsuitable for enteral nutrition.

6) Patients with acute nephritis, nephrosis, renal failure, hepatic disorder or similar conditions requiring strict restriction of proteins and electrolytes.

7) Patients unsuitable for enteral nutrition due to ileus or absence of residual function of intestinal tract.

8) Patients with moderate to severe neutropenia (WBC count <1000 cells/mm^3).

9) Patients with hyperlipidemia (TG>500 mg/dl, T-Cho>300 mg/dl).

10) Patients showing obvious gastrointestinal bleeding.

11) Patients with uncontrolled diarrhea.

12) Patients with congenital disorders of amino acid

Table 1
Glasgow Coma Scale (GCS)

Parameters	Scales
Best eye response (4-point scale)	1. No eye opening
	2. Eye opening to pain
	3. Eye opening to verbal command
	4. Eyes open spontaneously
Best verbal response (5-point scale)	1. No verbal response
	2. Incomprehensible sounds
	3. Inappropriate words
	4. Confused
	5. Orientated
Best motor response (6-point scale)	1. No motor response
	2. Extension to pain
	3. Flexion to pain
	4. Withdrawal from pain
	5. Localising pain
	6. Obeys Commands

The GCS is scored between 3 and 15, 3 being the worst, and 15 the best. It is composed of three parameters: best eye response (E), best verbal response (V), best motor response (M), as given above.

Note that the phrase 'GCS of 11' is essentially meaningless, and it is important to break the figure down into its components, such as E3V3M5 = GCS 11. A GCS of 13 or higher correlates with a mild brain injury, 9 to 12 is a moderate injury and 8 or less a severe brain injury.

metabolism.

13) Patients with heart failure associated with nausea, vomiting and diarrhea.

14) Patients with an allergy to the ingredients contained in the enteral diets used.

15) Patients who had participated in other clinical trials within the previous 30 days of the registration to this study.

16) Patients taking steroids.

17) Patients judged unsuitable for this study by the researchers for reasons not covered above.

2.2. Study design

The study was conducted as a prospective randomized controlled trial. Patients showing critically impaired consciousness with GCS scores of 8 or less for whom four or more days of post-operative bed rest had been prescribed were randomly allocated into two groups: one to be given the enteral diet enriched with EPA・GLA, and the other to be fed with an isonitrogenous and isocaloric control diet. All patients were evaluated regarding the incidence frequency of pressure ulcers based on DESIGN-R[14] **(Fig. 1)**. As for treatments and nursing-care other than nutritional care,

DESIGN-R assessment of progression towards healing

Chart number:
Name of patient:

						Date	/	/	/	/	/	/
Depth												

Depth: this shoud be measured at the deepest point of the wound. If the wound becomes shallower, the decreased depth should be reflected in the assessment

d	0	No particular skin lesion and no redness	D	3	Lesion extends into the subcutanecous tissue
	1	Persistent redness		4	Lesion extends to muscle, tendon and bone
				5	Lesion extends into the articular or body cavity
	2	Lesion extends into dermis		U	It is impossible to measure the depth

Exudate:amount

e	0	None	E	6	Heavy: requires dressing change more than twice a day
	1	Slight: dose not require daily dressing change			
	3	Moderate: requires daily dressing change			

Size: the area of a skin injury(length×width). Longest measurement in the wound is length; width is longest measurement perpendicular to that axis

s	0	None	S	15	100 cm^2 or lager
	3	Smaller than 4 cm^2			
	6	4 cm^2 or lager, but smaller than 16 cm^2			
	8	16 cm^2 or lager, but smaller than 36 cm^2			
	9	36 cm^2 or lager, but smaller than 64 cm^2			
	12	64 cm^2 or lager, but smaller than 100 cm^2			

Inflammation/Infection:

i	0	None	I	3	Clear signs of local infection (eg, inflammation, pus and foul smell)
	1	Signs of inflammation (fever, redness, swelling, and pain around the wound)		9	Systemic impact, such as fever

Granulation tissue: percentage of healthy granulation

g	0	Granulation cannot be assessed because the wound is healed or too shallow	G	4	Healthy granulation tissue occupies 10% or more, but less than 50%
	1	Healthy granulation tissue occupies 90% or more		5	Healthy granulation tissue occupies less than 10%
	3	Healthy granulation tissue occupies 50% or more, but less than 90%		6	No healthy granulation tissuse exists

Necrotic tissue: when necrotic and non-necrotic tissues are mixed, the dominating condition should be used for assessment

n	0	None	N	3	Soft necrotic tissue exists
				6	Hard and thick necrotic tissue is attached to the wound

Pocket: the area obtained by subtracting the uleer from the entire affected area, including the pocket

p	0	None	P	6	Smaller than 4 cm^2
				9	4 cm^2 or larger, but smaller than 16 cm^2
				12	16 cm^2 or larger, but smaller than 36 cm^2
				24	36 cm^2 or larger

Region [sacrum, ischium, trochanter, calcanum, heel, other region]　　　　Total

Fig 1

The DESIGN-R evaluation sheet: An absolute evaluation tool for monitoring pressure ulcer wound healing

the hospital's standard care protocols based on each patient's individual condition were adopted.

2.3. Administration

Administration started with the administration of enteral nutrition (300-400 Kcal/dose) via tube at low speed in the early post-operative stages (within 24 hours), gradually increasing the injection speed as appropriate by checking the tolerance so that the target energy intake quantity of standard body weight (in kg) x 30 Kcal/day could be achieved via enteral diet. The terminal end of the enteral feeding tube was inserted into the stomach. Although in principle the dose regimen was continuous enteral feeding, switching to intermittent feeding in conjunction with the monitoring of digestive system symptoms was also allowed. Feeding was continued for a minimum of four days, while monitoring continued for 14 days. The study was

Table 2
Baseline demographic and clinical characteristics of the two groups

Characteristic	Control diet （n＝7）	EPA・GLA enriched diet （n＝12）
Age	67.7±11.0	65.8±9.6
Gender　Male	5	7
Female	2	5
Type of enteral feeding	Gastric 7	Gastric 12
Admission weight (Kg)	61.8±4.5	60.8±2.9
GCS	7.3±1.5	7.2±1.8
Serum albumin (g/l)	3.8±0.4	3.6±0.4

EPA: eicosapentaenoic acid, GLA: gamma-linolenic acid, GCS: Glasgow Coma Scale

completed when, after the resumption of oral feeding, the energy intake from enteral feeding dropped to 75% or less of the patient's total energy requirement. The use of transfusion was limited as much as possible for the correct evaluation of the enteral diets effects, and use of fat emulsion was contraindicated.

2.4. Number of patients

In total 19 patients were enrolled in this study, including 12 patients placed in the EPA・GLA enriched diet group and 9 patients in the control group. Ages ranged from 49 to 86 years of age, with the average age being 67.3 years of age. The ratio of male to female patients was 12:7. The breakdown of the patients by neurosurgical disease was as follows: 10 cases of subarachnoid hemorrhage (52.6%), 5 cases of intra-cerebral hemorrhage (26.3%), 2 cases of acute subdural hemorrhage (10.5%), 1 case of acute epidural hemorrhage (5.3%) and 1 case of cerebral thrombosis (5.3%).

2.5. Endpoints

1) Primary endpoint: Number of newly-developed pressure ulcers per day (counting ulcers with d1 or higher score according to assessment by DESIGN-R).

2) Secondary endpoints: Adverse events and laboratory abnormalities.

2.6. Ethical considerations

Prior to the study, the approval was obtained from the Institutional Review Board of Juntendo University, Faculty of Health Science and Nursing (Approval Code: 22005) and the Ethical Review Board of Juntendo University Shizuoka Hospital (Approval Code: 22.302). The study was performed in conformity with "Ethical Guidelines for Clinical Research" compiled by the Ministry of Health, Labor and Welfare[15] and "Helsinki Declaration".[16] In addition, it was made clear to patients or their legal guardians that the enteral diet to be used as a control was a fluid diet containing a wide variety of balanced nutritional ingredients necessary to post-operative recovery and in general use, and that it would not cause any significant problems for the control group. Then, written consent was obtained for voluntary enrollment in the study from each patient or

Table 3
Composition of the enteral diets

Nutrient	Control diet	EPA・GLA enriched diet
Protein		
% of total calories	18.0	16.7
g/l	45.0	62.5
Carbohydrate		
% of total calories	56.8	28.2
g/l	142.0	106.0
Lipids		
% of total calories	25.2	55.1
g/l	28.0	93.7
n-6:n-3	3:1	1.6:1
n-3 (g/l)	0.2	10.0
EPA (g/l)	0	5.1
GLA (g/l)	0	4.1
DHA (g/l)	0	2.2
Vitamins		
Vitamin E (IU/l)	6	320
Vitamin C(mg/l)	90	840
B-carotene (mg/l)	780	672
Vitamin A (IU/l)	1830	4710
Vitamin D (IU/l)	160	430
Vitamin K1 (μg/l)	63	40
Folic acid (μg/l)	200	420
Thiamine (mg/l)	1.0	3.2
Riboflavin (mg/l)	1.0	3.6
Vitamin B6 (mg/l)	1.0	4.3
Vitamin B12 (mg/l)	2.0	6.0
Niacin (mg/l)	13	29
Biotin (μg/l)	38	6.0
Panthothenic acid	5	13
Trace minerals		
Na (mg/l)	1850	1310
K (mg/l)	1300	1960
Cl (mg/l)	800	1690
Ca (mg/l)	650	1060
P (mg/l)	550	1000
Mg (mg/l)	260	320
Cu (mg/l)	0.7	2.2
Zn (mg/l)	7.0	18
Fe (mg/l)	8.0	20
Se (μg/l)	250	160
Osmolarity (mOsm/l)	380	384

EPA: eicosapentaenoic acid, GLA: gamma-linolenic acid, DHA: docosahexaenoic acid

Table 4
Pressure ulcer status in the control diet and EPA・GLA enriched diet groups

Pressure ulcer status	Baseline Control	EPA・GLA	Day 4 Control	EPA・GLA	Day 7 Control	EPA・GLA	Day 14 Control	EPA・GLA
Pressure ulcer total number DESIGN-R	0	0	2 d1:2	0	3 d1:3	1 d1:1	4 d1:3 d2:1	0
Pressure ulcer total number Worse No change Recover	0	0	2 2	0	3 1 2	1 1	4 1 3	0

The control diet (control) and EPA・GLA enriched diet (EPA・GLA) groups included 7 and 12 patients, respectively. EPA: eicosapentaenoic acid, GLA: gamma-linolenic acid

his/her legal guardian prior to the study initiation.

3. Results

The study was performed after obtaining informed consent from 19 patients **(Table 2)**. **Table 3** shows the detailed composition of the enteral diets that were used for the EPA・GLA enriched diet group of 12 patients and the control diet group of 7 patients, respectively. The EPA・GLA enriched enteral diet contained 5.1g/liter of EPA and 4.1g/liter of GLA, while the control diet contained neither EPA nor GLA. There were no changes in other contents and the target amount of energy to be given throughout the study duration. No surgical procedures were required for suppuration or other symptoms during the feeding period. In addition, there were no cases of discontinuation due to adverse events during the course of this study.

Regarding new occurrence of pressure ulcers, only a single lesion was observed on day 7 in the EPA・GLA enriched diet group, showing apparently lower incidence of pressure ulcer compared to the control group, in which 2 lesions on day 4, 3 lesions on day 7

and 4 lesions on day 14 were observed **(Table 4)**. This was considered to be the evidence for the preventive effect of EPA・GLA enriched diet on pressure ulcers. Investigation on changes in CRP, an inflammatory index, showed more significant suppression of inflammation in the EPA・GLA enriched diet group when compared to the control group (t-test, $p<0.05$) **(Fig. 2)**. Based on this, it was suggested that the development of new pressure ulcers was prevented by the suppression of inflammation.

There were no remarkable changes of body weight and BMI in either of the two groups. Although transferrin, retinol-binding protein and prealbumin, indexes of nutrition levels, showed a mild increase after starting the enteral diets in both groups, there was no significant difference between the two groups. The absence of significant difference in these nutritional indexes between the two groups made it clear that enteral diets enriched with EPA・GLA, which can control the inflammation, are more effective than other diets without EPA・GLA.
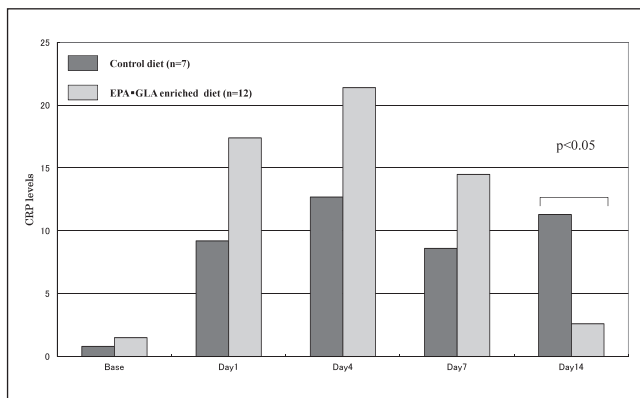
Fig 2

Improvement of CRP level of patients fed EPA・GLA enriched diet when compared to patients receiving control diet.
CRP: C-reactive protein, EPA: eicosapentaenoic acid, GLA: gamma-linolenic acid

4. Discussion

At present there is no accurate data on the incidence or frequency of pressure ulcers in patients after neurosurgical operation. Since many cases of patients with severely impaired consciousness for having neurosurgery are placed in the situation of general anesthesia for several hours, it is known that they are quite vulnerable to development of pressure ulcers. Therefore, it is important to swiftly take preventive measures for pressure ulcers. To date, although there have been some research reports regarding the prevention with nursing care or appropriate care for the ulcer pressure,[17] most of which recommend supplying energy, protein, vitamins and minerals as nutrition therapy based on the evidence. In the past, the widely prevailing attitude in the medical and nursing practice was that patients should lose weight to prevent pressure ulcers, since weight gain would lead to the elevation of compression force.[18] Recently, however, it was found that caloric restriction sufficient to cause weight loss actually increases the incidence of pressure ulcers. It has thus become essential to provide patients with nutritional care and appropriate administration of sufficient nutrition, targeting the prevention and treatment of pressure ulcers as the nutrition management.[19]

Regarding the prevention of pressure ulcers with nutritional therapy, the previous key studies showing the effects of nutritional therapy included the patients with fracture of the femur,[20] fracture of the pelvis[21] and various severe diseases.[22] All of those studies had positive outcomes of lower incidence of pressure ulcer in the study groups with nutrition-enriched diets than in the groups without such a diet. In addition, researchers of those reports on whether recovery from pressure ulcers would be promoted by implementing diets enriched with ascorbic acid,[23] protein[24] and zinc[25] only recognized the improvement of circulatory deficit and tissue repair. But Theilla et al. reported lower incidence of new pressure ulcer in the control group only when patients were given a dietary fluid that was specifically enriched with fatty acids but had equal levels of energy, protein, vitamins and minerals, and suggested that the suppression of inflammation by fatty acids might contribute to the lower incidence of new pressure ulcers.[26]

Further evidence confirming the anti-inflammatory effects of EPA・GLA-enriched enteral diets can be seen [27-30] when comparing the groups using EPA・GLA-enriched enteral diets with the other groups using nutrition diets of standard composition, in the patients with acute respiratory distress syndrome (ARDS), severe acute lung injury (ALI) and sepsis, it became clear that length of stay in ICU, length of artificial respiratory management, organ failure and also mortality rate were decreased in the groups using EPA・GLA-enriched enteral diets.

It has been believed that inflammation and low nutrition contribute to the formation of pressure ulcers.[31] The results of our study showed that EPA・GLA-enriched enteral diets suppressed inflammation and improved low nutrition and had an effect which prevented the formation of pressure ulcers. Pressure ulcers, once developed, will not only inflict suffering on patients themselves but also impose a heavy burden on nursing and care staff. Therefore, it is clear that there are high values in preventing pressure ulcers.

Recently the work of the NST (Nutrition Support Team) has been enhanced, and a framework of support systems for patients requiring tube feeding with enteral nutrition is being built by requesting the understanding of doctors and nurses so that optimal nutrition management can be provided, such as proper timing of the start of therapy, dosage adjustment, safe methods of administration to prevent aspiration pneumonia and management of the defecation. However, it is true that there are many cases where difficulty in feeding sufficiently due to lack of appetite, gastrointestinal symptoms and more, in some patients, causes poorer nutritional status than in their state prior to hospitalization. Particularly in post-neurosurgery patients there are many cases where it is difficult to simultaneously put into practice protocols to prevent pressure ulcers and follow manuals for nutrition management. On the other hand, pressure ulcers that develop despite nursing care given according to protocol, it is necessary to look for other options different from conventional care. Since our study clarified that a proper choice of enteral diet would contribute to the prevention of pressure ulcers in hospital wards and in further improvement of care, and make it possible to save hours of nursing care, we consider it easy to implement this nutritional management in medical and nursing areas of practical care.

5. Conclusions

Along with the recent remarkable improvements in nursing and care skills, it has been reported that the incidence of pressure ulcers in hospitals has decreased by utilization of nursing protocols for prevention of pressure ulcers and proper nursing and care products.
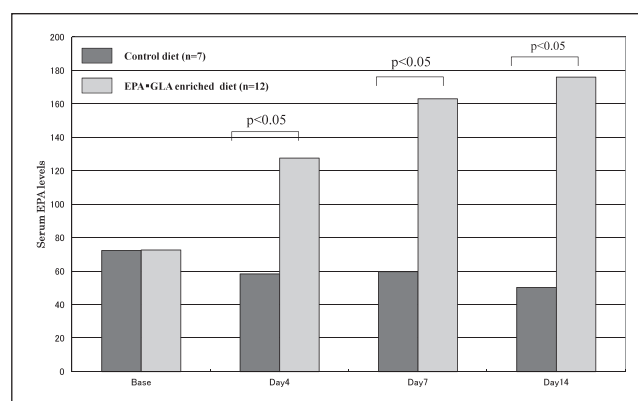
Fig 3
Serum EPA level of patients fed EPA・GLA enriched diet when compared to patients receiving control diet.EPA: eicosapentaenoic acid, GLA: gamma-linolenic acid
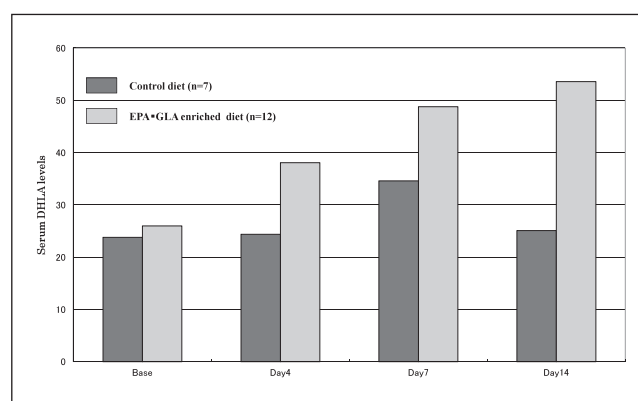
Fig 4
Serum DHLA level of patients fed EPA・GLA enriched diet when compared to patients receiving control diet.
DHLA: dihomo-gamma-linolenic acid, EPA: eicosapentaenoic acid, GLA: gamma-linolenic acid

We do, however, think that those pressure ulcers that develop in spite of proper nursing and care require an approach mediated by other factors than nursing and care, and that nutritional management should play its part. It was considered that nutritional management using EPA・GLA-enriched enteral diets could be a useful option for pressure ulcer prevention in patients who need long-term immobile bed rest in a supine position, as with post-neurosurgical patients.

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