<Article>

Experiment of Medical Translation in Language Background Students and Science-based Students

（語学系及び理系学生を対象にした医療翻訳に関する実験）

Mami Tsuyuki

Abstract

Are students with English skills without healthcare knowledge at disadvantages in translating medical documents compared with students with health scientific background without the experience of learning English specially? Experiments were held in June, 2011 to compare to the two groups. The total number of the subjects was 37 (students of the humanities were 20 and health science students 17). Both groups took the same translation task about medicine. There are no significant differences in the task scores between two groups. Therefore no disadvantage for language background students was found in this study.

1. Introduction

Technical translation, especially in medicine, is a worthy career for bilingual students who major in English. Regarding genres in medical translation, Reeves-Ellington (1998: 108) says that the most common include biomedical papers, clinical reports for New Drug Applications, case reports, patient consent forms, expert opinions, official regulations governing drug manufacturing and clinical research, package inserts, and patient education brochures. There is unique terminology in each type of document. Wakabayashi (1996: 356) contends that medical translation is a growing field especially in context of Japanese-English translation. Skilled medical translators continue to secure good offers and compensation.

Employers believe that it is hard for humanities students to acquire proficiency in medical translation. This is reinforced by the fact that most medical translators in Japan have prior healthcare work experience (*Fast Track Guide: Business Translation 2008*, 2007: 28). Maier and Massardier-Kenney (1993: 151) insist that students aspiring to become competent translators in medicine, law and science must achieve rapid proficiency in their fields of specialization even if they do not eventually practice their field. The authors suggest achieving such proficiency would be difficult for students of literature.

Achieving proficiency in medical English poses several challenges. However, this might be a false impression without definitive evidence. Niedzielski and Chernovaty (1993: 123-149) compared two groups; students who had a language background (Language

Background Students), and those who had a scientific or technical background (Science-based Students). They concluded that these two groups had no significant difference. The main difference between Language Background Students and Science-based Students was in the nature of their mistakes, with the former being weak in terminology and the latter in grammar and vocabulary unrelated to their specialty. Niedzielski and Chernovaty, however, conducted their experiments in Ukraine around twenty years ago. I did not find any similar comparative study conducted in modern Japan.

This study investigated whether language background students are at disadvantages in translating healthcare documents compared with science-based students at two tertiary institutions in Japan. I conducted experiments using vocabulary quizzes and translation tasks in June, 2011. Humanities students and health science students likely to take up healthcare translation work in the future were selected for this study to measure the potential English skills in medical translation.

2. Method of administering translation task

Students of Kitasato University were chosen as scientific-based students. As language background students, students of Aoyama Gakuin University were selected. See Section 2.1 for details about the subjects. The same procedures, question sheets, and model answers were used for both groups. Only the questionnaires were changed a little in consideration of differences in the students' situations. In each administration of the test, the students were given 15 minutes for its completion. The questions for the experiments were made to comply with special purpose. These questions concerned terminology in medicine. To consider the difficulty level of the test, the following specialists gave advice: Professor Joseph Dias, College of Literature, Aoyama Gakuin University and Shigeomi Koike, MD, Ph.D. See Section 2.2 and Appendix for details about the questions.

2.1 Subjects

The total number of participants was 37: 17 health science students and 20 students of the humanities were chosen as the subjects.

2.1.1 Group S: Students who had health scientific background

Students who studied in an English class at the Department of Allied Health Sciences of Kitasato University were chosen as subjects. All of the students were undergraduates. They majored in biomedical engineering. This group is called "Group S" in this paper. They are also called "science-based students" from Niedzielski and Chernovaty (1993).

As for the health science students, none of them had taken the TOEIC or TOEFL. Twelve students had taken the Eiken with one scoring at the second level, five at the

pre-second level, five at the third level, and one at the forth level (see Table 1).

Table 1

Students' glade of Eiken

Level	Group S*	Group L*
1	0	0
Pre-1	0	9
2	1	1
Pre-2	5	0
3	5	0
4	1	0
Total	12	10

*Number of students

Scoring at the second level is equivalent to the level of a high school graduate; the pre-second level is equivalent to the level of a high school student; and the third level is equivalent to that of a graduate from junior high school. Compared with the experiment held by Sasaki (2003: 35-36), the students' English levels seem quite normal. These facts suggest that the students did not have particular interests in English and they had no special English skills.

Therefore, the students of Group S had healthcare knowledge and their English skills were typical.

2.1.2 Group L: Students who had language background

Students in an interpretation class at Aoyama Gakuin University were chosen as subjects. It was a voluntary class by a teacher who had regular interpretation classes in the university. Almost all the students majored in English and one student majored in International Politics, Economics and Communication. One student was a graduate and the others were undergraduates. This group is called "Group L" in this paper. They are also called "language background students" from Niedzielski and Chernovaty (1993).

The students of Group L were speculated that they had high English skills. The questionnaire revealed that the students who provided a TOEIC score (14 of 37 students) had scores ranging from 740 to 990. The average score of these 14 students was 873.6. Of them, six students had a score of over 900 (see Tables 2 and 3).

Table 2

TOEIC score of Group L

Score	Number of students
990-950	3
949-900	3
899-850	4
849-800	1
799-750	2
749-700	1
Total	14

Table 3

Average score of TOEIC of Group L

Variable	Score*
Average	873.6
Median	882.5
Mode	865
S.D.	77.047
Minimum	740
Maximum	990

* *n*= 14

Their scores are considered very high because according to Institute for International Business Communication, the mean score of the 167th TOEIC held on September, 2011, was 567.8 and S.D. 171.2, and the rate who got the score over 845 was 6.8% (*Official Data, TOEIC test, TOEIC Official Site*). Three students had also taken the TOEFL PBT and had a score that was around 500 (see Table 4), and five students had taken the TOEFL IBT, scoring in the 79 to 100 range (see Table 5). Ten students had passed Eiken, nine at the pre-first level and one at level two (see Table 1). According to a website offered by The Society for Testing English Proficiency (2011), scoring at the pre-first level is equivalent to the level of university students.

Table 4

Score of TOEFL PBT of Group L

Score	Number of students
599-550	1
549-500	2
Total	3

Table 5

Score of TOEFL iBT of Group L

Score	Number of students
120-100	1
99-90	0
89-80	2
79-70	1
Total	4

The questionnaire also revealed that one student had experience with medical in the class. The other students answered that they did not have experience with medical translation or interpreting. Therefore, Group L was considered to have high English skills but they did not have medical knowledge.

2.2 Questions for the translation task

Part 1 had six vocabulary questions. Correct answers were awarded one point each. The total point of this section was six. Part 2 had two translation quizzes. The total score for this section was 16. Marking focused on two areas: English grammar and vocabulary. Grammar points were based on three or four areas in each question.

To choose appropriate phrases and sentences as questions *Medical and pharmaceutical translation* and *Medical and pharmaceutical translation (B)* (2010 and 2010 to 2011. Abe) were referred. The frequency of medical words in books and the Internet was also investigated. The choice of terminology was informed by the frequency of the terms in four medical books, specialized search engines, two books for English learners, and one general search engine. The books and search engines referred to include the following:

(1) Medical books

Stedman's English-Japanese Medical Dictionary 6th Edition (Stedman Editorial Committee, 2008)

Igaku-Shoin's Medical Dictionary Second Edition (Ito and Imura, 2009)

Writing Medical Records in English Forth Edition (Hajiro, 2008)

Igaku-eitango (Tomita, 2009)

(2) Medical search engines

The New England Journal of Medicine (theses released within 20 years were checked)

PubMed.gov, U.S. National Library of Medicine

(3) Books for English learners

Dialogue Vocabulary 1800 (Akiba and Mori, 2000)

Kikutan [Super] (Hitosugi [Written and Ed.], 2006)

(4) General search engine

Google

Each search engine was monitored from June 1 to September 3, 2011.

Since the students had not deemed to have experience of medical translation, it had been predicted that students would get few points if the questions were inappropriately difficult. Therefore basic terms and sentences were chosen as the questions for the experiment to investigate their potential English skills in medical translation.

2.3 Translation tasks

The experiment for health science students was held on June 13, 2011 at Kitasato University and the one for students of the humanities on June 19, 2011 at Aoyama Gakuin University. In the experiment for health science students, 18th student came at the time one minute before end. This student was excluded as a subject because the only questionnaires were answered. This exclusion was considered no influence to this experiment.

2.4 Comparison

The data were put into a Microsoft Excel 2007 spreadsheet and were compared (selections of multiple choice items and translations). Each translated sentence in Part 2 was converted to points before comparison.

3. Results

The full score for the translation task was 22. This task was divided into two parts. Part 1 was allotted six points and Part 2 was allotted 16 points. For all participants, the average total score for the translation task was 12.73, standard deviation 3.19, median 13 and most frequent score 15. The maximum score was 19 and minimum 3 (see Table 6).

Table 6

Scores on the Translation Task (Group S: n=17, Group L: n=20)

Variable	All participants*	Group S*	Group L *
Total			
Average	12.73	12.24	13.15
Median	13	13	13
Mode	15	15	13
S.D.	3.19	3.82	2.56
Minimum	3	3	9
Maximum	19	16	19
Full score	22	22	22
Part 1			
Average	2 .65	2.82	2.50
Median	3	3	2.5
Mode	2	4	3
S.D.	1.27	1.4	1.15
Minimum	0	0	0
Maximum	5	5	5
Full score	6	6	6
Part 2			
Average	10.08	9.41	10.65
Median	11	10	11
Mode	12	12	12
S.D.	2.58	3.28	1.66
Minimum	2	2	2
Maximum	14	13	14
Full score	16	16	16

* Points

The scores are analyzed statistically in the next section.

4. Statistical analysis

Correlations between knowledge of healthcare and score in the task were investigated. An analysis to determine whether there were statistical differences between the scores of students of the humanities and health science students was performed. There were no significant differences in the task scores between Group S and Group L.

Part 1 had six questions (six points). The average score of Group S was 2.82, Group L 2.50. An *f*-test was performed in advance and it showed that Group S and L were homoscedastic. The scores were subjected to a *t*-test (at a 0.05 of level significance [α=0.05]). The two-tailed test showed that P=0.45 and t=0.77 (-2.03<t<2.03). Therefore, no statistical differences were observed between Groups S and L.

Part 2 presented two questions to the participants. The full score in this section was 16 points; seven points for grammar and nine points for vocabulary. The average score of Group S was 9.41, and that of Group L was 10.65. An *f*-test was performed in advance and it showed that Groups S and L had unequal variance. A *t*-test with Welch's correction, at a significance level of 0.05 (α=0.05), was used. The two-tailed test showed that P=0.17 and t=1.41 (-2.07<t<2.07). Therefore, no statistical differences between the scores of Groups S and L were found.

In conclusion, there were no significant differences in the task scores between Group S and Group L in this study.

5. Discussion

Each part of the translation task will be analyzed in this section. Issues about this experiments and suggestions regarding medical translation will be made in this chapter.

5.1. Part 1

See Table 7 to confirm the rate of correct responses. This table was made with reference to the table by Fukayama ([Ed.], 2000, p. 123).

Table 7

Rate of Correct Answers in Part 1 (Group S: n=17, Group L: n=20)

Question				
	Appropriate answer	Other selections		
Group	*n* (%)	*n* (%)	*n* (%)	*n* (%)
(1) 動脈 *domyaku*				
	artery	hemorrhage	vein	hemoglobin
Group S	15 (88%)	0 (0%)	2 (12%)	0 (0%)
Group L	10 (50%)	0 (0%)	10 (50%)	0 (0%)
(2) 腎炎 *jin-en*				
	nephritis	nephrectomy	nephromegaly	nephric
Group S	0 (0%)	8 (47%)	3 (18%)	6 (35%)

Group L	10 (50%)	2 (0%)	4 (20%)	4 (20%)
(3) 側頭骨 *sokutokotsu**				
	temporal bone	frontal bone	parietal bone	occipital bone
Group S	7 (41%)	1 (6%)	5 (29%)	2 (12%)
Group L	2 (10%)	1 (5%)	12 (60%)	2 (2%)
(4) cardiac arrest				
	心停止	心室瘤	心血管造影	心奇形
	shinteishi	*shinshituryu*	*shinkekkanzoei*	*shinkikei*
Group S	8 (47%)	2 (12%)	6 (35%)	1 (6%)
Group L	13 (65%)	5 (25%)	1 (5%)	1 (5%)
(5) IV				
	静注で	経口	1 日 2 回	既往歴
	jochu de	*keiko*	*ichinichi nikai*	*kioreki*
Group S	15 (88%)	1 (6%)	0 (0%)	1 (6%)
Group L	7 (35%)	6 (30%)	1 (5%)	6 (30%)
(6) Itchy athlete's foot often occurs between the ( ) of the foot.				
	toes	ankle	instep	sole
Group S	3 (18%)	6 (35%)	2 (12%)	6 (35%)
Group L	8 (40%)	4 (20%)	5 (25%)	3 (15%)

* Five students chose no answer (Group S, 2: Group L, 3).

Significantly many students (25) chose correct answer “artery” in the question (1). Ten students of the humanities chose “artery” correctly and another ten chose “vein.” It is suggested that students knew that “artery” and “vein” were kinds of blood vessels. The health science students also significantly better on the question (5). This question was provided to ask about abbreviations. Fifteen students (88%) chose the correct answer “IV.” Abbreviations and units of measure are troublesome for students. The reason is that these words are too short to identify the meaning in dictionaries or on the Internet. It is significantly higher than for other questions except the question (1) showing that they were familiar with this term. On the other hand, the answers of Group L were split. That means they may have chosen the answer randomly. The question (6) was quoted from questions made by Fukuyama (2000). She claims that it is difficult for health science students to distinguish everyday words like body parts in English. The students’ answers were split and only three of them chose “toes.” This question was speculated to be easy for students of the humanities because the correct answer was the only one that was plural. However the answers of the students of the humanities were also

split. Four students chose “ankle,” “instep” five, and “sole” three. The question (3) was also difficult for both Group L and M because it is a term in anatomy.

5.2 Part 2

In the grammar questions of Question (2), students of the humanities got significantly better scores (100%). On the other hand, in the vocabulary questions, no difference was shown in both groups except Question (2) e). See Table 8 to confirm the rate of correct responses in Part 2.

Table 8

Rate of correct answers in Part 2 (Group S: n=17, Group L: n=20)

Measure	All participants n (%)	Group S n (%)	Group L n (%)
Question (1)			
a) Subject and verb	28 (76%)	13 (76%)	15 (75%)
b) Relationship of decoration	22 (59%)	9 (53%)	13 (65%)
c) Tense	29 (78%)	13 (76%)	16 (80%)
d) Vocabulary			
1. 37-year-old	35 (95%)	16 (94%)	19 (95%)
2. present with	4 (11%)	1 (6%)	3 (15%)
3. brownish-black	5 (14%)	2 (12%)	3 (15%)
4. big toe	25 (68%)	11 (65%)	14 (70%)
Question (2)			
a) Subject and verb	32 (86%)	12 (71%)	20 (100%)
b) Object	31 (84%)	11 (65%)	20 (100%)
c) That clause	32 (86%)	12 (71%)	20 (100%)
d) Tense	35 (95%)	15 (88%)	20 (100%)
e) Vocabulary			
1. medical student	33 (89%)	15 (88%)	18 (90%)
2. report	23 (62%)	12 (71%)	11 (55%)
3. advisor	23 (62%)	7 (41%)	16 (80%)
4. family history	12 (32%)	9 (53%)	3 (15%)
5. unremarkable	4 (11%)	2 (12%)	2 (10%)

5.2.1 Question (1)

“A 37-year-old man presented with a brownish-black nail on the big toe of the right foot.” (The model answer: *37 sai no dansei ga migiboshi no tsume ga kasshoku wo obita kokushoku ni nari jusin shita.* [37 歳の男性が右母趾の爪が褐色を帯びた黒色になり受診した.])

This sentence was quoted from *the New England Journal of Medicine* (Yun, S. J. and S. Kim, 2011). It is a typical sentence used at the beginning of a case study. The model answer was from Nankodo’s website.

Regarding vocabulary, the item “37-year-old man” had the best score among the questions for vocabulary in Parts 1 and 2. Ninety-five percent of the students wrote this phrase correctly. On the other hand, “present with” was one of the most difficult questions in this task. Some students thought this phrase meant *miseru* (見せる, “show”). Fukuda (2010) indicates that many learners mistook the sentence “patients may present with nonspecific symptoms” in their translations into Japanese and suggested one must check common words carefully.

This sentence should be translated in the past tense but some students translated it as present tense (Group L: four, Group S: three). These students tended to use “*-ga iru* (がいる).” To check the understanding about the relationship of decoration, “nail on the big toe” was chosen. This phrase should be understood as *oyayubi no tsume* (親指の爪). The percentage of correct answers was relatively low compared to other grammar questions.

5.2.2 Question (2)

“The medical student reported to the adviser that the patient’s family history was unremarkable” (The model answer: *Igakusei ha kanja no kazokureki ni tokkijikou ha nai to sidokyokan ni houkokusita* [医学生は患者の家族歴に特記事項はないと指導教官に報告した。]).

In the grammar questions, the language background students got markedly better scores (100%). The health science students also answered well. The number of students translating the grammar questions appropriately was between 11 and 15 (65 to 88%). Two of them considered “was (unremarkable)” as the main verb of the sentence.

Five words were picked up as indicators of vocabulary. “Medical student” should be translated as *igakusei* (医学生) without special context. Four subjects in Group S and five in Group L translated it to *iryo(kei) gakusei* (医療[系]学生). *Iryo(kei) gakusei* does not refer specifically to students of medicine, but of nursing, pharmacy, dentistry and various other students who study subjects related to medicine. It was also included as a correct answer in this task because “iryou(kei)” tends to be used often. “Advisor” means *shidokan* in this case but katakana *adobaiza* was given a point. The number of students who used *adobaiza* (アドバイザー), which was just put into *katakana*, was 20. It was quite common in Group L (15). Two

health science students considered “advisor” to be a noun “advice.” “Family history” should be translated as *kazokureki* (家族歴). It was speculated that health science students would have the advantage in this question, but only 53% (nine) answered correctly. The number of students who answered the phrase as *kioreki* (既往歴) was four. The health science students were expected to answer this item from their medical vocabulary. “Unremarkable” means *tokkijikou ha nai* (特記事項はない), which is frequently seen in medical contexts. This adjective was considered difficult for both Group L and M.

5.3 Issues

This was a cross-section study. Only potential English skills in medical translation were investigated. I could not give the students long translation tasks because of two reasons. The students had never learned medical translation. It was deemed that the students could not translate long sentences in medicine without knowledge. In addition only 15 minutes were given for each experiment because the translation task was held in the class. It is considered that a longitudinal study could be more effective to investigate skills of medical translation between language background students and science-based students.

5.4. Suggestions

Groups L and S made mistakes that were different in nature although there were no statistically significant differences in their task scores. The students with language background have the chance to develop their medical translation skills when they begin to learn. Some humanities students answered in the questionnaire that they found an interest in medical translation. However, the English departments of universities in Japan rarely have specialized classes for translation in science. According to Maier and Massardier-Kenney (1993: 151), there are four key aspects of translation practice: research skills, technical writing skill, collaboration, and theory. They primarily emphasize research skills. In this paper, three tools are suggested for improving research skills for healthcare translation: translation schools, books and the Internet, and free seminars.

Students who major in science can learn technical English at university but students of the humanities have to study English in healthcare at other schools. Schools of translation offer classes on medical translation. *Shinban igaku·yakugaku no honyaku·tsuyaku kanzen gaido bukku* (Ikaros-Shuppan, 2011: 134-137) introduces many courses for medical translation. Such specialized translation schools have another advantage. Those who learn at classes there will have many friends who have different majors from them. Translation schools accept both students who have scientific background or who only have English skills. Maier and Massardier-Kenney (1993) say that in the face of specialized material, as with any difficult

translation, collaboration is crucial. It includes collaboration with respect to another profession and another academic discipline but also within the translation profession itself (p. 157). Language background students and science-based students can help each other.

Fischbach (1962: 464) says that to translate scientific documents is to form meaning, i.e. transmitting ideas of a foreign author to a foreign or English-speaking reader. Therefore, healthcare professional students have an advantage in getting a job as a medical translator. To cover the lack of medical knowledge, students who major in literature have to study basics of healthcare by themselves. *Training in Medical Translation with Emphasis on German* (Lee-Jahnke, 1998) is a brief guide for learning medical translation not only for German but for a student whose first language is not German. It introduces practical and fundamental strategies for acquisition of medical translation skills (pp. 81-91). Trustworthy dictionaries are certainly needed both for students of the humanities and health science students. *Stedman's English-Japanese Medical Dictionary 6th Edition* (2008) and *Igaku-Shoin's Medical Dictionary 2th Edition* (Ito and Imura, 2009) are popular dictionaries to learn healthcare terms. Searching for information on the Internet is necessity for translation. *CiNii*, *GeNii* and *Google Scholor* are search engines specialize in academic theses by researchers and scholars. *The New England Journal of Medicine* and *PubMed.gov, U.S. National Library of Medicine* are popular websites, which allows for the searching of medical documents.

If students want to increase their knowledge of healthcare, attending lectures and meetings will give them a chance to learn about healthcare issues. For instance, Keio University presented free lectures, mainly to allow participants to learn about the brain (Keio University, 2010). Kitasato University and Aoyama Gakuin University collaborated to highlight healthcare issues and had symposia about foreign nurses and clinical studies (Kitasato University and Aoyama Gakuin University, strategic university collaboration program, 2010). Another choice is to take online courses in the website *Coursera*. Many famous universities around the world offer online courses. Students can take lectures about science and healthcare for free.

So, humanities students can research the field in many ways to learn healthcare terms in the classed offered by translation schools. They can study healthcare issues checking books, dictionaries, and the Internet. Attending seminars and symposia will expand one's knowledge of healthcare.

6. Conclusion

Just as Niedzielski and Chernovaty (1993) showed in their study, this study did not show significant differences between scores of students of the humanities and health science students. It means that knowledge of healthcare gave advantages to Group S and students of

Group L covered their disadvantage using their English skills. In this study no disadvantage for language background students was found.

Acknowledgements

The author would like to express her thanks to the students and teachers who voluntary cooperated in the experiments.

.....

About the Author

Mami Tsuyuki（露木麻未）: Affiliate of Department of English, College of Literature (Evening Division), Aoyama Gakuin University.

.....

References

[Japanese]

Abe, K. (April 2010 to August 2010).『医薬翻訳』. [Medical and pharmaceutical translation]. Lectures conducted at ISS Institute, Tokyo.

Abe, K. (September 2010 to February 2011).『医薬翻訳(B)』. [Medical and pharmaceutical translation (B)]. Lectures conducted at ISS Institute, Tokyo.

Akiba, T. and Mori, H. (2000). 『英単語・熟語ダイアローグ 1800（改訂版）』. *Eitaingo·jukugo daiarogu 1800 (kaitei-ban).* [Dialogue Vocabulary 1800]. Tokyo: Obunsha.

Fast Track Guide: Business Translation 2008.『稼げる実務翻訳ガイド 2008 年度版』. (2007). (p. 28).Tokyo: Alc.

Fukuda, M. (2010). 『定例トライアル 2010［実務］メディカル』. *Teirei-toraiaru 2010 [jitumu] medikaru*. {Regular Trial 2010 [Business] Medicine}. [Brochure]. *Amelia;* March Issue, 2010.

Fukayama, A. (2000). 『ESP の理論と実践：これで日本の英語教育が変わる』. *ESP no riron to jissen: kore de nihon no eigokyoiku ga kawaru.* [Theories and Practice of ESP]. Tokyo: Sanshusha.

Google. [Website] Retrieved from http://www.google.co.jp/ (Access date: June 1, 2011 to September 3, 2011)

Hajiro, K. (2008). 『臨床英文の正しい書き方　改訂第４版』. *Writing Medical Records in English Forthh Edition*. Kyoto: Kinpodo.

Hitosugi, T. (Written and Ed.) (2006).『キクタン[Super]』. *Kikutan [supa]*. {Kikutan [Super]}. Tokyo: Alc.

Ikaros-Shuppan (Ed.). (2011). 『新版医学・薬学の翻訳・通訳　完全ガイドブック』. *Shinban igaku·yakugaku no honyaku·tsuyaku kanzen gaido bukku*. [Complete guidebook for translation and interpretation of medicine and pharmacy]. Tokyo: Ikaros Mook.

Institute for International Business Communication. 『TOEIC 公式データ』. *TOEIC koshiki deta*. [TOEIC official data]. [Website]. Retrieved from http://www.toeic.or.jp/toeic/data/data_dist01.html?score_id=0000000101 (Access date: November 19, 2011)

Ito, M. and Imura, H. (2009).『医学書院　医学大辞典（第 2 版）』. *Igaku-Shoin's Medical Dictionary Second Edition*. [Electronic dictionary version]. Igaku-Shoin.

Keio University. (2010). 『脳の講習会～基礎知識～』. *Nou no koshukai-kisochisiki*. [Lectures for human brain]. [Website]. Retrieved from http://www.carls.keio.ac.jp/%E6%9B%B4%E6%96%B020100708brain.pdf

Kindersley, D. (Ed.), Kohashi, R. (translate) (2002). 『ヒューマン・ボディ』. *Hyuman·bodi.* [Human body]. Shufuno Tomo Co., Ltd.

Kitasato University. 『北里大学』. [Website]. Retrieved from http://www.kitasato-u.ac.jp/daigaku/syogai/rishusei/rishu02.html (Access date: May, 2011 to January, 2011)

Kitasato University and Aoyama Gakuin University, stragetic university collaboration program. (2010, September).『外国人看護士、今後の展望』. *Gaikokujin kangoshi, kongo no tenbo*. [Prospects for foreign nurses]. Seminars conducted at Aoyama Gakuin University

Kitasato University and Aoyama Gakuin University, strategic university collaboration program. (2010, December). 『ヘルスケア・ソリューション研究シンポジウム「臨床研究と医療の倫理」－治験の推進と人権保護のバランスを求めて』. *Herusukea·soryushon kenkyu simpojium "Rinsho kenkyu to iryo no rinri" Chiken no suisin to jinken hogono baransu wo motomete.* [Clinical Studies and Medical Ethics]. Seminars conducted at Aoyama Gakuin University

National Institute of Informatics. *CiNii.* [Website] Retrieved from http://ci.nii.ac.jp/ (Access date: January 29. 2013)

National Institute of Informatics. *Genii.* [Website] Retrieved from http://ge.nii.ac.jp/genii/jsp/index.jsp (Access date: January 29. 2013)

Sasaki, M. (2003). 医療系学生の数学的能力と教養教育に関する考察. Mathematical ability and general education in the medical students. *Yamagata Journal of Health Science*, 6: 35-36.

Stedman Editorial Committee. (2008). 『ステッドマン医学大辞典改訂第 6 版（最新改訂版）』. *Stedman's English-Japanese Medical Dictionary 6th Edition.* [Electronic dictionary version]. Medical View Co., Ltd.

The Society for Testing English Proficiency. (2011). 『英検』. *Eiken.* [Website]. Retrieved from http://www.eiken.or.jp/exam/index.html (Access date: November 19, 2011)

Tomita, R. (Ed.) (2009). 『医学英単語』. *Igaku eitango.* [Medical English words]. Tokyo: Synergy.

Yamauchi, M. (1987).『心理・教育のための統計法〈第 2 版〉』. *Shinri·kyoiku no tame no tokeiho (dai 2 han).* [Statistics for Psychology and Education second edition]. Tokyo: Saiensusha.

Yun, S. J. and S. Kim. (2011). 『IMAGES IN CLINICAL MEDICINE 爪のハッチンソン徴候 Hutchinson's Nail Sign』. *Tume no hacchinson choko*. *The New England Journal of Medicine (Japanese)*. Nankodo youshobu, 364 (18). [Website]. Retrieved from http://www.nankodo.co.jp/yosyo/xforeign/nejm/xf2hm.htm (Access date: May 11, 2011)

[English]

Baggaley, A. (Ed.) (2001). *Human Body.* New York: Dk Pub.

Barron, J. P., Breugelmans, R. and Ashida, R. (2009). A fundamental approach to radically improve English education in Japanese medical schools. *Igaku kyoiku,* 40 (2) : 113-115.

Coursera. [Website]. Retrieved from https://www.coursera.org/courses (Access date: January 14, 2013)

Fischbach, H. (1962). *Problems of medical translation*. *Bulletin of the medical library assocication*, 50 (3): 464

Lee-Jahnke, H. (1998). Training in medical translation with emphasis on German. In H. Fischbach (Ed.), *Translation and medicine.* American Translators Association scholarly monograph series, 10. (pp. 81-102). Amsterdam/Philadelphia: John Benjamins.

Maier, C. and Massardire-Kenney, F. (1993). Toward an expanded pedagogy of specialized translation. In S. E. Wright & L. D. Jr. Wright (Eds.), *Scientific and technical translation.*, American Translators Association Scholarly monograph series, 6. (pp. 151-157). Amsterdam/ Philadelphia: John Benjamins.

Micic, S. (2008). The role of translation in undergraduate medical English instruction. *Ibèrica 16 [2008]*: 169-182

Niedzielski, H. and Chernovaty, L. (1993). Linguistic and technical preparation in the training of technical translators and interpreters. In S. E. Wright & L. D. Jr. Wright (Eds.), *Scientific and technical translation. Translation and medicine.* American Translators Association scholarly monograph series, 6. (pp. 123-149). Amsterdam/Philadelphia: John Benjamins.

OED on line (The Oxford English Dictionary). Latest additions: June 2010. [Database]. (Access date: September 7, 19, and 20, 2011)

Oxford Dictionary of English. (2003). [Electronic dictionary version]. Oxford University Press.

PubMed.gov, U.S. National Library of Medicine. [Website]. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/ (Access date: June 1, 2011 to September 3, 2011)

Reeves-Ellington, B. (1998). The pragmatics of medical translation: A strategy for cooperative advantage. In H. Fischbach (Ed.), *Translation and medicine. American Translators Association scholarly monograph series, 6.* (pp. 105-115). Amsterdam/Philadelphia: John Benjamins.

The New England Journal of Medicine. [Website]. Retrieved from http://www.nejm.org/ (Access date: June 1, 2011 to September 3, 2011)

Seya. Y., Nishimura, T. *et al*. (1994). *A shorter course in health living.* Tokyo: Nan'un-Do.

Seya, Y. (1933). *The Future is Now*. Tokyo: Nan'un-Do.

Wakabayashi, J. (1996). Teaching medical translation. *Meta*, 41(3): 356-365.

Wright, S. E. and Wright, Jr., L. D. (Ed.). (1993). *Scientific and technical translation.* American Translators Association Scholarly Monograph Series, 6. Amsterdam/Philadelphia: John Benjamins.

Yun, S. J. and S. Kim. (2011). Hutchinson's nail sign. *The New England Journal of Medicine.* 364: e38 5, [Website] Retrieved from http://www.nejm.org/doi/full/10.1056/NEJMicm1009305 (Access date: May 11, 2011)

Appendix

Questions for the translation task

Part 1: 選択肢の中から適切な英語または日本語を選んで○をつけてください。(Please select the appropriate English/Japanese from choices and circle it.)

(1) 動脈

a. hemorrhage b. vein c. artery d. hemoglobin

(2) 腎炎

a. nephrectomy b. nephritis c. nephromegaly d. nephric

(3) 側頭骨

a. temporal bone b. frontal bone c. parietal bone d. occipital bone

(4) cardiac arrest

a. *shinsitsu-ryu* b. *shinkekkan-zoei* c. *shinkikei* d. *shinteishi*

(5) IV

a. *keikou* b. *jochu de* c. *ichinichi nikai* d. *kioreki*

(6) Itchy athlete's foot often occurs between the ( ) of the foot.

a. ankle b. instep c. toes d. sole

Part 2: 日本語に訳してください。(Please translate following sentences to Japanese.)

(1) A 37-year-old man presented with a brownish-black nail on the big toe of the right foot.

(2) The medical student reported to the adviser that the patient's family history was unremarkable.