

Classification and Organization of Medical words using Topic Maps

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Background

Information processing of medical information by computer.



Input of the medical information takes time.



As to type medical words takes time, due to conversion, this process should be shortened.



Software of dictionaries are necessary

Background

Medical dictionary to register

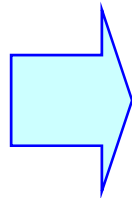
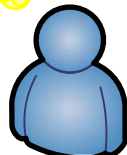
The words often used by all the medical departments while converting, are displayed on top when the medical dictionary is registered.

But suitable word for each medical department is not displayed on top of the list.

Conversion Example

Doctor of otorhinolaryngology

Doctor wants to
input : “内耳性難聴”



conversion of “ない”

1. 内科
2. 内分泌
3. 内耳性難聴

Previous research

The words of each medical department were extracted, and the medical treatment dictionary that specializes in each medical department based on the feature word was constructed.



As a result, it was possible to display on the top of the conversions the appropriate words for the respective medical departments

Previous research

ATOK2006

Alternatives	Answers
Great improvement	0
Improvement	1
Same	5
Declined	6

ATOK2006 + Medical dictionary

Alternatives	answers
Great improvement	0
Improvement	2
Same	10
Declined	3

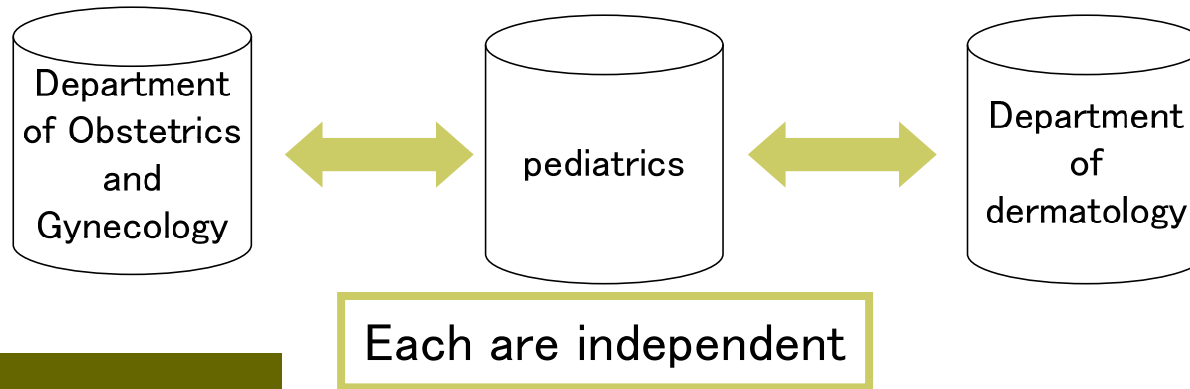
ATOK2006 + Medical dictionary + Medical dictionary each medical department

Alternatives	answers
Great improvement	0
Improvement	7
Same	7
Declined	1

It is necessary to make the dictionary more accurate.

Previous research

In the dictionary of each medical department, information of the word used by the others departments is not used.



In other departments

- ❑ A better mode of expression might be used.
- ❑ Even if a new word is used, it is not noticed.

Information on other departments might be able to be used in the dictionary.

Purpose

Then, it is constructed the dictionary considering the word used by others departments.



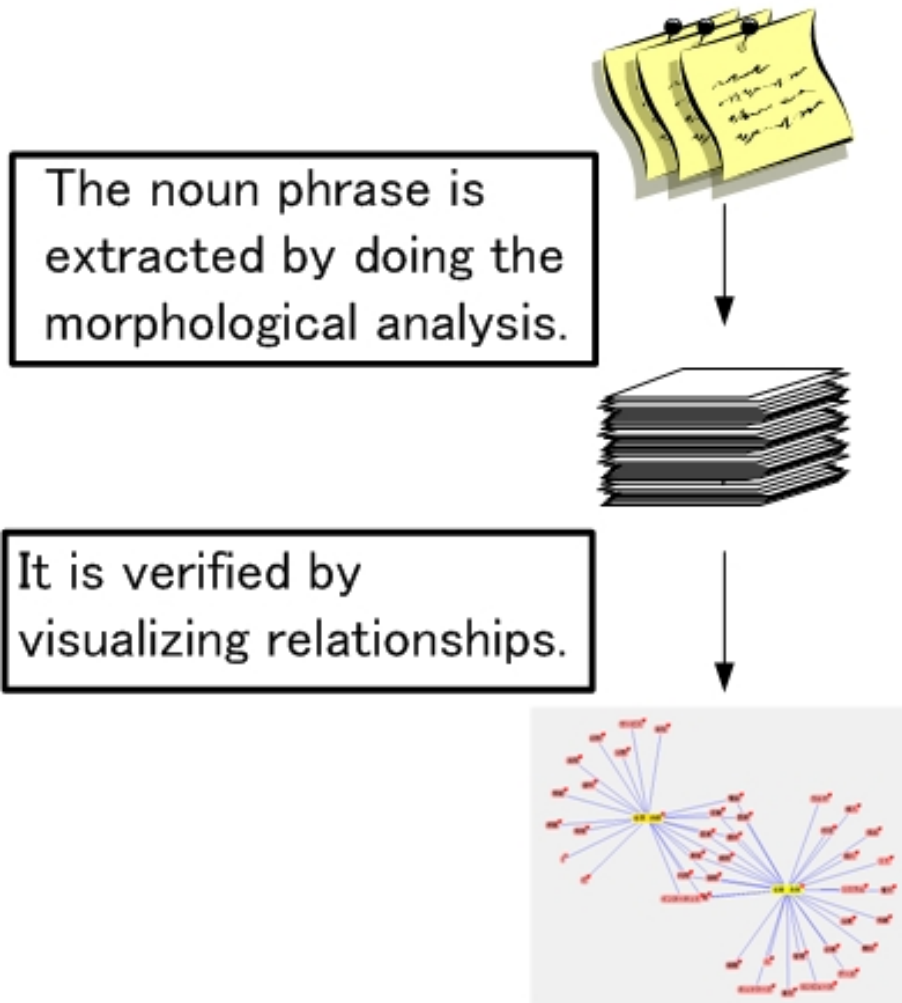
It is considered that the words used by other departments becomes candidates in the conversion of words, being as a result doctors' awareness and study material.



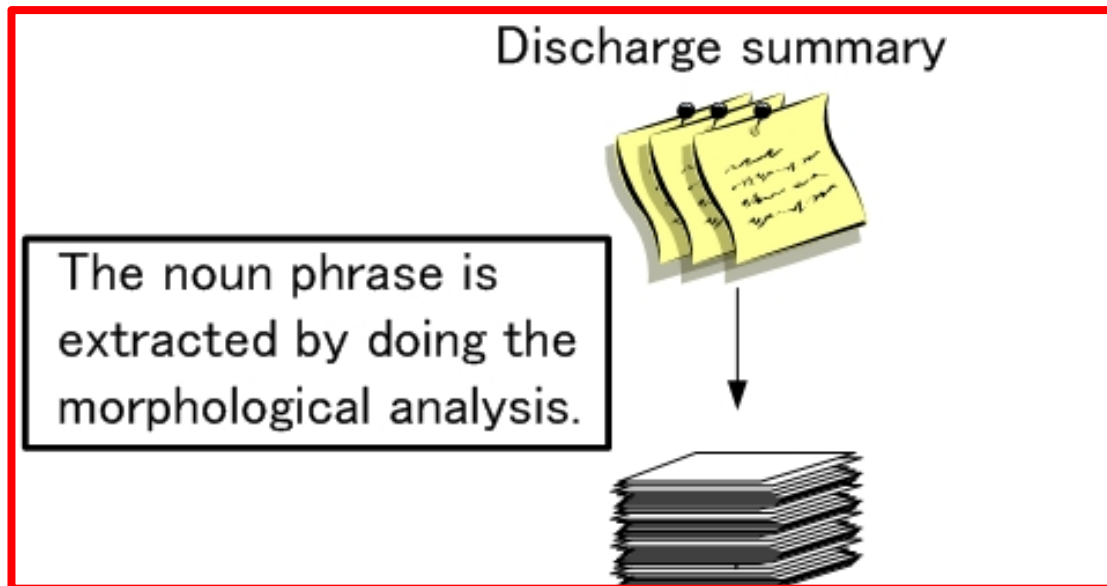
The relation of words used by each medical department is verified in this research.

Method

Discharge summary



Method



It is verified by visualizing relationships.

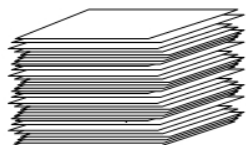


Extraction of noun phrase

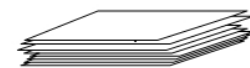
Discharge summary



The noun phrase is extracted by doing morphological analysis.



unknown word



classify



It is classified by hand work, and it is added.

register

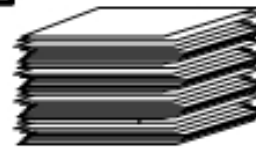
the noun phrase	classification	disease	diagnosis and treatment department	kana
ポリープ	disease	vocal cord polyp	department of otorhinolaryngology	ぽりーぷ
内科	other	lung cancer	department of respiratory surgery	ないか

Method

Discharge summary



The noun phrase is extracted by doing the morphological analysis.



It is verified by visualizing relationships.



Visualization of relationships

- The analysis result can be intuitively understood by visualizing relationships.
- The relationships are visualized by using Topic Maps.

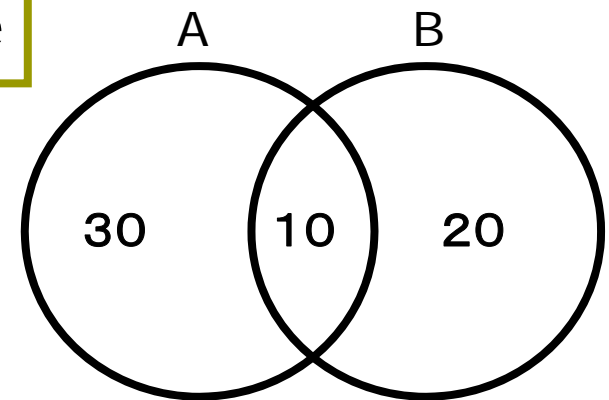
Advantage of visualization

$$A = 40$$

$$B = 30$$

$$A \cap B = 10$$

comprehensible

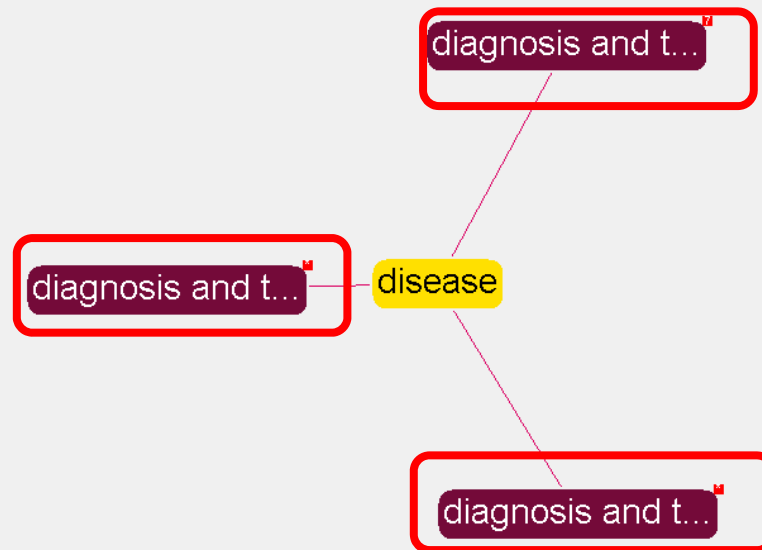


Visualization of relationships

- The medical department that has been examined are displayed by selecting diseases.
- The word used by the medical department is displayed by selecting the medical department

Visualization of relationships

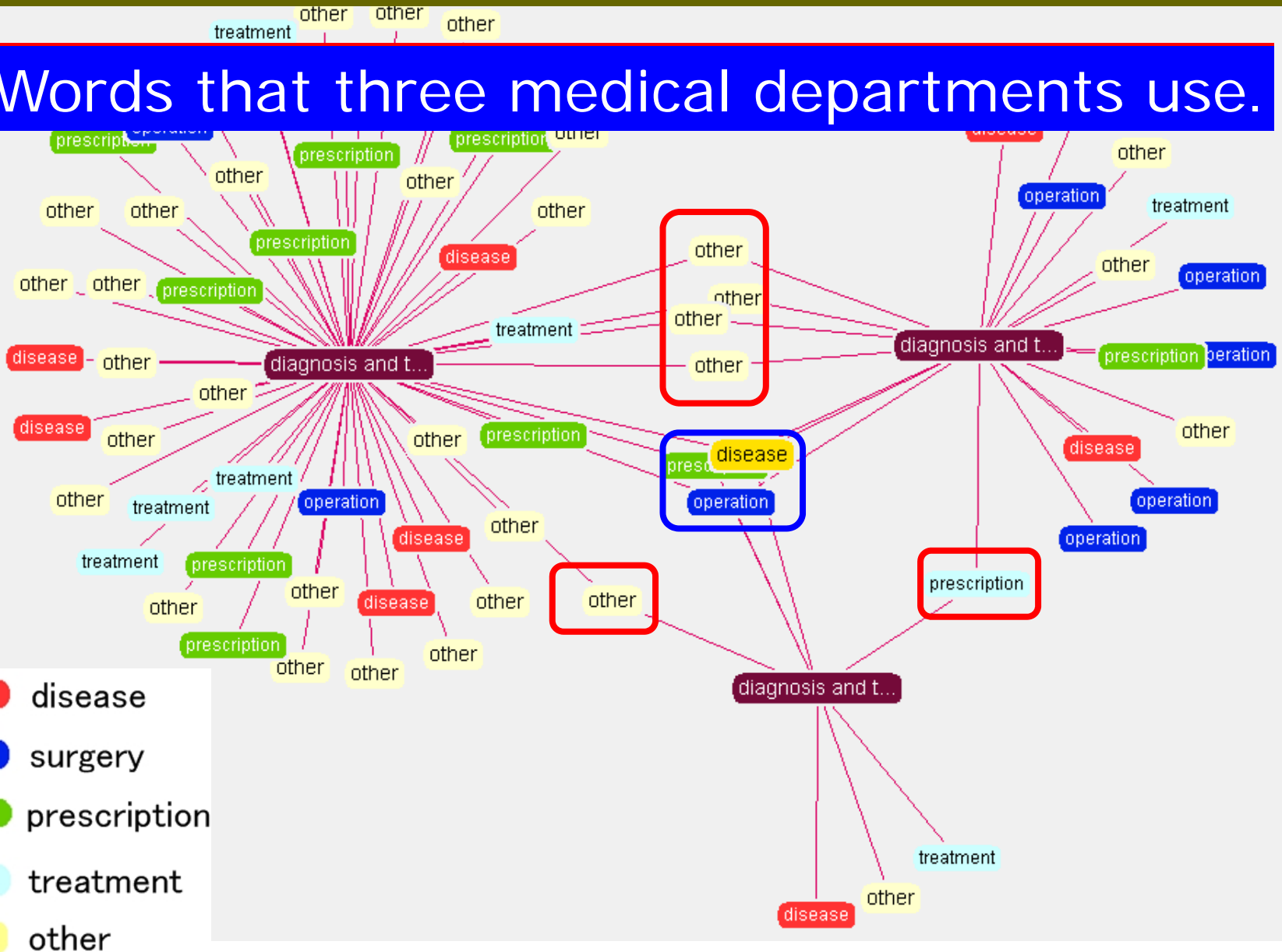
The medical departments that examines the name of a disease are displayed.



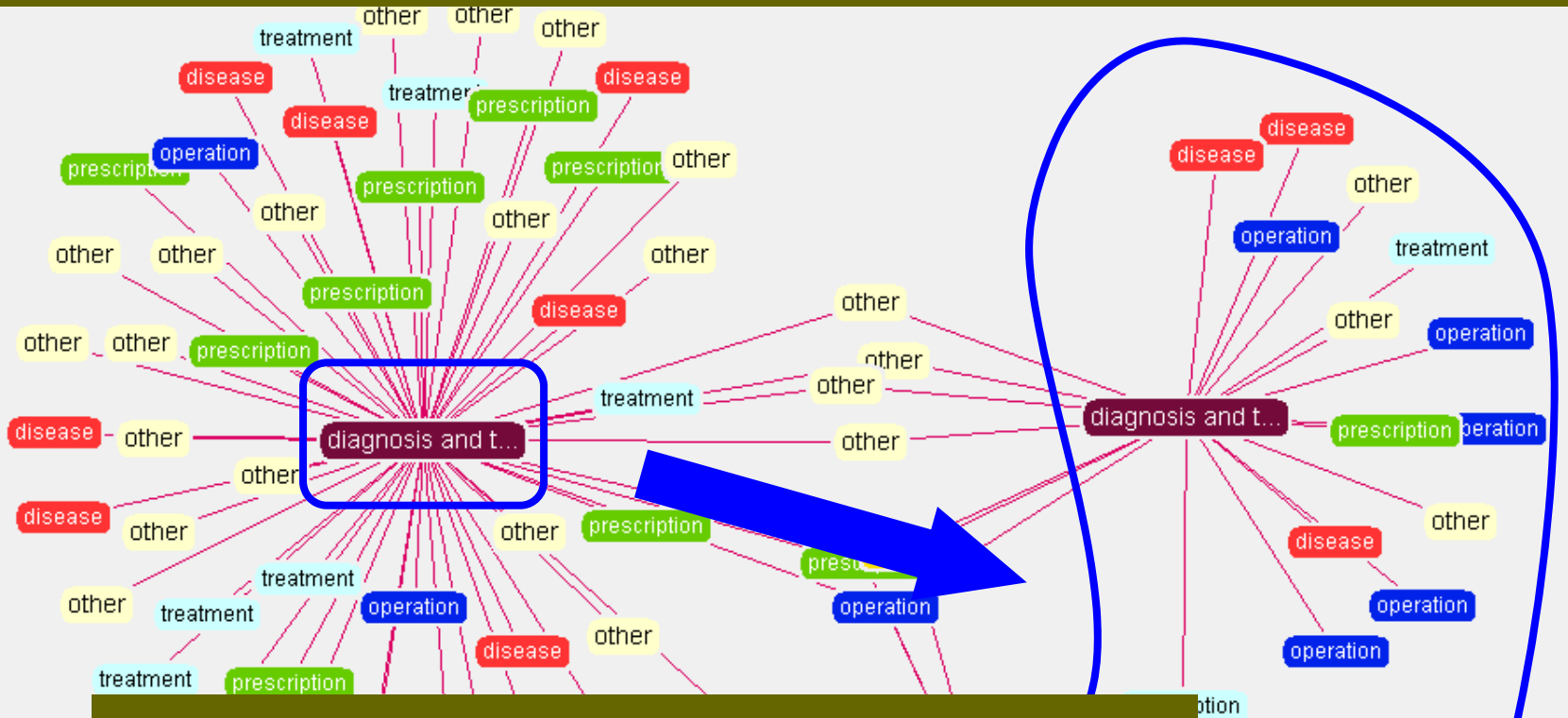
It is understood that there are three medical departments that treat the name of a disease.

The words used by each medical department are displayed.

Words that three medical departments use.



The words used by each medical department are displayed.



Words that has not been used

- disease
- surgery

These words become a part of doctors' awareness.

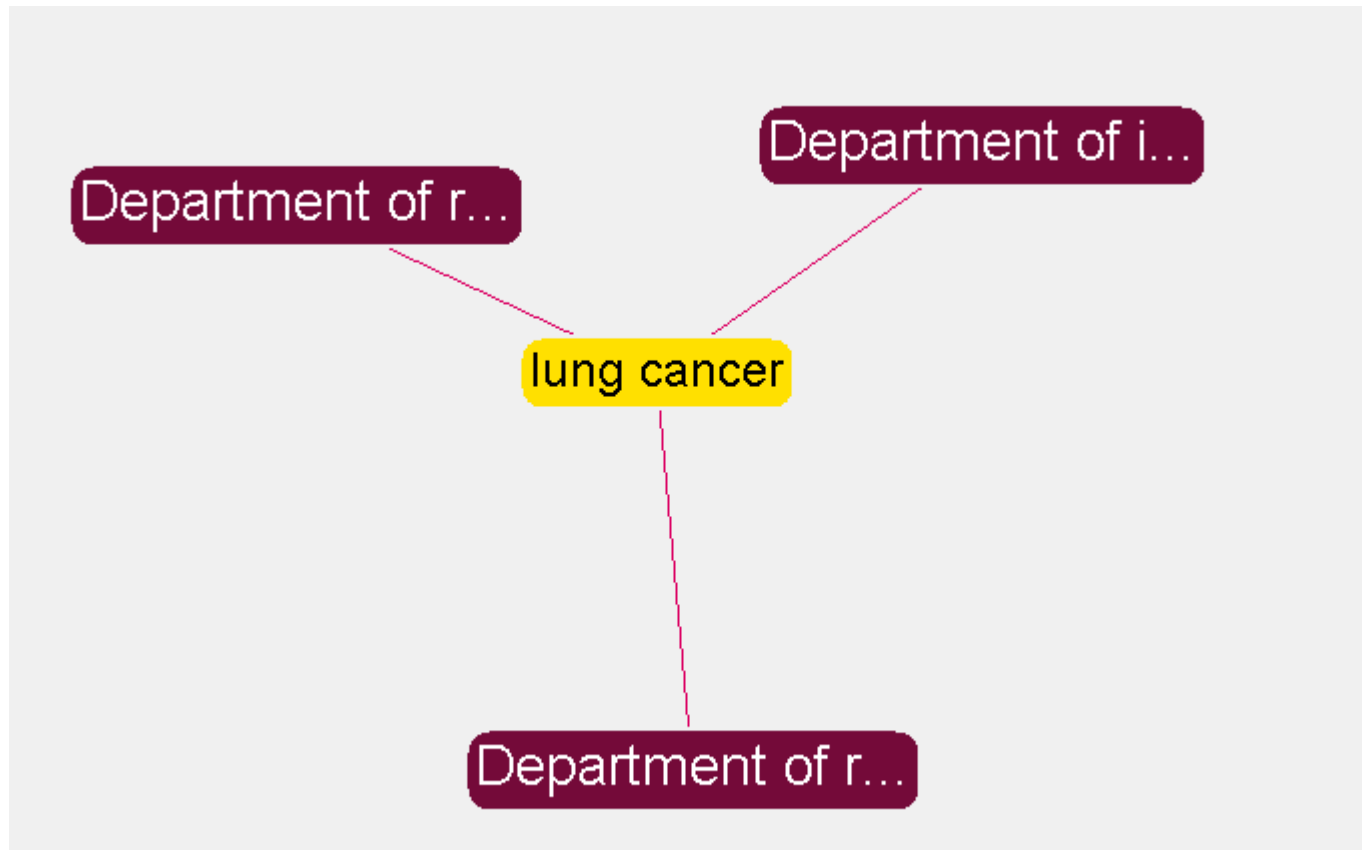
Evaluation

- ❑ 6074 discharge summaries of leaving in The Tokushima University Hospital from February to August, 2007 are target
- ❑ The relations between the name of a disease and the medical department and the relations between the medical department and the words in the lung cancer are visualized

Evaluation

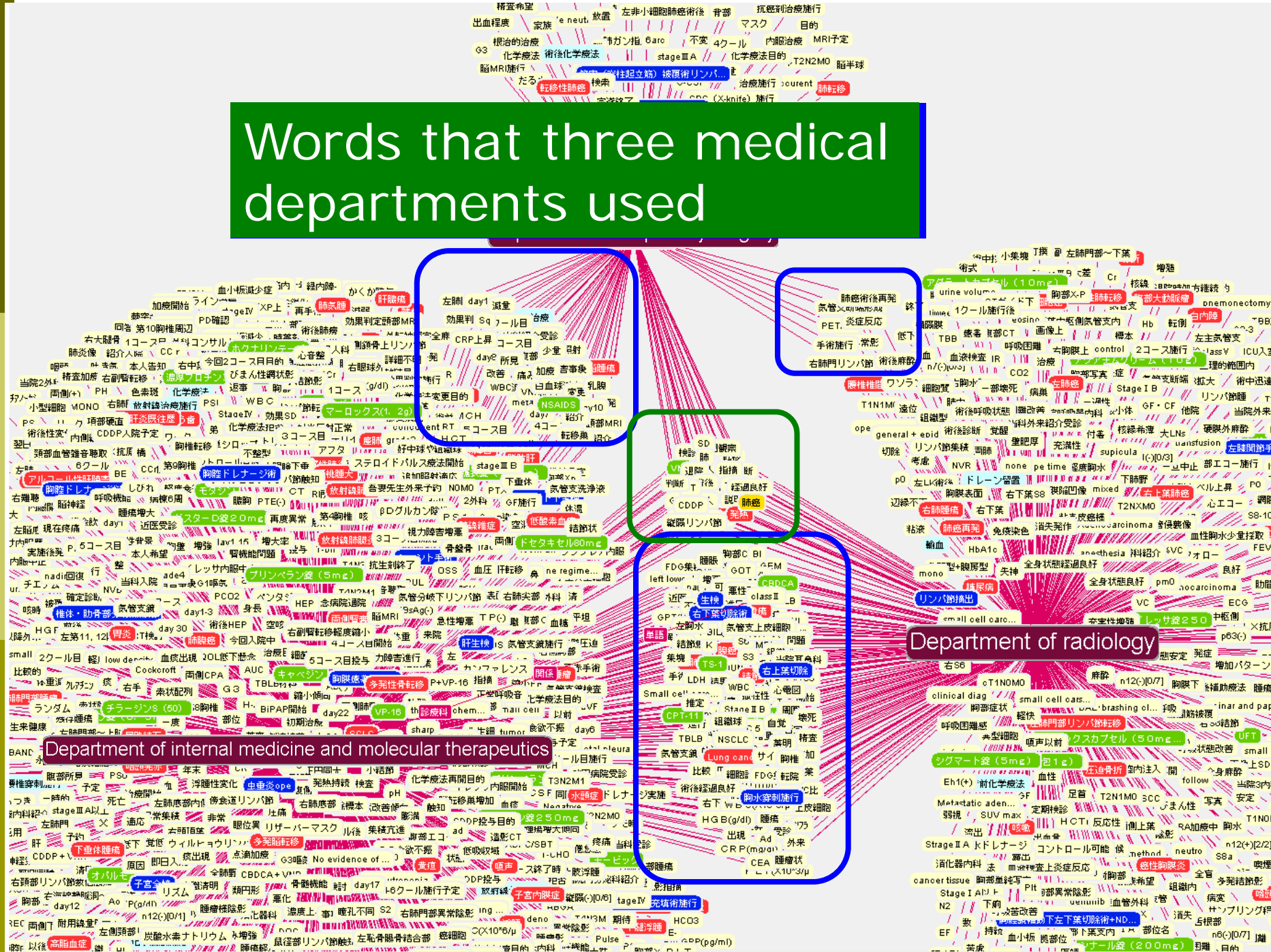
- Number of discharge summaries of lung cancer
 - 161 cases
- Diagnosis and treatment department
 - Department of respiratory surgery (46)
 - Department of internal medicine and molecular therapeutics (104)
 - Department of radiology (11)
- Number of words
 - 6763 words

Evaluation



It is easy to notice that there are three medical departments that examine lung cancer.

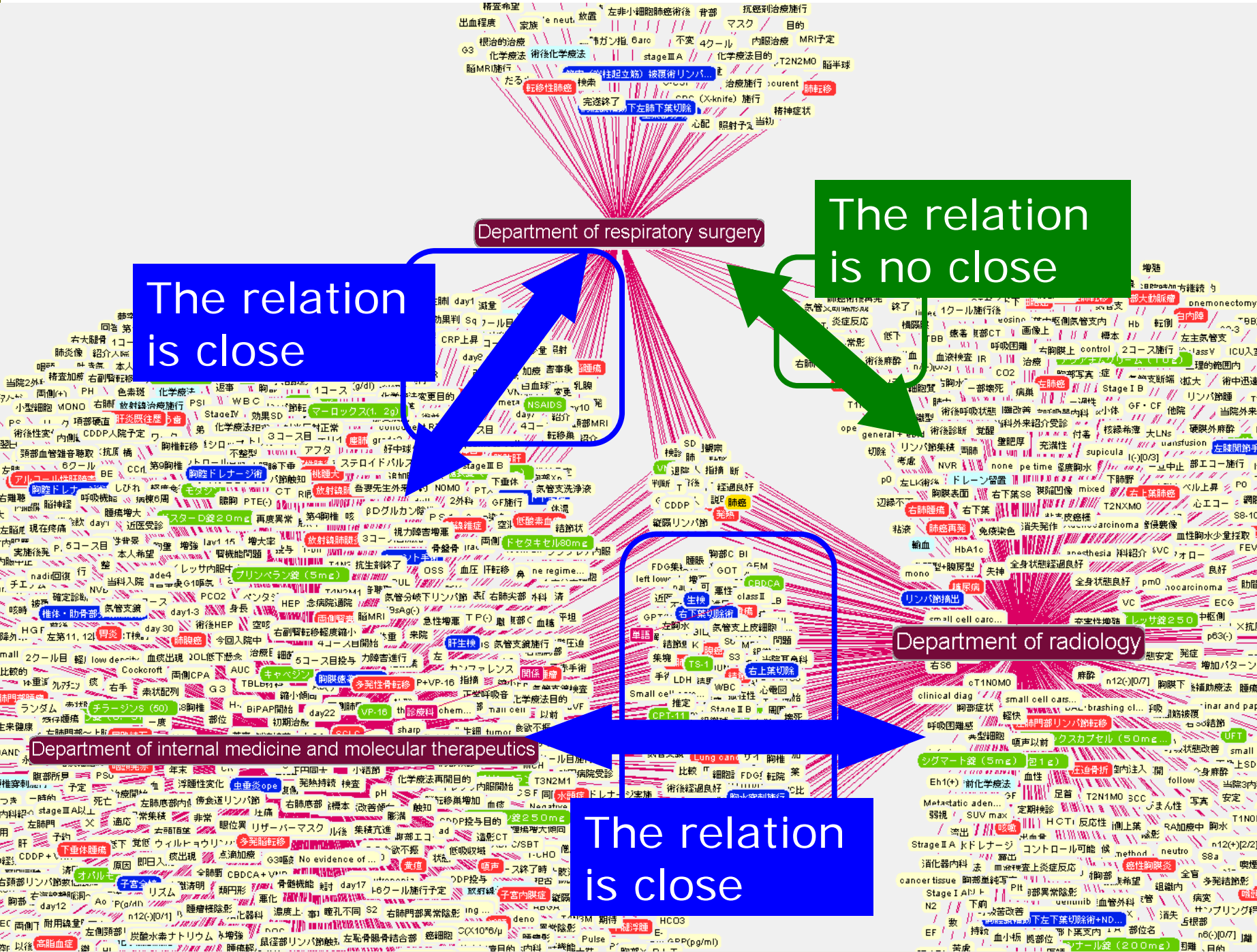
Words that three medical departments used



Department of internal medicine and molecular therapeutics

Department of radiology

Department of surgery



The relation is close

The relation is no close

Department of respiratory surgery

Department of radiology

Department of internal medicine and molecular therapeutics

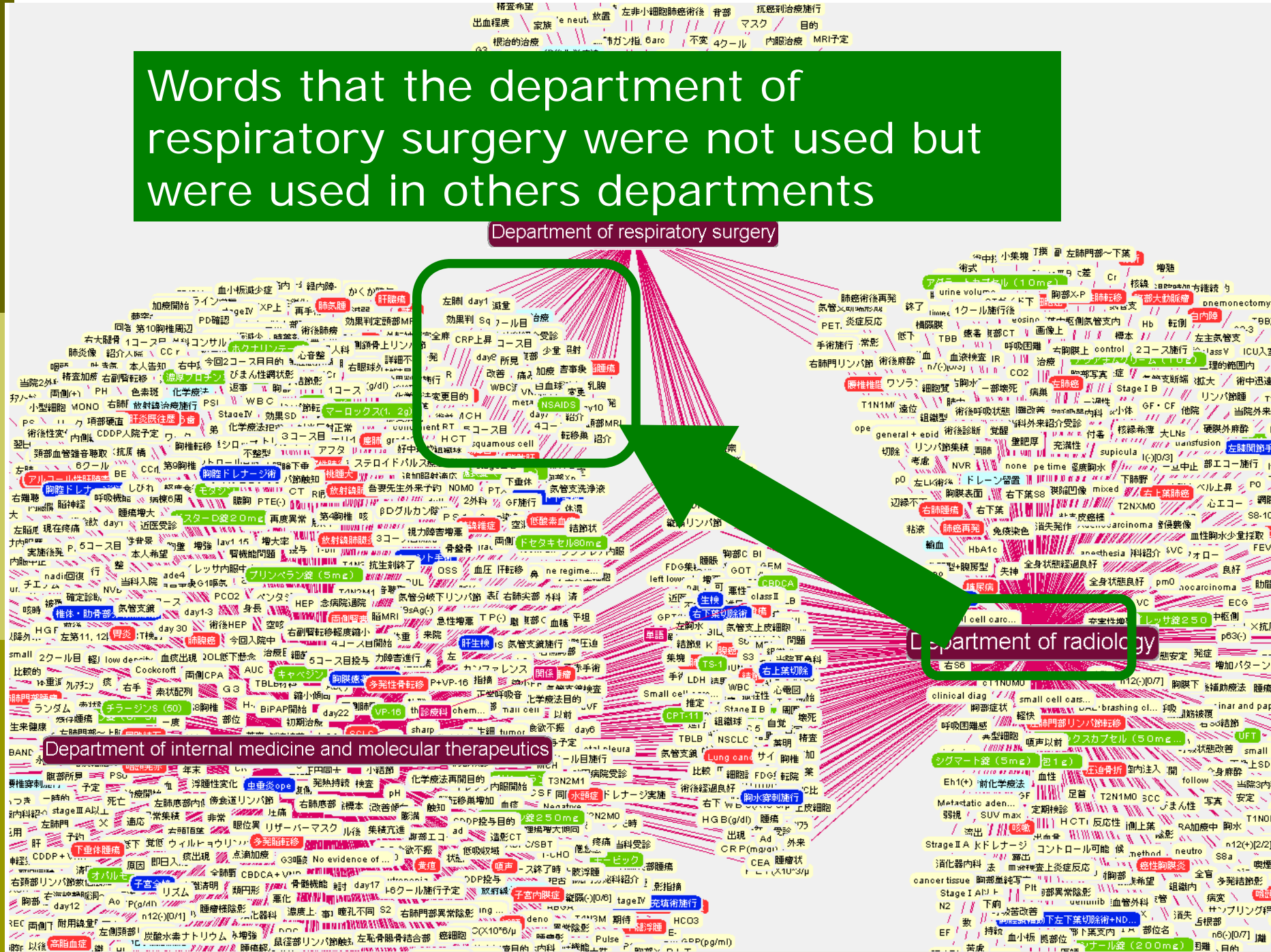
The relation is close

Words that the department of respiratory surgery were not used but were used in others departments

Department of respiratory surgery

Department of radiology

Department of internal medicine and molecular therapeutics



Discussion

- ❑ The words commonly used by the departments were easy to notice through visualization.
- ❑ Therefore, the words commonly but the departments show the relation between them.
- ❑ It is expected that the words used in other departments will be displayed in the conversion as candidates. And this will offer learning material to the doctors.

Discussion

Conversion candidate presented when doctor is input as “ϕ”

Department of internal medicine and molecular therapeutics

有害事象	73	Department of internal medicine and molecular therapeutics, Department of respiratory surgery, Department of radiology
癒着	11	Department of respiratory surgery
有意	10	Department of internal medicine and molecular therapeutics, Department of respiratory surgery, Department of radiology
有効	5	Department of internal medicine and molecular therapeutics
輸血	4	Department of internal medicine and molecular therapeutics, Department of respiratory surgery
輸血歴	3	Department of internal medicine and molecular therapeutics
有意所見	3	Department of internal medicine and molecular therapeutics
ユーロジン錠(2mg)	2	Department of respiratory surgery, Department of radiology
癒着術実施	2	Department of internal medicine and molecular therapeutics
輸液	2	Department of internal medicine and molecular therapeutics, Department of respiratory surgery

Conclusions

- ❑ It was a dictionary that considers the word used by other medical departments.
- ❑ Using Topic Map, it was displayed of the relations of the words used by medical departments.

Future tasks

- ❑ We make the dictionary proposes by this research, use actually by the doctor, and evaluate it.