Technical report on the Talisman project: data entry for a database of interstitial lung diseases

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Summary

The term interstitial lung disease (ILD) includes around 150 pathologies of multiple and often idiopathic etiologies. The interstitial syndrome is of complex radiological interpretation and differential diagnosis is often difficult. Some criteria such as age, gender or environmental exposures have a high importance depending on the disease, and need to be collected for every case. Most common imaging method is the chest x-ray but for more complex cases high-resolution computed tomographies (HRCT) of the lung are performed that contain more information on the lung tissue. Some projects on diagnostic aid based on lung CTs have been proposed and shown to improve diagnostics but often without taking into account other clinical data on the patient. An important part of the project[1] is the creation of a database of cases of ILDs containing images and other metadata on the patient. This paper describes the definition of the metadata necessary for a diagnostic aid system for ILDs. The most important clinical parameters for 15 frequent lung diseases are discussed and these data will subsequently be taken into account for the creation of a digital library of lung HRCTs destined for diagnostic aid and teaching

Introduction

Interstitial lung diseases are a relatively heterogeneous group of around 150 illnesses with often very unspecific symptoms[1]. The most frequent imaging method for the characterisation of ILDs is the high-resolution computed tomography of the chest but a correct interpretation of these images is difficult even for specialists as many diseases are rare and thus little experience exists. Moreover, interpreting HRCT images requires knowledge of the context defined by clinical data of the studied case[2]. A computerised diagnostic aid tool based on HRCT images with associated medical data to retrieve similar cases of ILDs from a dedicated database can bring quick and precious information for example for emergency radiologists[3]. There is a need for detailed database containing high-quality annotations in addition to clinical data[4].

The state of the art is studied to identify requirements for image–based diagnostic aid for ILDs with secondary data integration[5]. This paper will give a description of the various steps to define the most frequent ILDs and their criteria. These were organized in a form to fill the foreseen database. All the parameters included in the form are carefully explained, also to perform high-quality annotations of the interstitial lung tissue in the HRCT images annotation software developed by a medical image processing engineer in the University Hospitals of Geneva, and its own file format is implemented for DICOM images.

Methods

A/The selection of the most relevant clinical parameters:

This work is focusing on the clinical parameters of the 15 most frequent diseases for which related cases were collected from the main data warehouse. The foreseen form (Appendix A) has been filled for each case in order to populate the database of CT scans of ILDs.

Initially, the 15 most frequent diseases selected were:

- Miliary tuberculosis

- Bronchiolotis obliterans

- Idiopathic interstitial fibrosis

- Pulmonary sarcoïdosis

- Extrinsic alveolar allergic

- Pneumocystis carinii pneumonia (PCP)

- Drug hypersensitivity pneumonitis

- Pneumoconiosis

- Langerhans cell histiocytosis

- Lymphangioleiomyomatosis

- Alveolar proteinosis

- Acute interstitial pneumonia

- Diffuse pulmonary hemorrhage

- Pulmonary edema

For each disease, the selection of the main criteria characterizing each of the 15 diseases was done in collaboration with:

A/ Lung specialists at the University & Hospital of Geneva (HUG)

B/ Radiologists at the HUG

C/ Group of research of medical informatics service at HUG

Along with the knowledge bases of computer–based diagnostic decision support systems.[6]

B/ Database

A multimedia database is implemented to store ILD cases with clinical data and annotated image series. Cases from the HUG are retrospectively and prospectively collected to populate the database.

Currently:

- 99 clinical parameters associated with the 15 most frequent ILDs were selected,

- At the beginning, precisely 256 cases from the data warehouse were found but only those with CT images were kept, which reduced the number of cases to 122.

- 93 cases with certified diagnosis and their clinical parameters are stored in the database as well as 254 image series of which 54 have their regions of interest annotated; there is roughly 0.5 serie per case, and 34 slices per annotated series.

Results

The most relevant clinical parameters finally kept after the discussions with the above mentioned groups were organized in a HTML form (appendix A). Its structure includes several categories which contain themselves many attributes.

Before starting to fill the form, cases collected from the data warehouse related to the 15 selected diseases were selected by a radiologist and a medical doctor. During the five beginning seances, 10-15 cases with one single diagnosis (not several co morbidities) were selected to illustrate the selected diseases as the first disease motivating the hospitalization and the clinical investigation.

The selection of the typical cases was based on the following documents: “lettre de consultation de pneumologie”- “ lettre d’admission”- “ lettre de médecine interne”- “ examen de laboratoire” which confirms the diagnosis by finding the etiological agent - “ rapport d’histologie” which confirms the disease - “ lettre de sortie” describing the whole medical history of the patient during his stay in the hospital and before. See figures 1, 2, 3, 4, 5, 6 and 7 for more details.

The second step of the selection was to select CT series to be annotated related to each case, by keeping images with relevant lung tissue patterns. The selection was mainly based on the “rapport de radiologie”, which describes the typical patterns contained in the series.

Once the selection of cases with the radiologist finished, the form was filled by checking once again the electronic health record (EHR) of each case.

The time to fill the form depends on each case. Some cases took around from 1hour 30minutes to 2hours 45minutes to really understand the history of the diseases and to find the right document in the EHR that may help to get the useful information to fill the form. The quickest cases took around 30 to 45 minutes. It can be said that a mean of 45 minutes is needed to understand the case and to find the right document with the right conclusion of the diagnosis among the 15 selected diseases.

The documents that were consulted in the EHR are specifically:

lettre type de pneumologie,

lettre de sortie

lettre de décès

lettre de soins intensifs

For certain cases and especially for those which the diagnosis was unique and clear e.g “military tuberculosis” it was easy to find the correct information in the “lettre type de pneumologie” or “lettre de sortie” as the doctor mentioned clearly the diagnosis.

But in more complicated cases, many documents were required as: “lettre d’admission”, “lettre de pneumologie”, “lettre de suivi”, “lettre de medicine interne” and “ lettre de la 2ème consultation de pneumologie”.

Each disease is linked with its corresponding ICD-10 code in order to standardize the content of our database. The clinical parameters of the form were mapped to the Snomed; UMLS and Mesh collections of terminologies whenever possible.

In this part, each parameter is described in details. Its “use”,” how it was filled”, and “why it was selected” are explained.

A /. Confidential Data:

- a.1/The initials: with respect to the data privacy of all patients included in this work, only the initials were collected as the identifier. When similar initials occurred, the patient number was used as it is unique for each patient in the hospital

- a.2/Stay number: It is delivered from the data ware house. One patient can have several numbers of stay in hospital but only the stay number corresponding to one of the 15 selected diseases was retained

- a.3/Patient number: it is unique for each patient in the hospital, even if the patient had different stay in the hospital

- a.4/Birthdate: expressed in this way (YYYY-MM-DD) as it is found in the EHR and the data warehouse

- a.5/Medical service: It is the code corresponding to the service where the patient stayed during the episode of the selected disease. In the EHR, the whole clinical pathway of the patient is stored. Indeed, the patient visits many medical services but the name of the service related to the 15 selected interstitial diseases was kept.

-.a.6/ ICD-10 code: is the code attributed to the type of the ILD. A scrolling list containing ICD-10 codes of all the 15 selected ILD was used in the form. The following ICD-10 codes are available:

A19.0	Tuberculose miliaire aiguë, localisation unique et précisée
A19.1	Tuberculose miliaire aiguë, sièges multiples
A19.2	Tuberculose miliaire aiguë, sans précision
A19.8	Autres tuberculoses miliaire
A19.9	Tuberculose miliaire, sans précision
B22.1	Maladie par VIH à l'origine d'une pneumopathie lymphoïde interstitielle
B59	Pneumopathies à PCP

J67.8	Pneumopathie par hypersensibilité à d'autres poussières organiques
J67.8X-001	Alvéolite allergique précisée
J67.9	Pneumopathie par hypersensibilité aux poussières organiques, sans précision
J67.9X-001	Alvéolite allergique sans précision
J67.0	Poumon de fermier
J70.2	Affections pulmonaires interstitielles aiguës, médicamenteuses
J70.3	Affections pulmonaires interstitielles chroniques, médicamenteuses
J70.4	Affection pulmonaire interstitielle, médicamenteuse, sans précision
J84.8X-003	Bronchiolite oblitérante avec pneumonie en voie d'organisation (BOOP)
D86.8X-001	Erythème noueux dû à la sarcoïdose
J84.1X-001	Fibrose post-inflammatoire du poumon

B /. Patient Data:

This second part of the form contains all the information of the clinical state of the patient and is organized into **18** subclasses.

b.1/ Diagnosis: The diagnosis is established after the background reading of the EHR. A score of reliability is attributed to the latter because discordances were found between the ICD-10 code found in the data warehouse and the right one inferred from the EHR. The reliability score which quantifies how reliable the final diagnosis found in the EHR is and how it corresponds really to the medical history and laboratory results of the patient.

The reliability score: between 40-100% is deduced from the "lettre de sortie" - "lettre de pneumologie", sometimes from the laboratory tests results (biology - anatomopathology) and sometimes simply from the "rapport de radiologie" which describes carefully the patterns specific to each diseases in the HRCT images.

b.2/ Demographics and professionals data:

- Age: expressed in **years** (like in the EHR)

- Gender: expressed on two variables (**F/M**)

- Professions: expressed in a free text field.

PS: All these information are available in the EHR and are in the administrative part of the latter.

b.3/ Smoking history: expressed in UPA (unit pack/year). "Unknown" was used if not precised in the EHR.

b.4/ Disease duration: expressed in weeks, it is very important to precise the mode of start of the disease in order to separate between acute, sub-acute and chronic interstitial lung pathologies. In order to look for similar cases, this parameter will guide the medical student or the medical intern in their diagnostic approach. This information was extracted from the "lettre d'admission" that describes how long the patient was suffering before his check up and coming to the hospital. The disease duration was expressed in weeks as it commonly appears in the EHR.

b.5/ The medication: This category gathers the most important drugs which can induce the ILD. Theses were chosen from the review of literature and are described in the non commercial form "dénomination commune internationale", e.g: "Aspirine" and not "acide acetyl salicylique".

For each drug, the following fields were filled:

- b.5.1/Quantity: no restriction about the unit used because it is expressed in different units in the EHR e.g cp/j- mg/j- 1 or 2 times/j

- b.5.2/Duration: expressed in days. In the EHR, it was found it in days- weeks- years.

- b.5.3/Others drugs: It is used to describe others drugs which can be offensive for the interstitial lung apparatus;

- There are 3 choices for each drug (yes- no- unknown).

PS: The importance to add the option “unknown” comes from the fact that some EHR do not give more details.

b.6/ Findings on physical exam:

The information got for this part was based on the letter which reflects most the impact of one of the 15 selected diseases. One patient can have several letters but the information about the patient state according to the selected disease was used.

All the information below was available in the EHR and is organized according to anatomical categories:

- b.6.1/Generals: contains 8 attributes expressed in 3 options (yes - no - unknown), for one attribute the localization was precised because it is important for the etiological diagnosis.

- b.6.2/ Respiratory: contains 7 attributes expressed in 3 options (yes-no-unknown). For one attribute, the type is required.

- b.6.3/Cardiac: contains 3 attributes expressed in 3 options (yes - no - unknown), for the pressure arterial systolic we fixed a standard threshold of 80 to get the information as described in the EHR and used in the laboratory of the HUG

- b.6.4/Abdominals: contains 2 attributes expressed in 3 options (yes-no-unknown)

- b.6.5/ORL, Visual and Skin: expressed in 3 options (yes - no - unknown).The type of the anomalies which may help in the diagnosis were expressed in free text and were easily found in the HER

- b.6.6/Articular or joint exam: expressed in 3 options (yes - no - unknown), this information was well described in the EHR but only for the cases who had an idiopathic pulmonary fibrosis.

Remarks: For each category, of those above (generals, respiratory, cardiac, etc…) the most quested attributes in the exam ahead were selected according to the 15 selected ILD as it is described in the Quick Medical Reference-Knowledge Base (QMR-KB). All the attributes have 3 choices and for others more details such (type- localization) are expressed in free text in the form.

b.7/ Past medical history: 20 parameters are chosen according to the QMR knowledge base and which are often quested during the medical anamnesis of the 15 ILD cases because they have an important value to establish the diagnosis. There are 3 choices for the responses (yes-no-unknown) in order to get a structured data that are suitable for data mining.

b.8/ Occupational history: 2 parameters based on some articles from “Up-to-date” and after discussion with lung specialists, those parameters have a great influence on the appearance of certain interstitial lung pathologies:

- The drug-addiction: expressed in 3 options (yes-no-unknown)

- The activities /leisure of the patient because some patients can be exposed to toxic agents which may have a bad impact on the respiratory apparatus. Fortunately, in some cases, this information is available in free text in their EHR.

b.9/ Environmental exposures: 5 attributes of agents which induce specific interstitial lung diseases. The followings were selected according to discussions with lung specialists:

- Moulds

- Birds

- Others animals

- Mineral particles: the 3 most frequent agents responsible of the selected pneumoconiosis are chosen (silicosis – siderite – asbestosis)

All those attributes are expressed in 3 options (yes-no-unknown) and were available in the EHR of certain cases but sometimes the allergic histories of the patient was not very detailed and were filled as the third option “unknown”.

- Others exposures: expressed in free text, some patient suffers from other specific agents and this information has to be added in the database. For specific cases of ILD, the details of the exposure agent were well described in the EHR.

b.10/ Host risk factors: This list was restricted to **8** parameters that have been selected by the lung specialists and should be searched for each case due to their influence to cause a lot of damage for certain patient who developed a serious cases of interstitial lung diseases and there are expressed in 3 options (yes - no- unknown):

- HIV

- Chemotherapy

- Radiotherapy

- Hemopathy

- Transplant received

- Diabetes

- Alcohol

- Malnutrition

b.11/ Laboratory tests: alike the previous category, parameters that have a big value to indicate the diagnosis of 15 selected ILD and described in the QMR-KB were kept. The units used for each test are **standard-unit** used in the EHR inside the HUG. Some tests are expressed in normalized values like (positive - negative - unknown) or (increased – decreased – unknown) as they can not be expressed in unit. These normalized values were determined according to the EHR.

PS: before performing our form, we took look in the electronic health record and we tried to respect the entire unit used in order to ovoid any confusion.

b.12/ The Oximetry tests: 2 tests have been selected:

- b.12.1/Oxygen arterial blood: we mentioned a standard threshold to express the result used in the EHR by the pneumologists

- b.12.2/CO2 arterial blood: expressed in 3 options (increased – decreased – unknown) as expressed in the EHR by the pneumologists

PS: we respect the type of answers that exist in the electronic health record,

A focus was carried out on these two tests as it mentioned in the QMR-KB because they indicate the level of the respiratory distress syndrome and usually used in the EHR.

b.13/ The pulmonary function testing: 4 parameters have been selected according to lung specialists to separate between the obstructive and restrictive syndromes which have a high importance to point out the diagnosis of specific interstitial lung diseases:

- b.13.1/CPT (total pulmonary capacity): expressed in liters (l)

- b.13.2/VEMS (maximal expired volume in one second): expressed in liters/sec

- b.13.3/VR (residual volume): expressed in liters (l)

- b.13.4/CVF (functional vital capacity): expressed in liters (l)

PS: The unit used are standard and with respect to those used in the EHR by the HUG-laboratory.

b.14/ Smear sputum: the most important attributes selected from the QMR-KB are organized in unroll a scroll list with the ability to choose more than one among the list and which they have high significance to confirm the etiological diagnosis of 15 selected ILDs; fortunately we found a good description of the type of the sputum in the EHR for many cases but if we do not know the result, just chose the option «unknown”.

b.15/ Bronchoalveolar lavage (BAL): 10 attributes were selected to express the finding of BAL result and expressed in 3 options (yes- no- unknown), those attributes help to maintain the diagnosis of the 15 selected ILDs:

- Opportunist agents: besides the 3 options (yes - no- unknown), the type of the etiological agent was described in form of unroll list. This information is easily available in the laboratory tests results

- Neoplastic cells: expressed in 3 options (yes - no- unknown), in the EHR, it mentioned only if the neoplastic cells are present or not and we respected these way of response

- Lipoproteic alveolar liquid: expressed in 3 options (yes - no- unknown)

- Mineral particles: expressed in 3 options (yes - no- unknown)

- Siderophages: expressed in 3 options (yes - no- unknown)

- Cells of Langherans: expressed in 3 options (yes - no- unknown)

- Total hypercellulartiy: expressed in 3 options (yes - no- unknown)

- Lymphocytary alveolite: expressed in 3 options (yes - no- unknown)

- Neutrophilic alveolite: expressed in 3 options (yes - no- unknown)

Those parameters are available in the EHR in the report of “lavage bronchioalvéolaire”. All those parameters are not available for all the cases but only for the patients with the following diseases: alveolite allergique extrinsèque - bronchiolite oblitérante”, and the information is described in their “lettre de pneumologie”.

b.16/ The biopsy**:** organized in 4 types:

- b.16.1/The lung biopsy: expressed in a scroll list with the important attributes which confirm the etiological diagnosis of the 15 selected ILDs,

- b.16.2/Biopsy during the bronchoscopy transbronchial: expressed in a scroll list containing the important attributes which confirm the etiological diagnosis of ILDs,

- b.16.3/Surgical biopsy of others organs like lymph node or cutaneous biopsy which may help to establish the etiological diagnosis: expressed in free text.

Those types of information are available in the EHR in the “rapport d’histologie”

b.17/ Remarks: this free-text field is used to give more details about the co morbidities associated to each case and can help to understand much better the selected case which integrated our database.

Example:

Here is a case of miliary tuberculosis and screen shots of the documents used to get the information needed to fill the form.

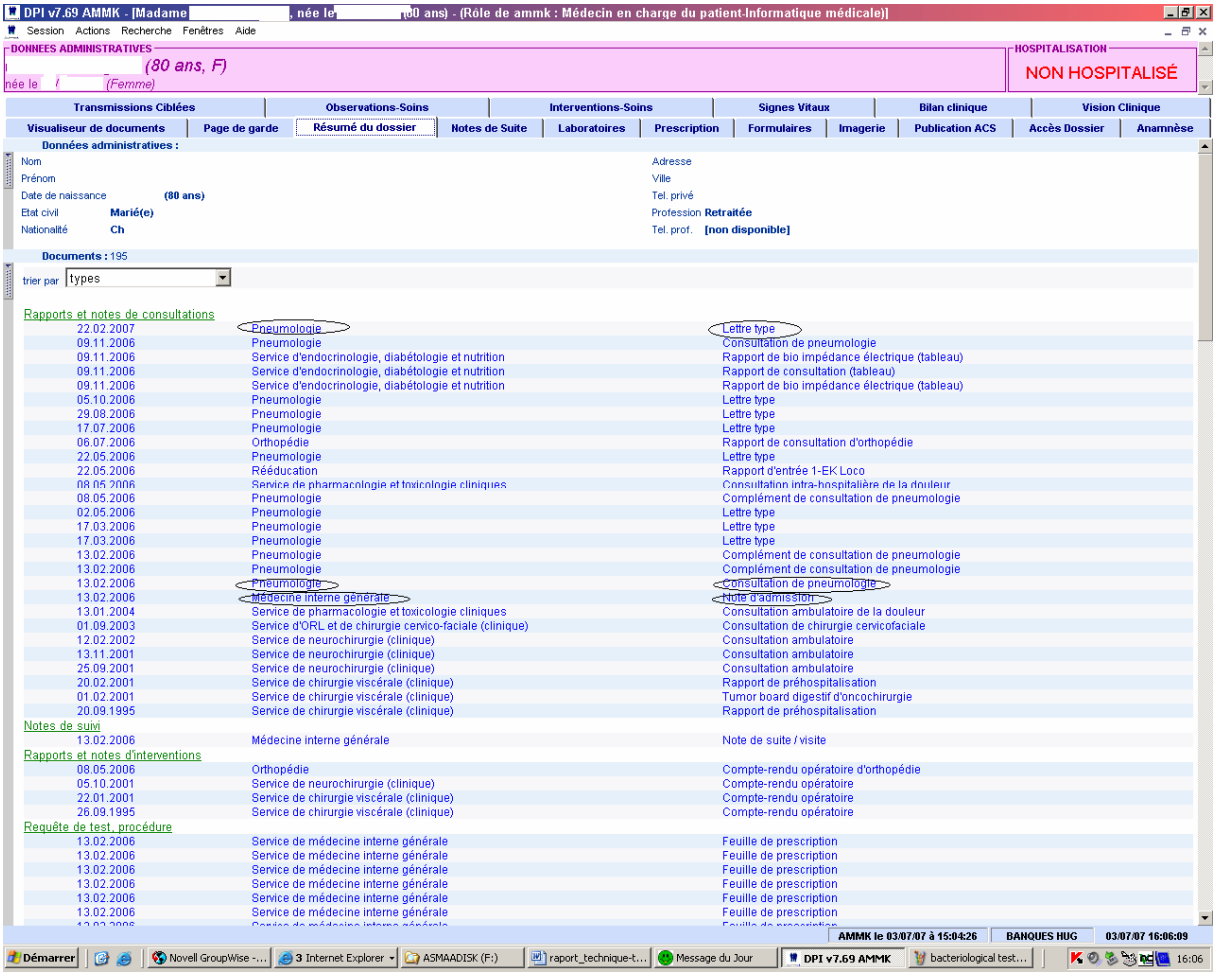

Figure 1: a screen shot of the documents found in a miliary tuberculosis case, at the upper level are found the administrative data and then the types of documents.

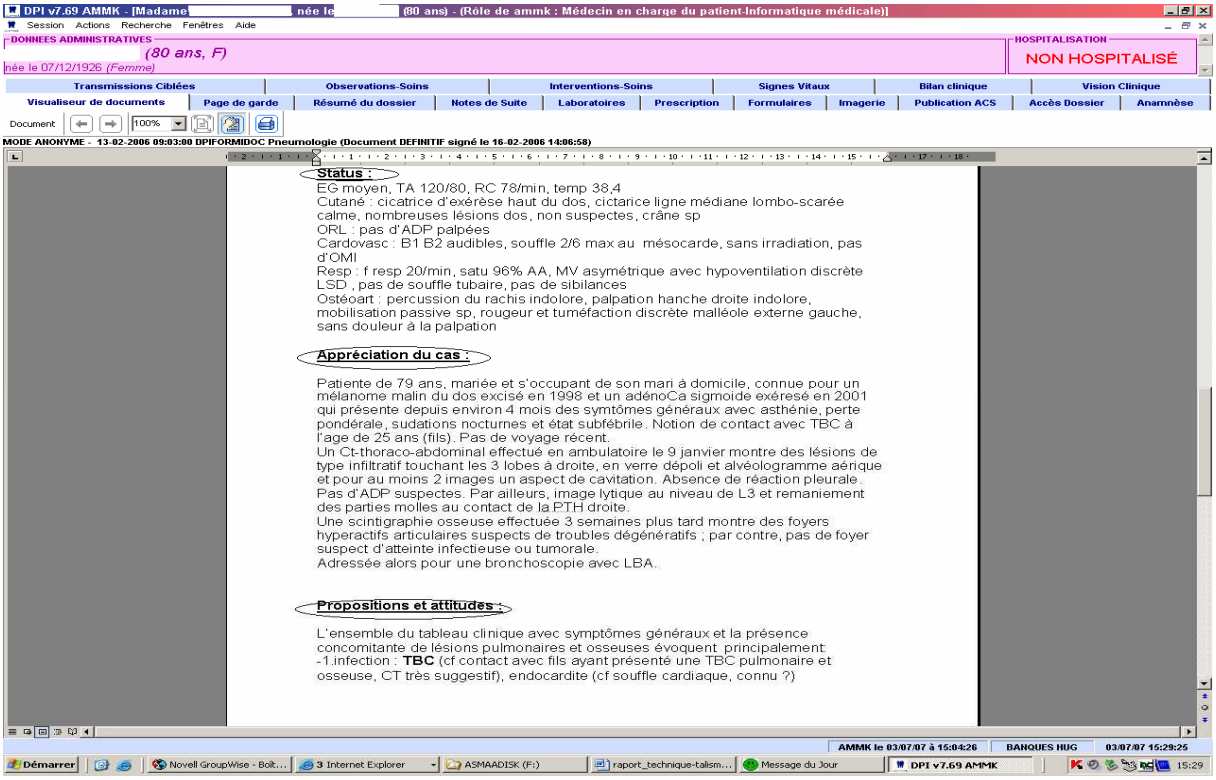

Figure 2: a screen shot of the appreciation of the case under observation by the pneumologist in charge of the patient.

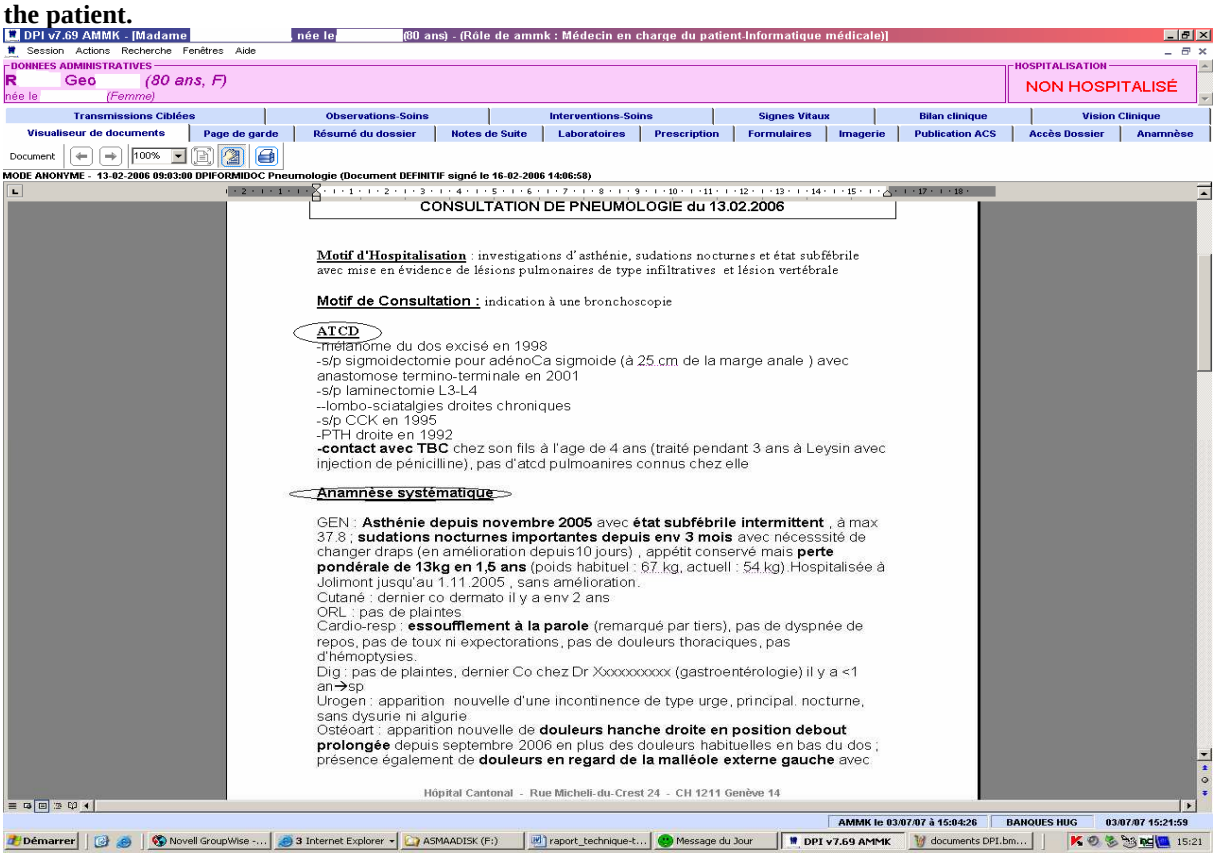

Figure 3: a screen shot of the pneumologist's letter on which is described the medical history of the patient and the anamnesis made by the pneumologist.

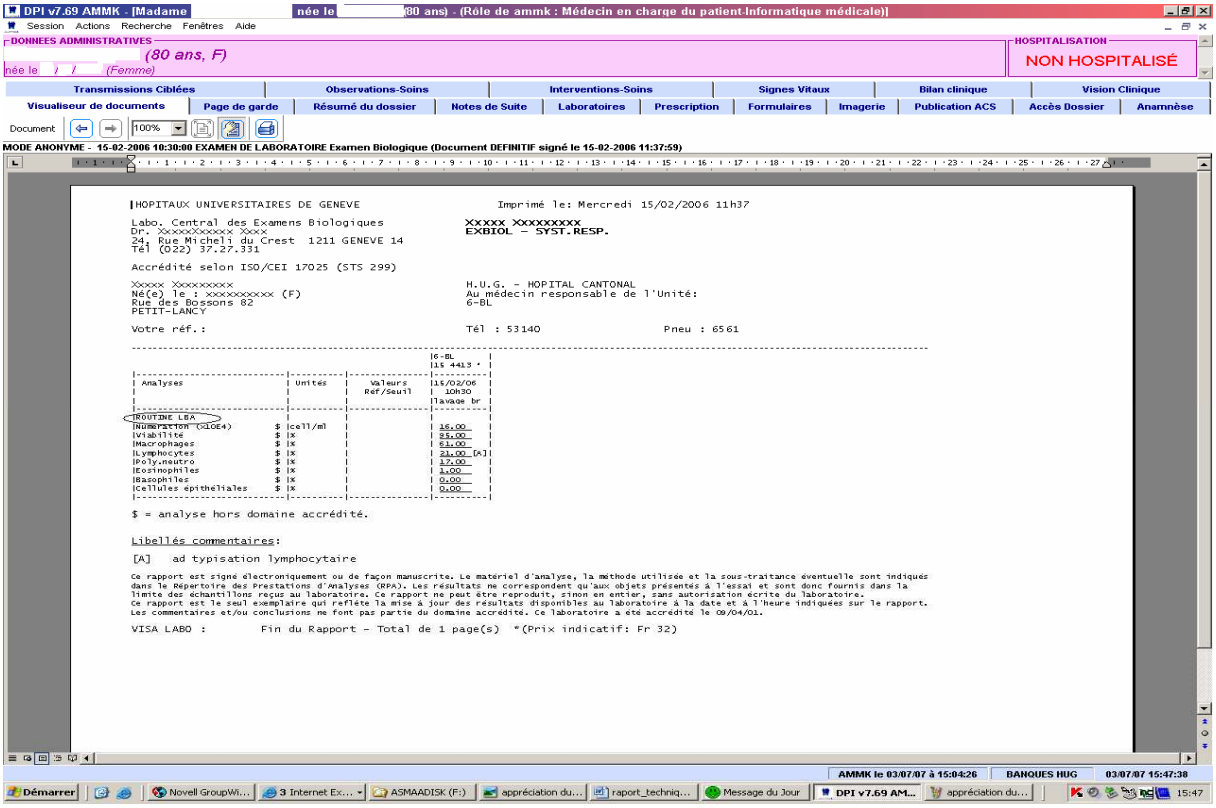

Figure 4: a screen shot of the bronchoalveolar lavage, the result is expressed in % but all the information of the case should be considered to reach the diagnosis.

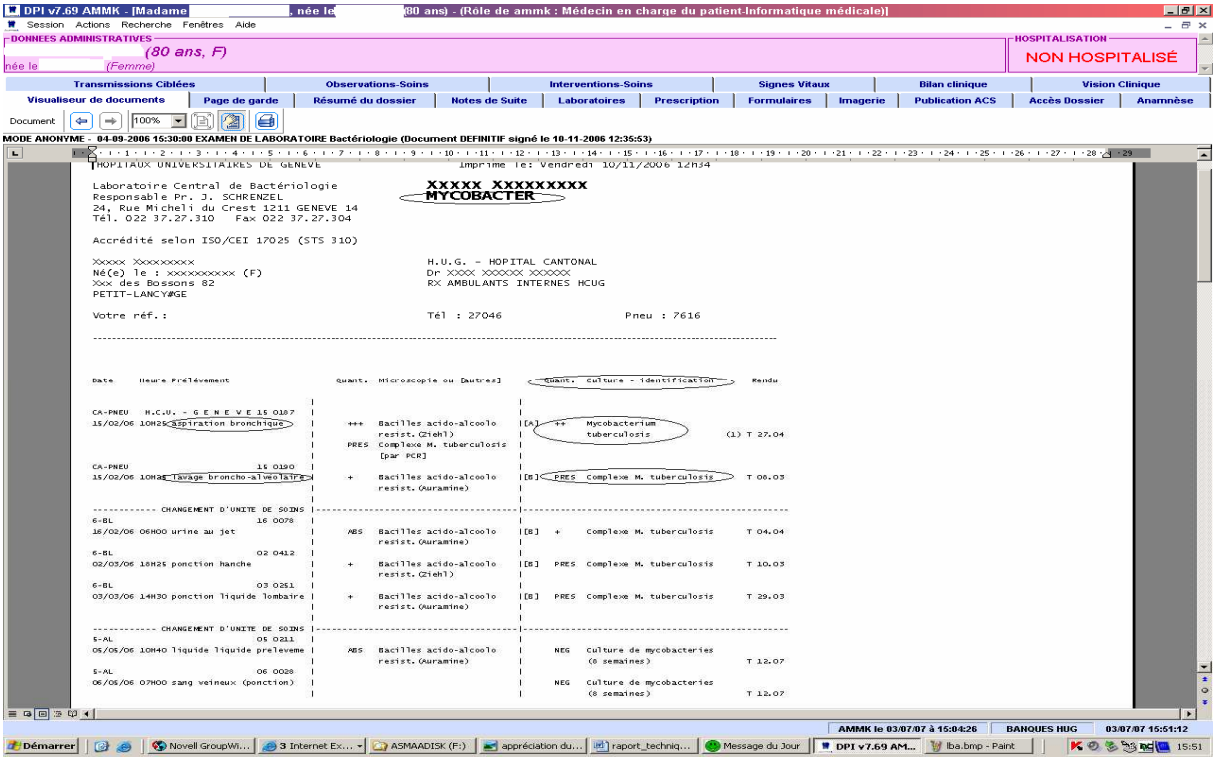

Figure 5: a screen shot of the bacteriological test which confirms the diagnosis of the Miliary tuberculosis as it found the etiological agent: M.Tuberculosis.

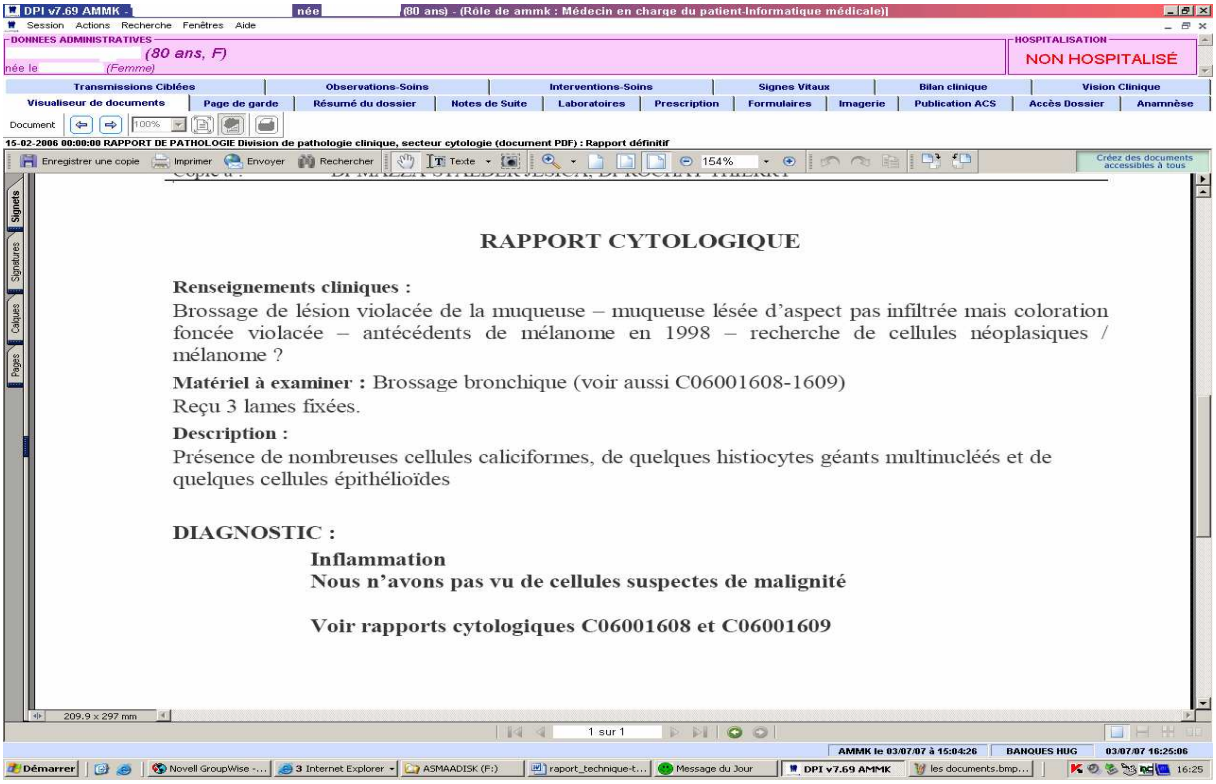

Figure 6: a screen shot of the cytological report.

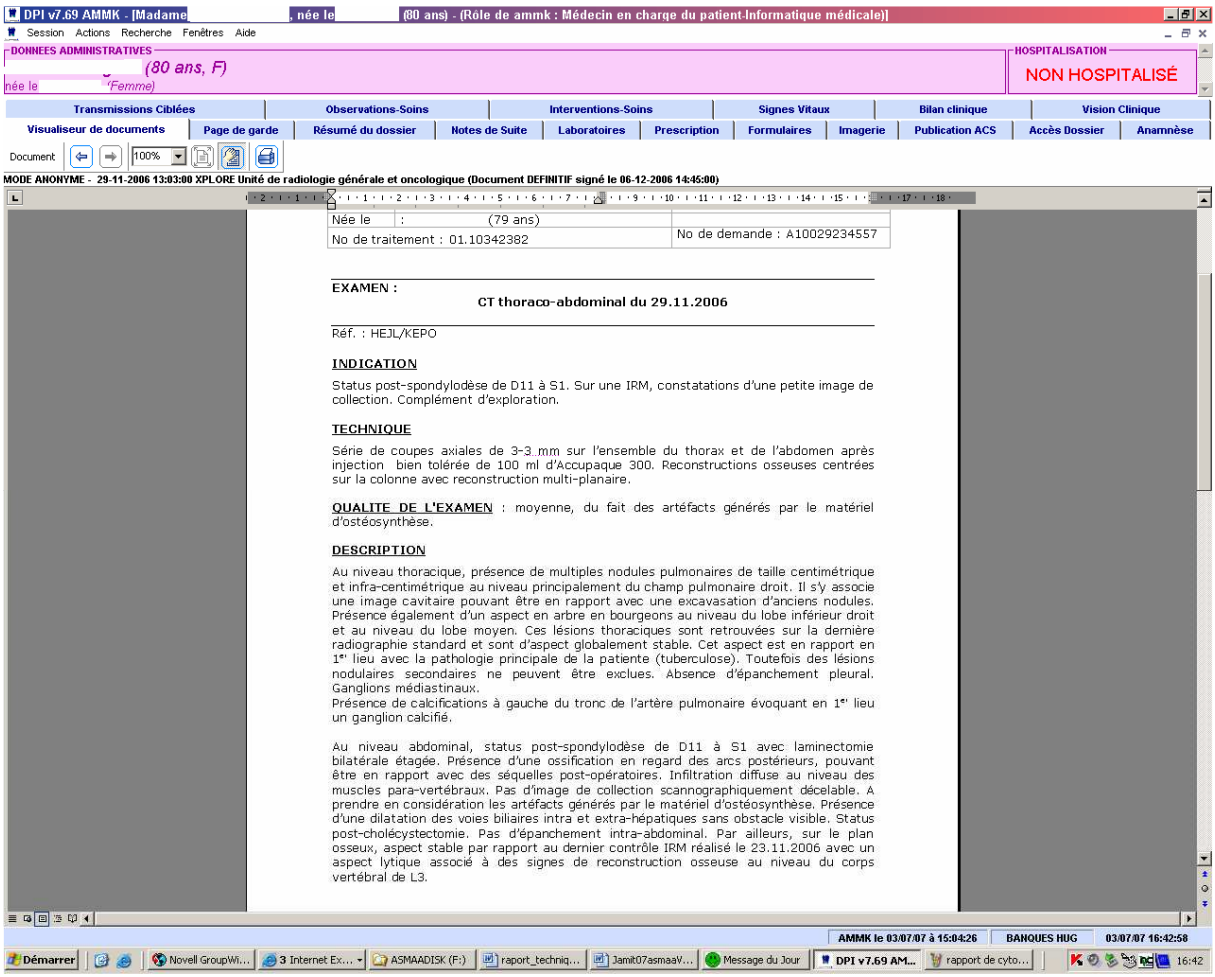

Figure 7: a screen shot of the radiology report which may help substantially to confirm the diagnosis.

Conclusion

The radiological image does not constitute the only way of diagnosing patients with ILD, although it is an important part of diagnostics. Several decision support systems have been developed concentrating on the image only. An evaluation showed that diagnostic quality can be improved by purely image-based solutions. Still, in clinical practice diagnostics remains very closely linked to the integration of all patient data with the interpretation of images. ILDs are pathologies of multiple and often idiopathic etiologies and of complex radiological interpretation. Specific criteria such as age, sex, and risk factors are extremely important for diagnostics. The literature review for criteria characterizing all pathologies permitted to underline the importance of these patient data. It is therefore the aim to create a decision support system capable to integrate patient data with images for teaching and as diagnostic aid. This is not only expected to help in fields such as emergency radiology but particularly for teaching.

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Appendix A: The form for new ILD case

New ILD case

1.Values for table "confidential data":

1.1 Initials:

1.2 Stay number:

1.3 Patient number:

1.4 Birthdate (YYYY-MM-DD):

1.5 Medical service:

1.6 ICD 10 code:

2.Values for table "patient data":

2.1 Diagnosis: , reliability: %

2.2 Age: years old

2.3 Gender: F M

2.4 Profession:

2.5 Smoking history:

2.6 Disease duration: weeks

2.7 Medication:

a) cordarone:	yes	no	unknown,	1. quantity		
				2. duration		days
b) cyclines:	yes	no	unknown,	1. quantity		
				2. duration		days
c) cyclophosphamides:	yes	no	unknown,	1. quantity		
				2. duration		days
d) nitrofurantoïnes:	yes	no	unknown,	i. quantity		
				ii. duration		days
e) methotrexate:	yes	no	unknown,	i. quantity		
				ii. duration		days
f) busulfan:	yes	no	unknown,	i. quantity		

					ii. duration	days
g) gold salts:	yes	no	unknown,	i. quantity		
				ii. duration		days
h) bleomycin:	yes	no	unknown,	i. quantity		
				ii. duration		days
i) corticosteroid:	yes	no	unknown,	i. quantity		
				ii. duration		days
j) other drugs:	yes	no	unknown,	1. quantity		
				2. duration		days
				3. type		

2.8 Findings on physical exam:

a) generals:

- 1. fever: yes no unknown
- 2. cyanosis of mucous membrane(s): yes no unknown
- 3. anorexia: yes no unknown
- 4. finger(s) clubbed: yes no unknown
- 5. Raynaud's phenomenon: yes no unknown
- 6. myalgia: yes no unknown
- 7. arthralgy: yes no unknown
- 8. lymph node(s) enlarged: yes no unknown, localisation:

b) respiratory:

- 1. cough: yes no unknown
- 2. tachypnea: yes no unknown
- 3. breathing intercostal retraction inspiratory: yes no unknown
- 4. breathing accessory muscle(s) used: yes no unknown
- 5. lung(s) percussion and/or auscultation abnormal: yes no unknown
- 6. sputum production: yes no unknown,

type:

7. chestpercussion diaphragm low and/or movement decreased bilateral: ☐ yes ☐ no ☐ unknown

c) cardiac:

1. tachycardia: ☐ yes ☐ no ☐ unknown

2. leg(s) edema bilateral slight or moderate: ☐ yes ☐ no ☐ unknown

3. pressure arterial systolic: ☐ <90 ☐ >90 ☐ unknown

d) abdominals:

1. liver enlarged slight: ☐ yes ☐ no ☐ unknown

2. splenomegaly present: ☐ yes ☐ no ☐ unknown

e) ORL anomalies: ☐ yes ☐ no ☐ unknown, type:

f) visual anomalies: ☐ yes ☐ no ☐ unknown, type:

g) skin lesion(s): ☐ yes ☐ no ☐ unknown, type:

h) articular deformations: ☐ yes ☐ no ☐ unknown

2.9 Past medical history:

a) lymphom or leukemia: ☐ yes ☐ no ☐ unknown

b) neoplasm malignant: ☐ yes ☐ no ☐ unknown

c) respiratory infection recent: ☐ yes ☐ no ☐ unknown

d) pneumonia recurrent: ☐ yes ☐ no ☐ unknown

e) asthma: ☐ yes ☐ no ☐ unknown

f) allergy: ☐ yes ☐ no ☐ unknown

g) wheezing: ☐ yes ☐ no ☐ unknown

h) drug hypersensitivity: ☐ yes ☐ no ☐ unknown

i) dyspnea acute recurrent attack(s): ☐ yes ☐ no ☐ unknown

j) lupus erythematosus systemic: ☐ yes ☐ no ☐ unknown

k) progressive systemic sclerosis: ☐ yes ☐ no ☐ unknown

l) rheumatoid arthritis: ☐ yes ☐ no ☐ unknown

m) tuberculosis contact: ☐ yes ☐ no ☐ unknown

n) tuberculosis hx: ☐ yes ☐ no ☐ unknown

o) arthritis: ☐ yes ☐ no ☐ unknown

p) renal insufficiency: ☐ yes ☐ no ☐ unknown

q) HTA: ☐ yes ☐ no ☐ unknown

r) angor: ☐ yes ☐ no ☐ unknown

s) subOAP: ☐ yes ☐ no ☐ unknown

t) weight loss greater than 10%: ☐ yes ☐ no ☐ unknown

Abbreviations:

HTA: arterial hypertension

subOAP: acute pulmonary edema

2.10 Occupational history:

a) drug-addiction: ☐ yes ☐ no ☐ unknown

b) activities and leisures: ☐

2.11 Environmental exposures:

a) moulds: ☐ yes ☐ no ☐ unknown

b) birds: ☐ yes ☐ no ☐ unknown

c) other animals: ☐ yes ☐ no ☐ unknown

d) organic dust: ☐

e) mineral particles:

1. silicosis: ☐ yes ☐ no ☐ unknown

2. siderite: ☐ yes ☐ no ☐ unknown

3. asbestose: ☐ yes ☐ no ☐ unknown

f) other exposures: ☐

2.12 Host risk factors:

a) HIV: ☐ yes ☐ no ☐ unknown

b) chemotherapy: ☐ yes ☐ no ☐ unknown

c) radiotherapy: ☐ yes ☐ no ☐ unknown

d) hemopathy: ☐ yes ☐ no ☐ unknown

e) transplant received: ☐ yes ☐ no ☐ unknown

f) diabetes: ☐ yes ☐ no ☐ unknown

g) alcohol: ☐ yes ☐ no ☐ unknown

h) malnutrition: ☐ yes ☐ no ☐ unknown

2.13 Laboratory tests:

a) VS: ☐ mm/h

b) CRP: ☐ mg/l

c) hematocrit blood: ____ %

d) hemoglobin blood: ____ g/l

e) ldh serum: ____ U/l

f) WBC: ____ cells/ml

g) WBC eosinophilic(s) : ____ cells/ml

h) WBC neutrophilic(s): ____ cells/ml

i) tuberculin skin test: ☐ positive ☐ negative ☐ unknown

j) rheumatoid factor: ____ U/ml

k) immunoelectrophoresis serum igg: ____ g/l

l) immunoelectrophoresis serum iga: ____ g/l

m) immunoelectrophoresis serum igm: ____ g/l

n) angiotensin converting enzyme activity: ____ mg/dl

o) kveim test: ☐ positive ☐ negative ☐ unknown

Abbreviations:
VS: sedimentation speed
CRP: C-reactive protein
WBC: white blood cell

2.14 Oximetry tests:

a) oxygen blood arterial: ☐ <80 ☐ >80 ☐ unknown

b) carbon dioxyde tension blood arterial: ☐ increased ☐ decreased ☐ unknown

2.15 PST (pulmonary function testing):

a) CPT: ____ l

b) VEMS: ____ l/sec

c) VR: ____ l

d) CVF: ____ l

Abbreviations:
CPT: total pulmonary capacity
VEMS: maximal expired volume in one second
VR: residual volume
CVF: functional vital capacity

2.16 Smear sputum tests: [ ]

2.17 BAL (bronchoalveolar lavage):

a) opportunist agents: ☐ yes ☐ no ☐ unknown,

type:

b) neoplastic cells:	yes	no	unknown
c) lipoproteic alveolar liquid:	yes	no	unknown
d) mineral particles:	yes	no	unknown
e) siderophages:	yes	no	unknown
f) cells of Langerhans:	yes	no	unknown
g) total hypercellularity:	yes	no	unknown
h) lymphocytary alveolite:	yes	no	unknown
i) neutrophilic alveolite:	yes	no	unknown
j) eosinophilic alveolite:	yes	no	unknown

2.18 Biopsy:

a) lung:

b) bronchoscopy transbronchial:

c) surgical:

d) other bodies:

2.19 Remarks:

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