



# BEST Image

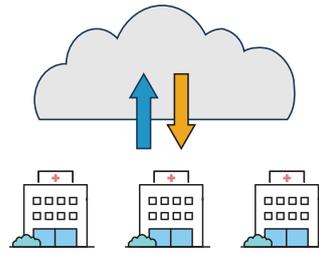
BEST Image is a cloud-based multi-center medical image research platform.





### Medical Image Evaluation System

A systematic medical image evaluation system to read medical images with the DICOM Viewer and record clinical information and evaluation results in the selected forms



### Multi-center Research

A cloud-based research platform for systematic collection and management of medical images, clinical information, and evaluation results that enables multi-center joint research.



### Customized Design

Data workflow design optimized for the research environment for efficient research.

## Using the BEST Image Service

BEST Image provides an efficient research environment by separating the research management privilege from the medical image evaluation privilege.



#### Task Manager

Registers Reviewers for each task and assigns them to studies in the task



#### Reviewer

Evaluates the studies assigned by the Task Manager.

#### Research Design

- Data Workflow Design
- Research Participant Registration
- Form Creation

#### Research Data Preparation

- Medical Image Processing
- Clinical Information Processing

#### Research Progress Management

- Study/Reviewer Management
- Progress Monitoring
- Medical Image Evaluation
- Evaluation Report Completion

#### Research Result Extraction

- Medical Image Evaluation Result Extraction
- Research Reference Data Extraction



## Task Manager – Research Environment Management

Build an optimal research environment by managing the settings for each task to which the Task Manager belongs.

#### Task List

View all researches the user participates in.

#### Reviewers

Register research participants and assign roles.

#### Code Manager

View and manage the list of registered codes by task.

#### Station List

Register and manage the server that exchanges medical images with the BEST Image service.



## Form Manager – Form Creating Tool

Create forms for the research with different types of Q&A to refine the research ideas and evaluation results.

**Q&A List**

- Text
- Number
- Code
- Dictionary
- Date/Time
- Date
- Time
- Image
- Audio
- Name
- UID
- Calculator
- Description
- Separator

**Form Question Example**

Q1. Comment  
No abnormal findings  
Text Input Question

Q2. Height / Weight  
cm  
Numeric/Unit Input Question

Q3. Sex  
Male Female  
Selection Question

Q4. Nodules  
Right upper Right middle Right lower  
Left upper Left middle Left lower  
None  
Image Attachment Question

Q5. Exam date  
연도 월 일  
Date Input Question

Q6. Key image  
Paste from Viewer 파일 선택 선택권 박탈 없음  
Image Attachment Question

### Create Forms

Create forms that suit the intent of the Task Manager with the 13 types of Q&A. This enables you to collect most evaluation results.

### Assign Forms

The Task Manager chooses the form to assign to the study depending on the purpose of the task.

### CID (Clinical Information Document)

CID collects clinical information of the patients and can be used by the reviewers as reference data for medical image reading.

### Report

Report is a format used to collect the results of the reviewers' evaluation of medical images, and a reviewer cannot access another reviewer's evaluation results during the research period in order to increase the reliability of the research.

\*Our form creation tool provides user convenience features that make it easy to utilize collected data with analytical programs such as R, SPSS, and SAS.



## Job Manager – Medical Image and Data Management

View the saved studies and reviewers by task at a glance and manage them.



### Prepare CID

The Task Manager prepares the clinical information required for the reviewers' evaluation of medical images for each study.

### CID Status

The tag name shows the type of CID created by the Task Manager. The tag color shows whether or not the CID has been completed by the Task Manager.

Not completed Completed



### Assign Reviewers

The Task Manager selects the study and report type and assigns them to the reviewers.

### Report Status

Report assigned to the reviewer. The tag color shows whether or not the Report has been completed by the reviewer.

Not completed Completed

**BEST image** Job Manager Form Manager Task Manager Monitoring

Studies

Sample Task	Modality	Patient ID	Patient Name	Study Description	Accession No.	Study Description	Study Comments	Age	Sex	King	cidStatus
1	CT	NAME_201	NAME_201	MRA_paramc		MRA		5	M	11	Completed
2	CT	NAME_202	NAME_202			MS		2	F	3	Completed
3	CT	NAME_203	NAME_203			MS		2	F	3	Completed
4	CT	NAME_204	NAME_204			MS		2	F	4	Completed
5	CT	NAME_205	NAME_205			MS		2	F	3	Completed
6	CT	NAME_206	NAME_206			MS		2	F	3	Completed
7	CT	NAME_207	NAME_207			MS		2	F	2	Completed
8	CT	NAME_208	NAME_208			MS		2	F	4	Completed
9	CT	NAME_209	NAME_209			MS		2	F	4	Completed
10	CT	NAME_210	NAME_210			MS		2	F	4	Completed
11	CT	NAME_211	NAME_211			MS		2	F	3	Completed
12	CT	NAME_212	NAME_212			MS		2	F	4	Completed
13	CT	NAME_213	NAME_213			MS		2	F	4	Completed
14	CT	NAME_214	NAME_214			MS		2	F	4	Completed
15	CT	NAME_215	NAME_215			MS		2	F	4	Completed

Series

Preview

Instance: 12541



**Medical image inquiry**  
Quickly view the medical images of the study with our web-based DICOM Viewer.

**Study case inquiry**  
- View the list of studies by task.  
- Provides a quick preview of the medical images saved in the selected study.



## Monitoring – Research Progress Monitoring

The Task Manager can monitor data input and output by task and the participant's research progress.

### Monitor the Reviewers' Evaluation Progress

Reviewer	Task Status	Points	Status
ms02@ms.ac.kr	Completed	1.0	43022
ms02@ms.ac.kr	Completed	0.0	4036
ms02@ms.ac.kr	Completed	0.0	0.0
ms02@ms.ac.kr	Completed	0.0	0.0
ms02@ms.ac.kr	Completed	0.0	0.0
ms02@ms.ac.kr	Completed	0.0	0.0
ms02@ms.ac.kr	Completed	0.0	0.0
ms02@ms.ac.kr	Completed	0.0	0.0
ms02@ms.ac.kr	Completed	0.0	0.0
ms02@ms.ac.kr	Completed	0.0	0.0

Shows the progress of the evaluation of the study assigned to each reviewer participating in the research.

### Track progress of filling the form

Task	Task Status	Reviewer	Study
202001 TEST A B01	Completed	ms02	4308
202001 TEST A B02	Completed	ms02	4307
202001 TEST A B03	Completed	ms02	4306
202001 TEST A B04	Completed	ms02	4305
202001 TEST A B05	Completed	ms02	4304
202001 TEST A B06	Completed	ms02	4303
202001 TEST A B07	Completed	ms02	4302
202001 TEST A B08	Completed	ms02	4301
202001 TEST A B09	Completed	ms02	4300
202001 TEST A B10	Completed	ms02	4299
202001 TEST A B11	Completed	ms02	4298
202001 TEST A B12	Completed	ms02	4297
202001 TEST A B13	Completed	ms02	4296
202001 TEST A B14	Completed	ms02	4295
202001 TEST A B15	Completed	ms02	4294
202001 TEST A B16	Completed	ms02	4293
202001 TEST A B17	Completed	ms02	4292
202001 TEST A B18	Completed	ms02	4291
202001 TEST A B19	Completed	ms02	4290
202001 TEST A B20	Completed	ms02	4289

Shows the assignment and completion status of the reports created for each task.

### Task Statistics

Study ID	Study Date	Study Description	Size
2019-01-24	2019-01-24	2019-01-24	1721 MB
2019-01-27	2019-01-27	2019-01-27	71 MB
2019-04-03	2019-04-03	2019-04-03	153 MB
2019-04-09	2019-04-09	2019-04-09	78 MB
2019-08-21	2019-08-21	2019-08-21	1319 MB
2019-08-21	2019-08-21	2019-08-21	139 MB
2019-08-21	2019-08-21	2019-08-21	14 MB
2019-11-01	2019-11-01	2019-11-01	2099 MB
2019-11-01	2019-11-01	2019-11-01	1019 MB
2019-11-01	2019-11-01	2019-11-01	20 MB
2019-11-01	2019-11-01	2019-11-01	11 MB
2019-11-01	2019-11-01	2019-11-01	1427 MB
2019-11-01	2019-11-01	2019-11-01	204 MB

Provides statistics such as the size of medical images stored and the number of users for each task.

### Monitor Study Transmission Status

Status	Patient ID	Study Date	Study Description	Size	Unit	AE T	Mod	Part	Type	Queue ID	Sent Date	Sender
Completed	0001	2019-01-08	A	300	48	MS2	32.76	104	Study	2021-08-2		ms02@ms.ac.kr
Completed	0001	2019-01-08	A	300	47	MS2	32.76	104	Study	2021-08-2		ms02@ms.ac.kr
Completed	0001	2019-01-08	A	300	46	MS2	32.76	104	Study	2021-08-2		ms02@ms.ac.kr
Completed	0001	2019-01-08	A	300	45	MS2	32.76	104	Study	2021-08-2		ms02@ms.ac.kr
Completed	0001	2019-01-08	A	300	44	MS2	32.76	104	Study	2021-08-2		ms02@ms.ac.kr
Completed	0001	2019-01-08	A	300	43	MS2	32.76	104	Study	2021-08-2		ms02@ms.ac.kr
Completed	0001	2019-01-08	A	300	42	MS2	32.76	104	Study	2021-08-2		ms02@ms.ac.kr
Completed	0001	2019-01-08	A	300	41	MS2	32.76	104	Study	2021-08-2		ms02@ms.ac.kr
Completed	0001	2019-01-08	A	300	40	MS2	32.76	104	Study	2021-08-2		ms02@ms.ac.kr
Completed	0001	2019-01-08	A	300	39	MS2	32.76	104	Study	2021-08-2		ms02@ms.ac.kr
Completed	0001	2019-01-08	A	300	38	MS2	32.76	104	Study	2021-08-2		ms02@ms.ac.kr
Completed	0001	2019-01-08	A	300	37	MS2	32.76	104	Study	2021-08-2		ms02@ms.ac.kr

Provides the transmission status of the medical images sent to the linked PACS and AI server.



## Worklist – Medical Image Reading and Evaluation Report Completion

Read the images of the study assigned by the Task Manager and record the evaluation results in the Report form.

### Study List

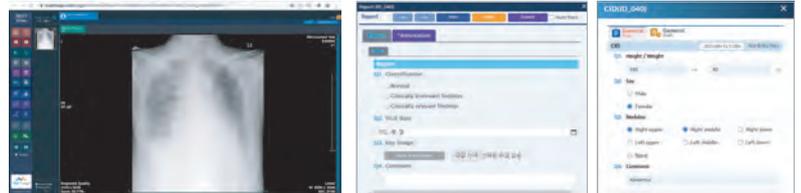
View the studies assigned by the Task Manager as a list.

### Evaluation Status

Shows the status of the report that records the results of the medical image reading.

### Search Criteria

Perform study search based on search criteria.



You can view CID and Report forms in the web-based DICOM Viewer. Read the medical images by referring to the CID and record the evaluation results in the Report.

### Account

Users registered with reviewer privilege can use the features to read medical images and complete the evaluation result report

### View Forms

View the report form assigned to the reviewer along with the study by the Task Manager. Complete and submit the evaluation results in the Report form.

### View Related Studies

View other tasks' studies of the patients in the selected study.

### Image Preview

Provides a quick preview of the medical images of the study.

The screenshot shows the 'BEST Image Worklist' interface. At the top, there are search filters for Modality, Patient ID, Patient Name, and Study Description. Below this is a table of studies with columns for Patient ID, Patient Name, Sex, Age, Study Date, Accession No., Study Description, Mod, Part, and Item. A 'Report' form is open on the right, showing a 'Classification' section with radio buttons for 'Normal', 'Clinically irrelevant findings', and 'Clinically relevant findings'. Below the report form is an 'Image Preview' section showing a small thumbnail of a medical image.



## DICOM Viewer

Provides an environment optimized for medical image reading and evaluation for multi-center imaging research.

### User Convenience Features

#### Web-based Viewer

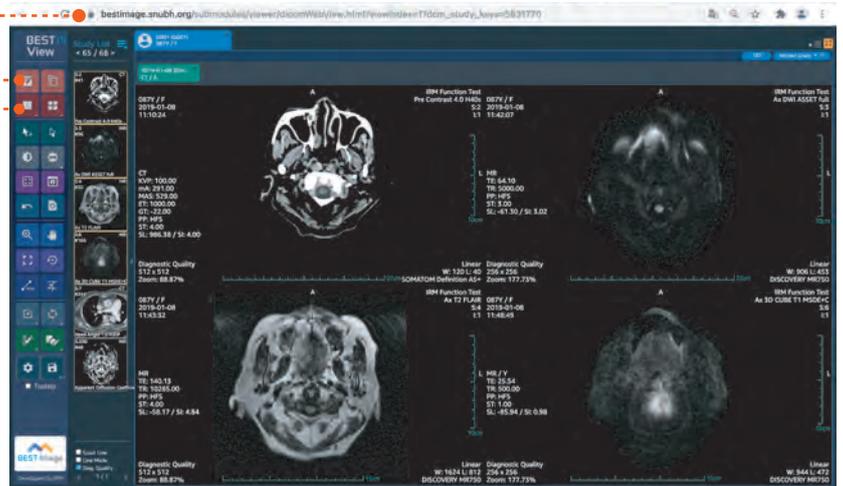
A web viewer to view medical images in the HTML5-based browser. No separate plug-in installation required. Load images quickly with the thin-client technology.

#### Complete the Report

Record the medical image reading and evaluation results by directly opening the Report window in the viewer.

#### Configure the Layout

Customize the layout and image display mode (Series/Stack) based on the characteristics of medical image types.



### Image Reading Features

#### 2D Image Processing (Image Transformation)

- Window Width/Level
- Apply Filters (Invert, Pseudo Color Mapping, etc.)
- Move Images (Panning, Flip, and Rotation)
- Resize (Zoom In/Out and Fit)

#### Measurement/Annotation

- Measure Object Length (Length, CT Ratio, etc.)
- Measure Object Area (Rectangle, Ellipse, etc.)
- Measure Object Angle (Angle, Cobb's Angle, etc.)
- Annotation Tool (Text, Arrow Line, Localization, etc.)

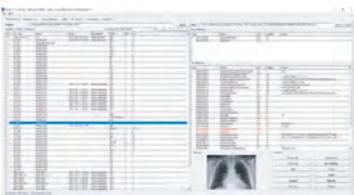
#### Etc.

- Compare Images (Cross Link, Scout Line, etc.)
- View Images in Cinematic Mode (Cine Mode)
- Quick Study Switch
- View CID
- View Related Studies



## SNUPI – BEST Image Utility

Provides a utility for processing medical images and clinical information to prepare research data and extracting research results.



Medical Image Pre-processing Screen



Clinical Information Refining Screen

### Research Data Preparation

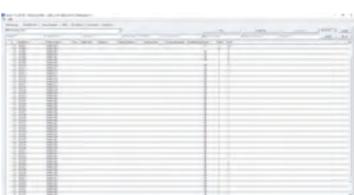
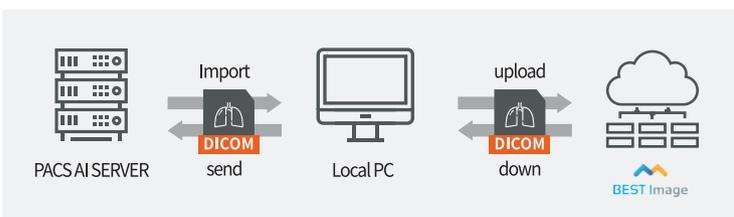
- Refine patient clinical information and use them as a form for research purposes.
- Original medical images can be pre-processed for de-identification and used for research purposes.
- Standardized the original image file to the DICOM standard.

### Research Data Transmission

- Send research data between PACS, PC, and BEST Image.
- Import images from PACS with the original medical images to your PC.
- Preprocessed medical images can be uploaded to BEST Image and used for research purposes.

### Research Result Extraction

- Extract your research results from BEST Image onto your PC.
- Batch extract the evaluation results during the research.
- Medical images used in the research can be downloaded in DICOM format and other image formats.



Medical Image Extraction and Format Conversion Screen



Evaluation Result Extraction Screen

## Use Case

### Centers using BEST Image

Seoul National University Bundang Hospital Seoul/Eunpyeong/Karf/Daejeon/Bucheon St. Mary's Hospital  
 Sinchon/Ilsan/Kangnam/Wonju Severance Christian Hospital Seoul Asan Medical Center Pusan National University Hospital Kyunghee University Hospital  
 Severance Check-Up Gangdong Kyunghee University Hospital Wonju Severance Christian Hospital Keimyung University Hospital  
 Samsung Medical Center Konkuk University Hospital Massachusetts General Hospital Korea Centers for Disease Control and Prevention (KCDC)

### Research Cases

Pulmonary Tuberculosis Breast cancer Cerebral infarction Lung cancer Liver cancer Coronary artery  
 Chest Stroke Cardiovascular system Etc.



#### Build an Integrated Database

We provides an integrated database by classifying medical images held by each hospital by disease or under specific criteria on the cloud platform.



#### Medical Image Research

Enables all researchers in multicenter research to upload and access the medical image reading service at the same time.

\*This service works seamlessly with the existing PACS to provide a data workflow optimized for the research environment.



#### AI Research

We provide a medical image collection and preprocessing service to establish a database for AI learning.

\*This service can be used for medical image evaluation research by integrating AI with the analysis server.

Component	Main Specification
<b>Task Manager</b> Comprehensive Research Management	<b>Job Manager</b> - View studies accumulated for each task and assign forms and reviewers - Reference medical data of the study  <b>Form Manager</b> - Advanced form creation environment with 13 types of Q&A and answer conditions - Validate questions before creating the form - Enter code by question to help analyze the results and statistics  <b>Task Manager</b> - View all tasks managed by the Task Manager and register and manage research participants - Manage the server that exchanges medical images for each task  <b>Monitoring</b> - Manage the type of forms assigned and the progress of evaluation of the studies by reviewer - Statistics such as the size of medical images stored for each task and registered participants - Monitor the status of images sent to the linked PACS and AI server for each task
<b>Reviewer</b> Study Evaluation	<b>Worklist</b> - View the studies and forms assigned to the reviewer - Complete and submit the evaluation result form  <b>DICOM Viewer</b> - Set the viewer environment in accordance with the types of medical images. - Image processing and measurement/annotation features for accurate medical image evaluation - Reviewers have access to user convenience features when evaluating medical images.
<b>SNUPI</b> Research Data Pre-Processing	- Send medical images and clinical information between the PACS, AI server, and cloud - Perform medical image calibration, pre-processing for de-identification, and clinical information refinement - Extract the results at the end of the research
<b>External Interface</b>	. Web application server for standard interface . DICOM, DICOM Web . HL7 V2, HL7 V3, HL7 FHIR . IHE XDS.b, XDS-I.b, MHD, PDQm, ATNA . Content-neutral data management . RESTful APIs provided for service-specific data services . OAuth2-based user authentication/authorization management server . HTML5 based Zero Footprint DICOM Viewer