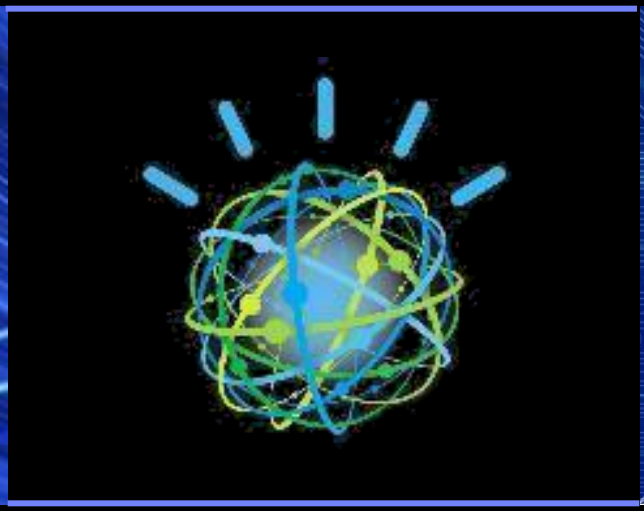
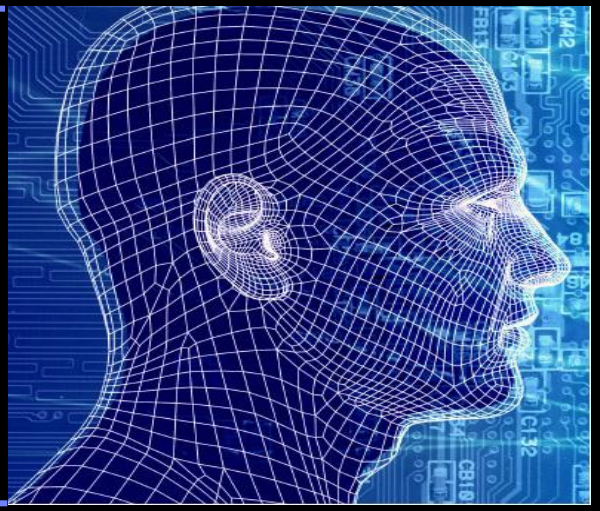
Update:
IBM Watson and Evidence-Based Patient Care

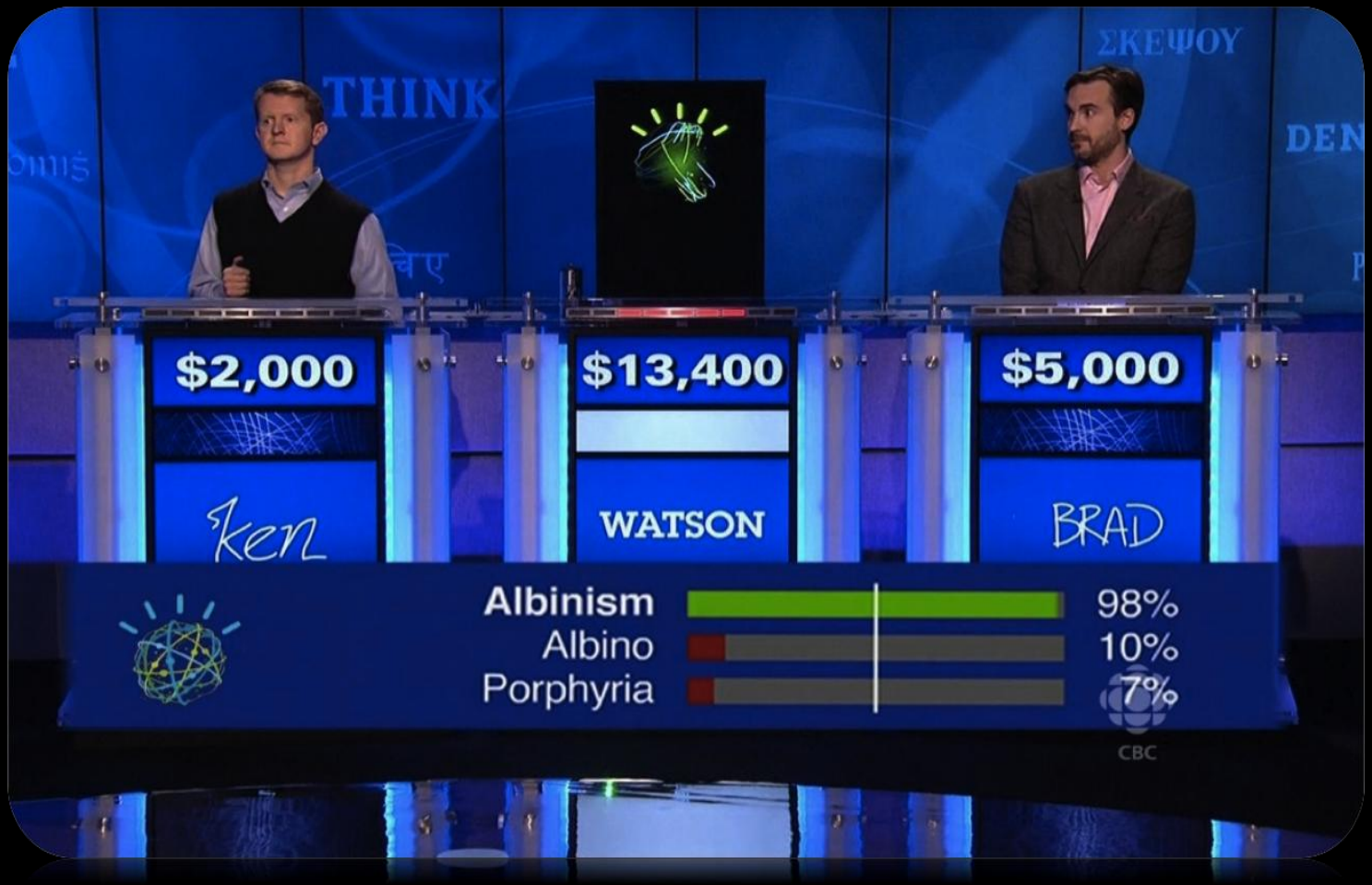
Jeffrey Betts
IBM Healthcare and Life Sciences

Kelowna Conference, June 19, 2012





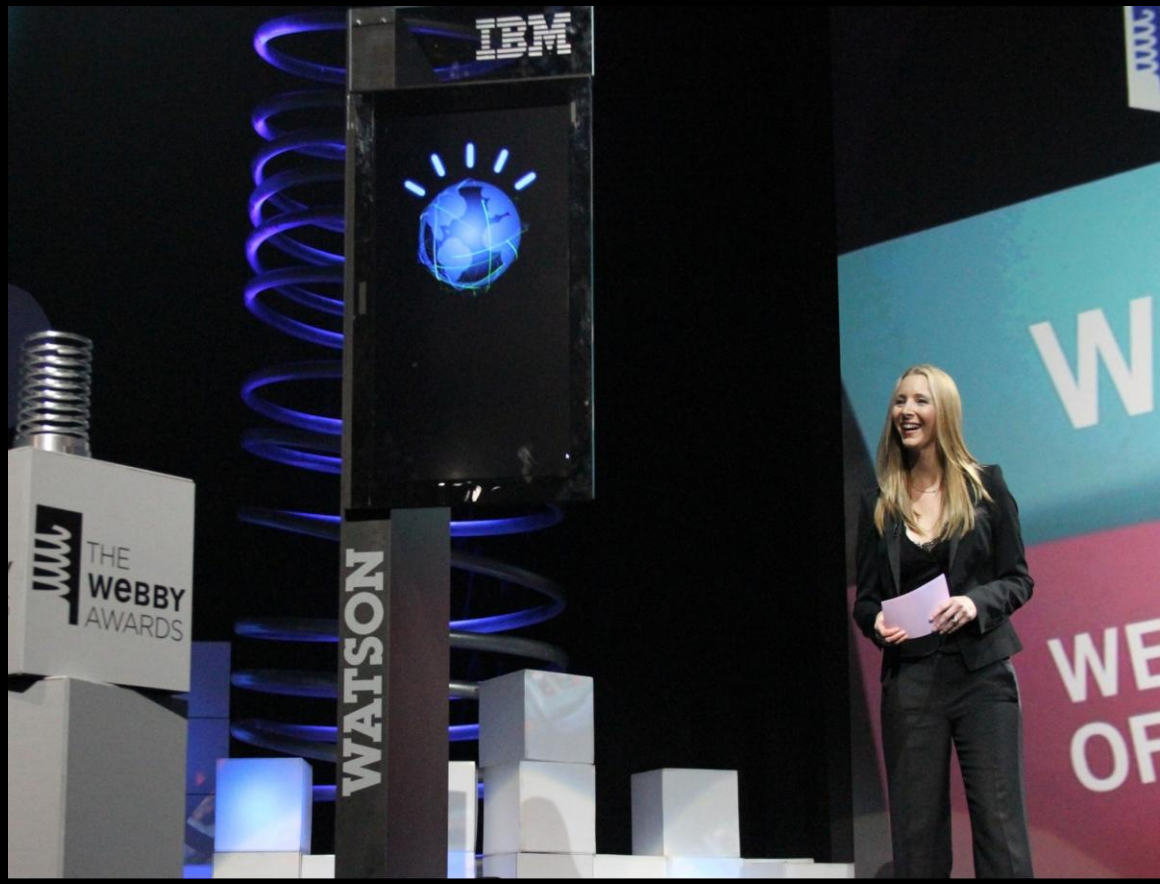
On February 14, 2011, IBM Watson made history …



Actress Lisa Kudrow presents IBM's Watson with "Person Of The Year" at the 15th Annual Webby Awards

Watson's Acceptance Speech:

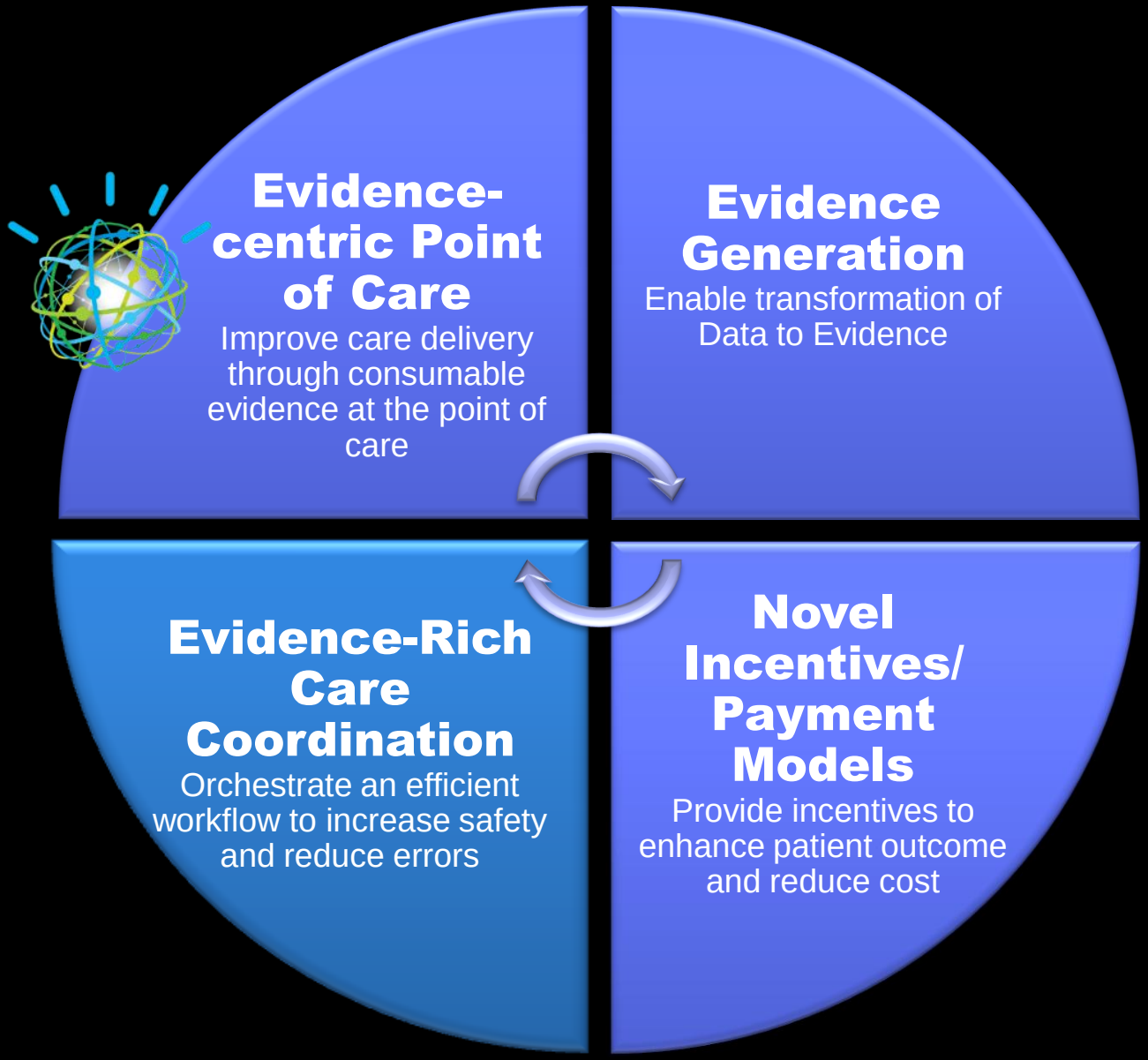
"Person of the Year…..ironic."



What if our doctors had all the evidence they need to deliver highest quality care, every time?

Can we design a computing system that rivals a human's ability to retrieve, analyze and interpret vast amounts of information? How could we use it for clinical decision support?

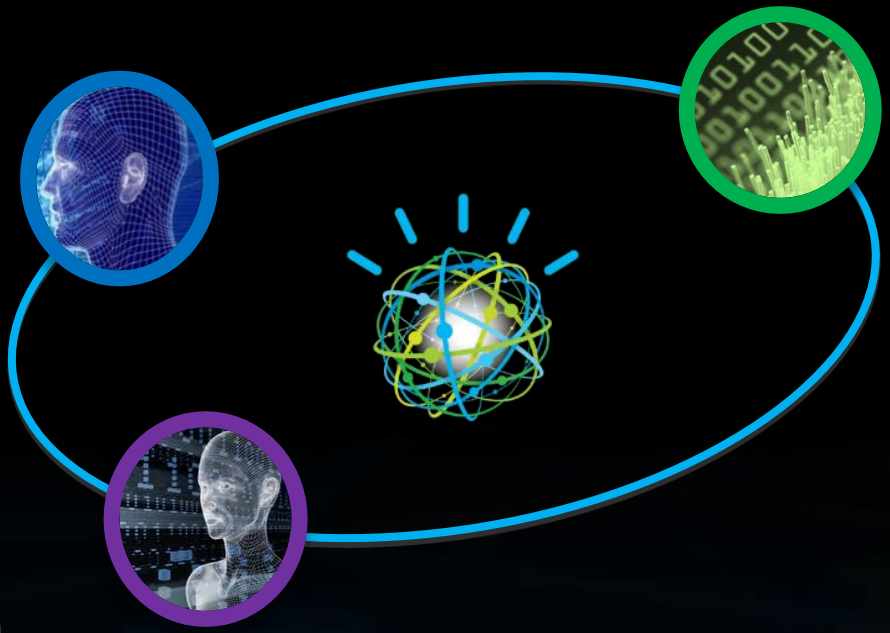
Evidence: Evolving to support Personalized Healthcare

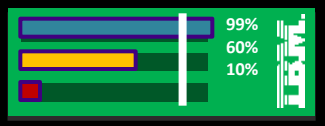


IBM Watson brings together a set of transformational technologies to drive optimized outcomes

1 Understands natural language and human speech

2 Generates and evaluates hypothesis for better outcomes





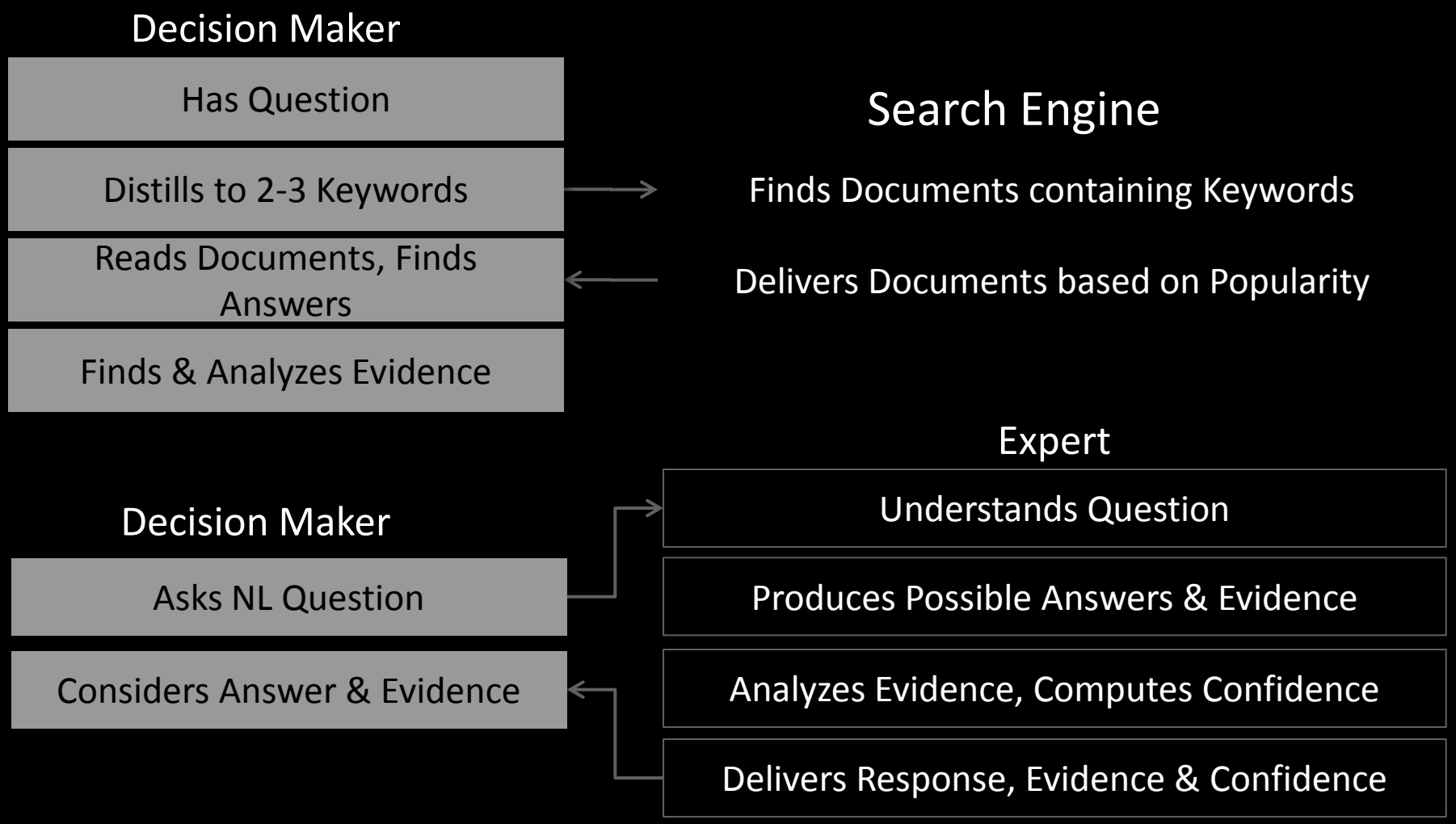
3 Adapts and Learns from user selections and responses

...built on a massively parallel probabilistic evidence-based architecture optimized for POWER7

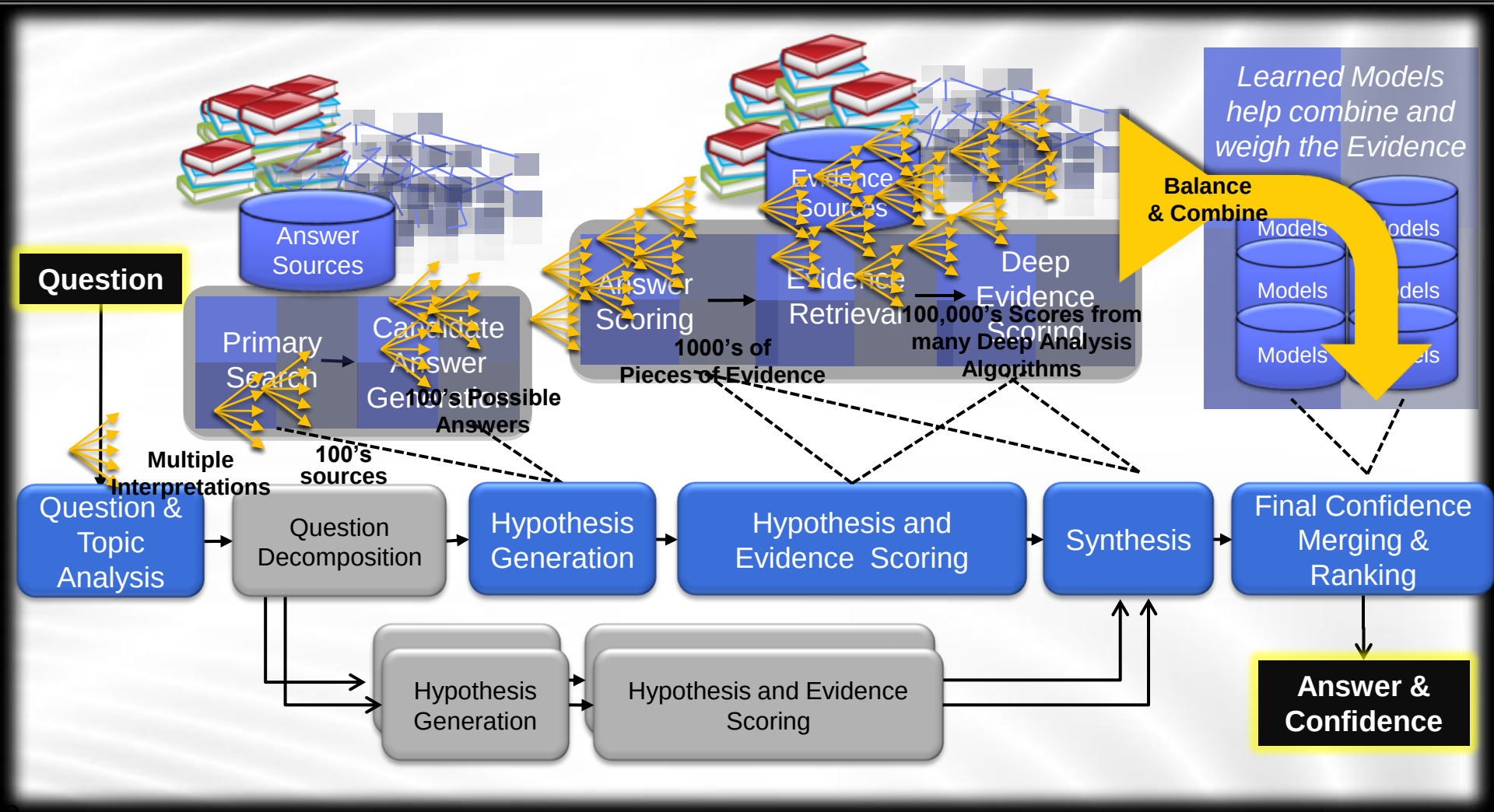
Why is it so hard for computers to understand humans?

	Structured Data	Unstructured Data
Where was Einstein born?	<table><tr><th>Physicist</th><th>Birth Place</th></tr><tr><td>A. Einstein</td><td>Ulm</td></tr><tr><td>N. Bohr</td><td>Copenhagen</td></tr><tr><td>M. Curie</td><td>Warsaw</td></tr></table> Source: Excel File, Database, etc.	***"One day, from among his city views of Ulm, Otto chose a water color to send to Albert Einstein as a remembrance of Einstein´s birthplace"*** **Source: http://www.schaeffenacker-ulm.de/en/otto.html**
Welch ran this?	<table><tr><th>Person</th><th>Organization</th></tr><tr><td>L. Gerstner</td><td>IBM</td></tr><tr><td>J. Welch</td><td>GE</td></tr><tr><td>W. Gates</td><td>Microsoft</td></tr></table> Source: Excel File, Database, etc.	***"If leadership is an art then surely Jack Welch has proved himself a master painter during his tenure at GE"*** **Source: *Jack Welch and the GE Way,* Robert Slater**

IBM Watson Goes Way Beyond Search

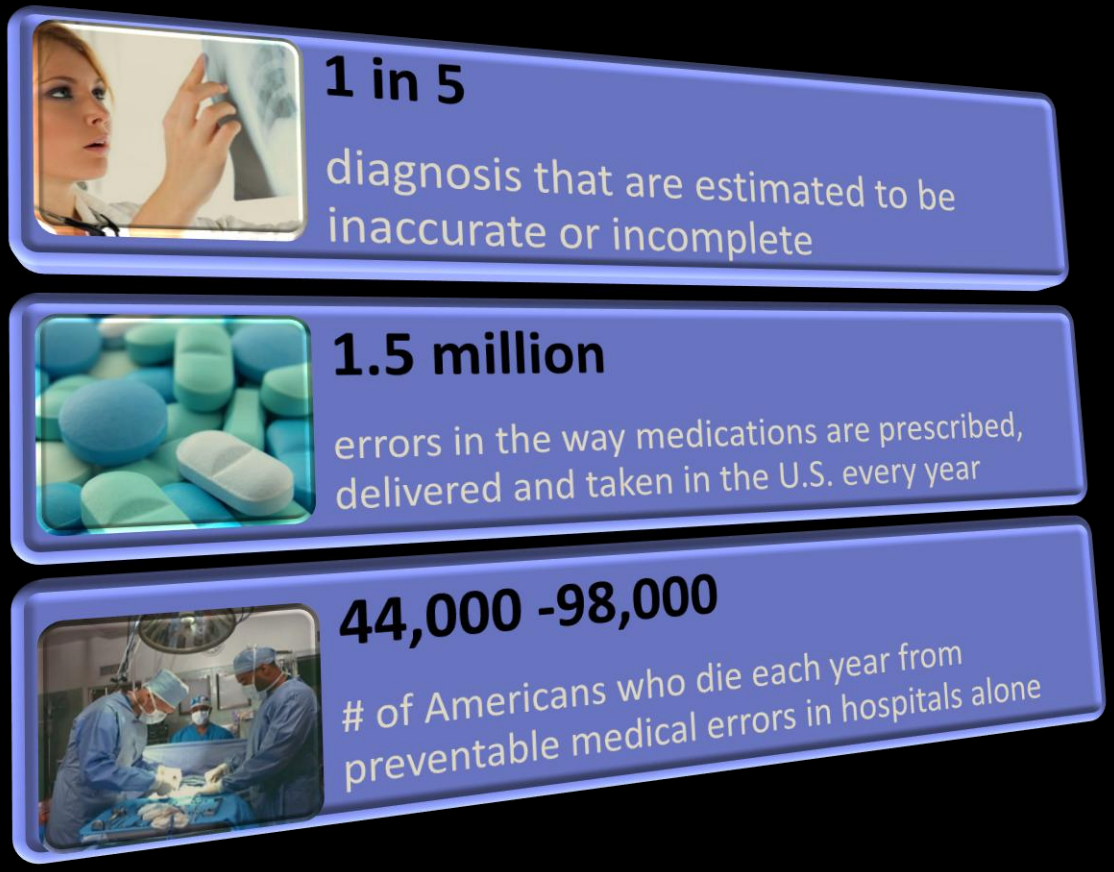


How Watson Works



Healthcare Industry is beset with some of the most complex information challenges we collectively face

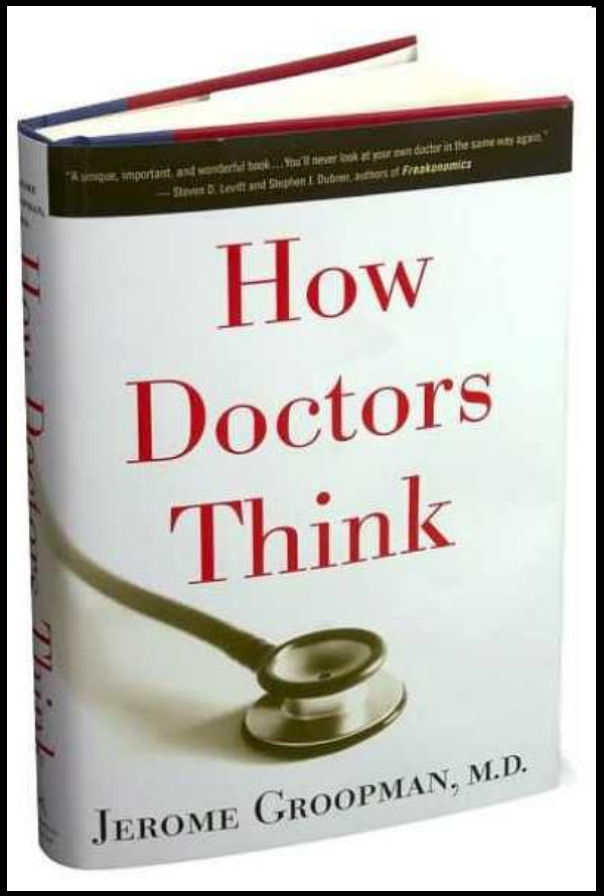
- Medical information is doubling every 5 years, much of which is unstructured
- 81% of physicians report spending 5 hours or less per month reading medical journals



Source: International Journal of Circumpolar Health, DoctorDirectory.com, Institute for Medicine"

Cognitive Dispositions to Respond (CDRs) That May Lead to Diagnostic Errors…

Aggregate bias
Anchoring
Ascertainment bias
Availability
Base-rate neglect
Commission bias
Confirmation bias
Diagnosis momentum
Feedback sanction
Framing effect
Fundamental attribution error
Gambler's fallacy
Gender bias
Hindsight bias
Multiple alternatives bias
Omission bias



Bias Blind Spot: we recognize cognitive bias in others but…

Unstructured data is messy but filled with key medical facts

Medications, diseases, symptoms, non-symptoms, lab measurements, social history, family history and much more

80% of medical information is unstructured....

Medical Transcription Discharge Summary Sample # 2:

DATE OF ADMISSION: MM/DD/YYYY

DATE OF DISCHARGE: MM/DD/YYYY

ADMITTING DIAGNOSIS: Syncope.

CHIEF COMPLAINT: Headache, dizziness.

HISTORY OF PRESENT ILLNESS: This is an (XX)-year-old male with a past medical history of coronary artery disease, CABG done a few years ago, hypothyroidism, hypertension, cardiomyopathy, who presented to the emergency room with complaints of headache and dizziness. The patient was in his usual state of health when he suddenly felt lightheaded and had to sit down. He did not lose consciousness completely by himself, but did not have any syncope. No nausea or vomiting. No chest pain. No shortness of breath. Came to ER and had a CT head, which was within normal limits. The impression was atrophy with old ischemic changes but no acute intracranial findings. No focal weakness, headache, vision changes or speech changes. The patient has had similar episodes since one year. Peripheral neuropathy since one s of 25 pounds in the last 6 months. octitis and secondary to decreased appetite.

PROCEDU sclerotic heart disease, pleural thickenin ed to prior examination, COPD pattern.

CONSULT

PAST ME hyperten

FAMILY H

SOCIAL H

ALLERGIE

REVIEW hemorrh and feet.

PHYSICAL Appearar masses. rhythm. smooth n within no

LABORAT neutroph 1.6, PTT 3

The patient had a chest x-ray, which showed cardiomega effusion, a left costophrenic angle which has not change head CT, which showed atrophy with old ischemic chang

Echocardiogram Sample Report:

DATE OF STUDY: MM/DD/YYYY

DATE OF INTERPRETATION OF STUDY:

Echocardiogram was obtained for assessment of left vent function. The patient has been admitte syncope. Overall, the study was subop

FINDINGS:

1. Aortic root appears normal.
2. Left atrium is mildly dilated. No gros recognized, although subtle abnormalit atrium is of normal dimension.
3. There is echo dropout of the interat could not be excluded.
4. Right and left ventricles are normal ventricular systolic function appears to fraction is around 55%. Again, due to p abnormalities in the distribution of late excluded.
5. Aortic valve is sclerotic with normal Doppler study demonstrates trace aort
6. Mitral valve leaflets are also scleroti imaging and Doppler study demonstrat regurgitation.
7. Tricuspid valve is delicate and opens clearly seen. No evidence of pericardia

CONCLUSIONS:

1. Poor quality study.
2. Eyeball ejection fraction is 55%.
3. Trace to mild degree of mitral regur
4. Trace aortic regurgitation.

Cardiology Consultation Transcribed Medical Transcription Sample Reports

DATE OF CONSULTATION: MM/DD/YYYY

REFERRING PHYSICIAN: John Doe, MD

CONSULTING PHYSICIAN: Jane Doe, MD

REASON FOR CONSULTATION: Surgical evaluation for coronary artery disease.

HISTORY OF PRESENT ILLNESS: This (XX)-year-old lady is seen in consultation for Dr. John Doe. She has been under consideration for ventral hernia repair and has a background of aortic valve replacement and known coronary artery disease. The patient was admitted with complaints of abdominal pain, anorexia, and vomiting. She underwent a CT scan of the abdomen and pelvis and this showed the ventral hernia involving the transverse colon, but without strangulation. There was a atrophic right kidney. She had bilateral renal cysts. The hepatic flexure wall was thickened. There was sigmoid diverticulosis without diverticulitis. It has been recommended to her that she undergo repair of the ventral hernia. For this reason, cardiology consult is obtained to assess whether she can be cleared from the cardiac standpoint.

PAST CARDIAC HISTORY: Bypass surgery. She underwent echocardiography and cardiac catheterization prior to the operation. Echocardiography showed an ejection fraction of 50%. There was marked left ventricular hypertrophy with septal wall 1.60 cm and posterior wall 1.55 cm. Coronary arteriography showed 90% stenosis in the anterior descending artery, situated distally just before the apex of the left ventricle. Only mild to moderate narrowing was seen elsewhere in the coronary circulation.

CORONARY RISK FACTORS: Her father had an irregular heartbeat and her brother had a fatal heart attack. She herself has had high blood pressure for 20 years. She has elevated cholesterol and takes Lipitor. She has had diabetes for 20 years. She is not a cigarette smoker. She does little physical exercise.

REVIEW OF SYMPTOMS: CARDIOVASCULAR AND RESPIRATORY: She has no chest pain. She sometimes becomes short of breath if she walks too far. No cough. She has occasional swelling of her feet. Occasionally, she gets mildly lightheaded. Has not lost consciousness. She tends to be aware of her heartbeat when she is tired. She has no history of heart murmur or rheumatic fever. GASTROINTESTINAL: Recent GI symptoms as noted above, but she does not usually have such problems. She has had no hematemesis. She has no history of ulcer or jaundice. She sometimes tion and no blood in the stool. GENITOURINARY: She tends to have up once at night to pass urine. No dysuria, incontinence. She has had lo stones noted. NEUROLOGIC: She has occasional headaches. No on, hearing, or speech. No limb weakness. MUSCULOSKELETAL: She cle pains and has a history of gout. HEMATOLOGIC: No anemia, us blood transfusion. GYNECOLOGIC: No gynecologic or breast

She has had shoulder and hand injuries and has had carpal tunnel tic and has been on insulin. She has chronic renal insufficiency with as had hypothyroidism. She has had morbid obesity. She has chronic uses BiPAP. She has had hysterectomy and oophorectomy in the past.

spital, she was taking glipizide XL 2.5 mg daily, metoprolol 50 mg torvastatin 40 mg daily, Synthroid 75 mcg daily, aspirin 81 mg daily, urrently, she is taking Lipitor 40 mg daily, Lantus 10 units at bedtime, oprolol 50 mg b.i.d., and Zosyn 2.25 grams q.6h.
es not drink alcohol.

e is not currently dyspneic, in no distress. She is alert, oriented, and

d react normally. No icterus. Mucous membranes well colored. nopathy. Jugular venous pressure not elevated. Carotids equal. per minute and regular and the blood pressure 132/78. The cardiac . There is a grade 3/6 ejection systolic murmur heard medial to the with well heard radiation to the neck vessels.
cussion and auscultation. Normal respiratory effort.
der. The presence of a large ventral hernia is noted.
bl t I did not feel the
lesions are noted.
lectrolytes are normal. BUN and creatinine 18/2.2.
7 with hematocrit 34.9, platelets 187,000.
oin A1c 7.7. TSH 1.82. Troponin I was normal on three occasions.
ged heart with postoperative changes, but no evidence of acute
ble left atrial enlargement. Low voltage QRS, probable inferior wall
terior wall infarction, age undetermined.

with bioprosthetic valve. Residual systolic murmur.
ase with severe stenosis in anterior descending artery, but this is
s only a small mass of myocardium.
cular systolic function. The EKG appearance of previous myocardial
, indicating multiple other medical problems as listed above
the chart.
It appears that she does not wish to proceed with the
if such surgery is not

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PAST MEDICAL HISTORY:
1. Coronary artery disease as described above with previous PTCA and stenting procedures.
2. Dyslipidemia.
3. Hypertension.
4. Status post breast lumpectomy for cancer with followup radiation therapy to the chest.

ALLERGIES: None.

MEDICATIONS: Aspirin 81 mg daily, Plavix 75 mg daily, Altace 2.5 mg daily, metoprolol 50 mg b.i.d. and Lipitor 10 mg q.h.s.

SOCIAL HISTORY: She quit smoking approximately 8 months ago. Prior to that time, she had about a 35- to 40-pack-year history. She does not abuse alcohol.

FAMILY MEDICAL HISTORY: Mother died prematurely of breast cancer. Her father died prematurely of gastric carcinoma.

REVIEW OF SYMPTOMS: There is no history of any CVAs, TIAs or seizures. No chronic headaches. No asthma, TB, hemoptysis or productive cough. There is no congenital heart abnormality or rheumatic fever history. She has no palpitations. She notes no nausea, vomiting, constipation, diarrhea, but immediately prior to admission, she did develop some diffuse abdominal discomfort. She says that since then, this has resolved. No diabetes or thyroid problems. There is no depression or psychiatric problems. There is no musculoskeletal disorders or history of gout. There are no hematologic problems or blood dyscrasias. No bleeding tendencies. Again, she had a history of breast cancer and underwent lumpectomy procedures for this with followup radiation therapy. She has been followed in the past 10 years and mammography shows no evidence of any recurrent problems. There is no recent fevers, malaise, changes in appetite or changes in weight.

PHYSICAL EXAMINATION: Her blood pressure is 120/70, pulse is 80. She is in a sinus rhythm on the cardiac monitor. Respirations are 18 and unlabored. Temperature is 98.2 degrees Fahrenheit. She weighs 160 pounds, she is 5 feet 4 inches. In general, this was an elderly-appearing, pleasant female who currently is not in acute distress. Skin color and turgor are good. Pupils were equal and reactive to light. Conjunctivae clear. Throat is benign. Mucosa was moist and noncyanotic. Neck veins not distended at 90 degrees. Carotids had 2+ upstrokes bilaterally without bruits. No lymphadenopathy was appreciated. Chest had a normal AP diameter. The lungs were clear in the apices and bases, no wheezing or egophony appreciated. The heart had a normal S1, S2. No murmurs, clicks or gallops. The abdomen was soft, nontender, nondistended. Good bowel sounds present. No hepatosplenomegaly was appreciated. No pulsatile masses were felt. No abdominal bruits were heard. Her pulses are 2+ and equal bilaterally in the upper and lower extremities. No clubbing is appreciated. She is oriented x3. Demonstrated a good amount of strength in the upper and lower extremities. Face was symmetrical. She had a normal gait.

IMPRESSION: This is a (XX)-year-old female with significant multivessel coronary artery disease. The patient also has a left main lesion. She has undergone several PTCA and stenting procedures within the last year to year and a half. At this point, in order to reduce the risk of any possible ischemia in the future, surgical myocardial revascularization is recommended.

PLAN: We will plan to proceed with surgical myocardial revascularization. The risks and benefits of this procedure were explained to the patient. All questions pertaining to this procedure were answered.

Text Analytics – Social History / Smoking Status

NLP of unstructured physician notes found 40% more smokers than previously identified in the structured social history smoking data.

Source: IBM Research study with large clinical care organization in California

Why is Watson Technology ideal for healthcare?

Understands natural language questions

What condition has red eye, pain, inflammation, blurred vision, floating spots and sensitivity to light?

Analyzes large volumes of structured and unstructured data

Physician Notes, Medical Journals, Clinical Trials, EMRs, Pathology Results, Blogs, Wikipedia

Generates and evaluates hypothesis

Possible Diagnosis	Confidence
Uveitis	91%
Iritis	48%
Keratitis	29%

Presents responses with confidence

Supports iterative dialogue to refine results

Family History, Patient Interview, Physical Exam, Current Medications

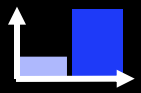
Learns from results over time

What actions were taken? What treatments were prescribed? What was the outcome?

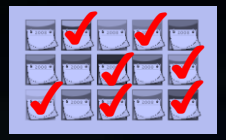
IBM and Memorial Sloan-Kettering adapting Watson for Oncology

1 in 4
individuals will die from cancer

3X
rate cancer cost climbs vs. std. health costs or 15-18% / yr.



20%
of cancer cases receive the wrong diagnosis initially with some as high as 44%



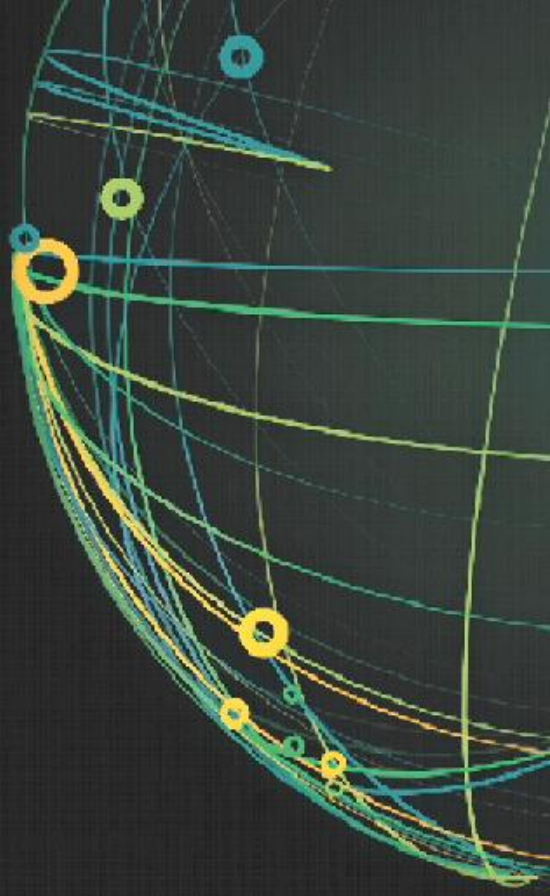
75,000
Annual cancer deaths in Canada

MEMORIAL SLOAN-KETTERING CANCER CENTER · ESTABLISHED 1884 ·

+

IBM

Source: American Cancer Society, National Health Institute, Canadian Cancer Society

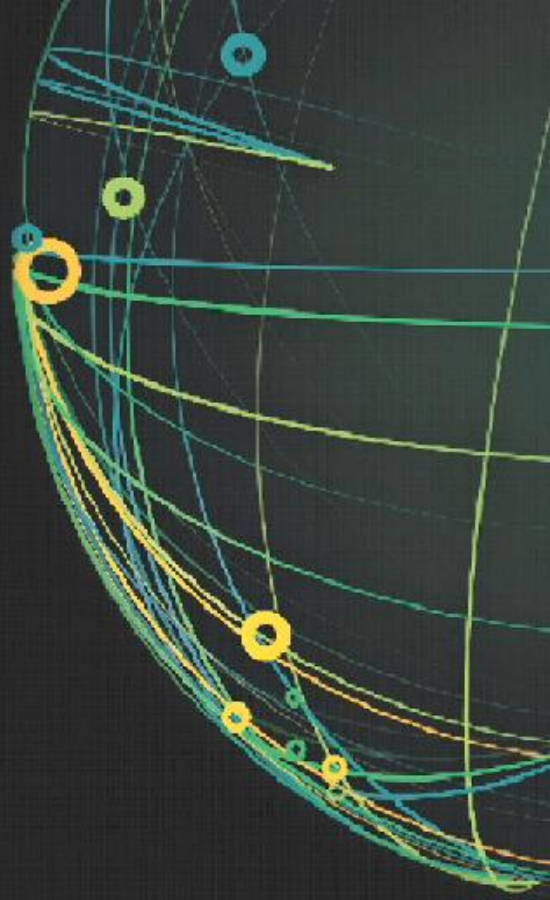


The vision for this demonstration was created with the guidance of the physician experts at Memorial Sloan-Kettering Cancer Center.

IBM

Memorial Sloan-Kettering Cancer Center

Preparation for Doctor's First Consultation with Patient



IBM WATSON

EMR Patient EMR

Patient Details MRN: 040103110830840 Name: Lin J. Yamato Age: 37

SUMMARY | ENCOUNTERS | CONDITIONS | ALLERGIES | MEDICATIONS | LABS | PATHOLOGY | IMMUNIZATIONS | IMAGING | PROCEDURES | DOCUMENTS | CLINICAL SUMMARY

Imaging Report

From date: To date: Show Show all

Last: Units: Send to EMR Reset

Imaging

Sort By:

- Modality
- Ordered by
- Date

Expand all Collapse all

MRI +

CT (3) −

CT Chest (2)

02/07/2012:
Joanne Cameron / Chest

CT Abdomen (1)

08/12/2009:
Joanne Cameron / Abdomen

Report

Chest CT Report

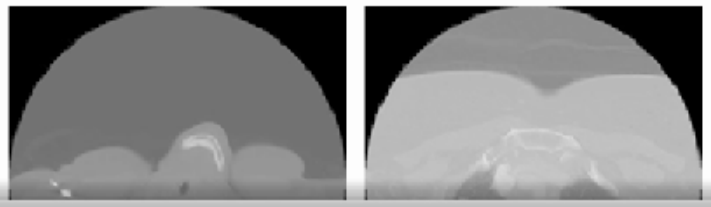
Referring Physician
Dr. Joanne Cameron

Source
N/A

Referral Date
01/05/2012

Electronically Signed
Dr. Joanne Cameron

HIDE IMAGE −



Imaging Details

Ordered by
Dr. Joanne Cameron

Indication
Abnormal chest x-ray

Status
Signed

Ask Watson

IBM WATSON

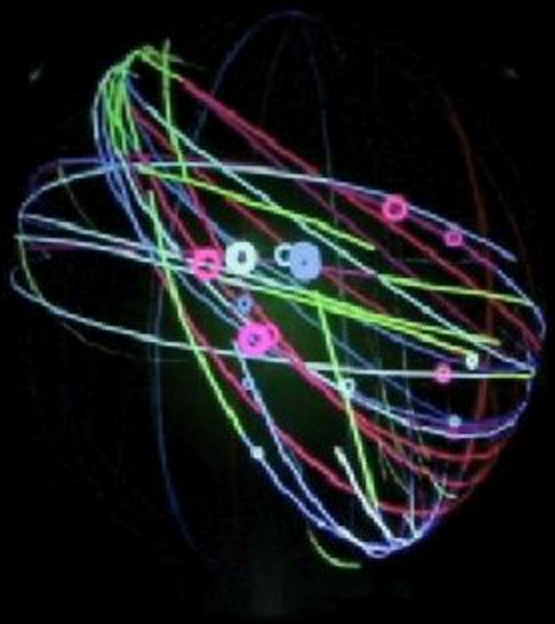
Patient EMR

Watson is evaluating patient info against Watson knowledge base...

234 Textbooks

IBM WATSON

Patient EMR



Watson is evaluating patient info against Watson knowledge base...

1,973 Guidelines

Patient EMR

Watson is evaluating patient info against Watson knowledge base...

20,274 Journal articles

Patient EMR

Watson is evaluating patient info against Watson knowledge base...

4,843 Drug info documents

Patient EMR

Watson is evaluating patient info against Watson knowledge base...

1,578 Other clinical documents

Patient EMR

Case Information

The IBM Watson case information does not obviate the need to review the EMR record in detail

PATIENT	DEMOGRAPHICS	CURRENT CONDITION
Lin J. Yamato	**Gender:** Female	**DX:** Lung Adenocarcinoma
Patient ID: 000-0000	**DOB:** Jan 15, 1975 (37)	**Smoking History:** Never smoker
Provider ID: 00-0000-0	**Place of Birth:** Osaka, Japan	

Diagnosis	Location	Stage
Adenocarcinoma of lung origin	3.1 cm lesion in the right upper lobe of the lung	IV Adenocarcinoma
Adenocarcinoma of lung origin	1.7 cm lesion in the right adrenal gland	

Key Points

2/16/12 – Pathology report from CT biopsy of right adrenal gland: Metastatic adenocarcinoma; morphologically consistent with specimen 312-647

2/07/12 – CT chest/abdomen/pelvis with contrast: 1.7 cm lesion right adrenal gland suspicious for a metastatic deposit

2/05/12 – CT chest without contrast: 3.1 cm lesion right upper lobe of lung suspicious for neoplasm

Ask Watson

Case Information | Test Options | Treatment Options

IBM WATSON

Patient EMR

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morphologically consistent with specimen 312-647 — EMR — EVIDENCE

2/07/12 – CT chest/abdomen/pelvis with contrast: 1.7 cm lesion right adrenal gland suspicious for a metastatic deposit — EMR — EVIDENCE

2/05/12 – CT chest without contrast: 3.1 cm lesion right upper lobe of lung suspicious for neoplasm — EMR — EVIDENCE

2/03/12 – [illegible] dry cough - labored breathing — EMR — EVIDENCE

Information Needed

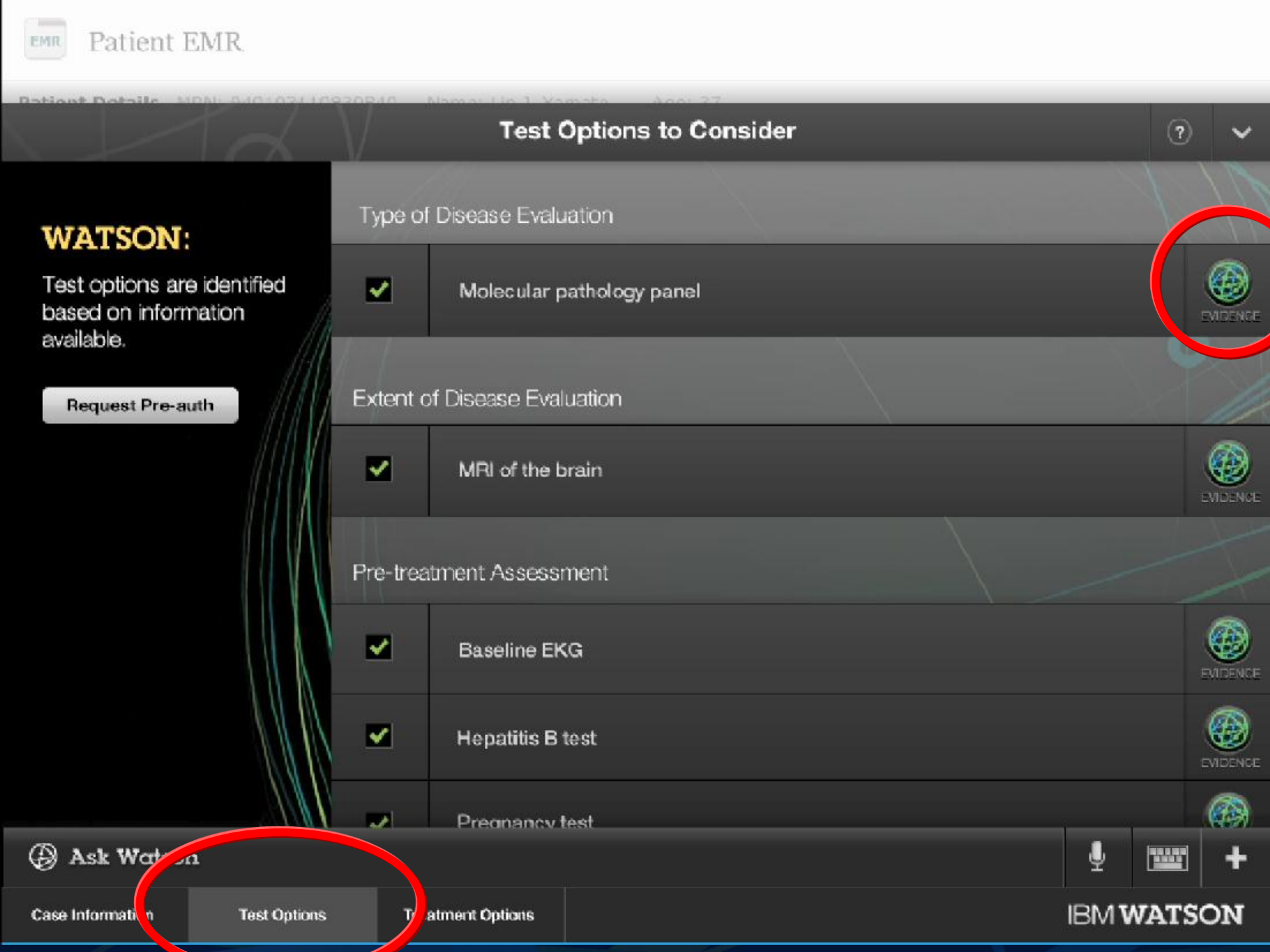
Has the patient experienced any hemoptysis? — EMR — EVIDENCE

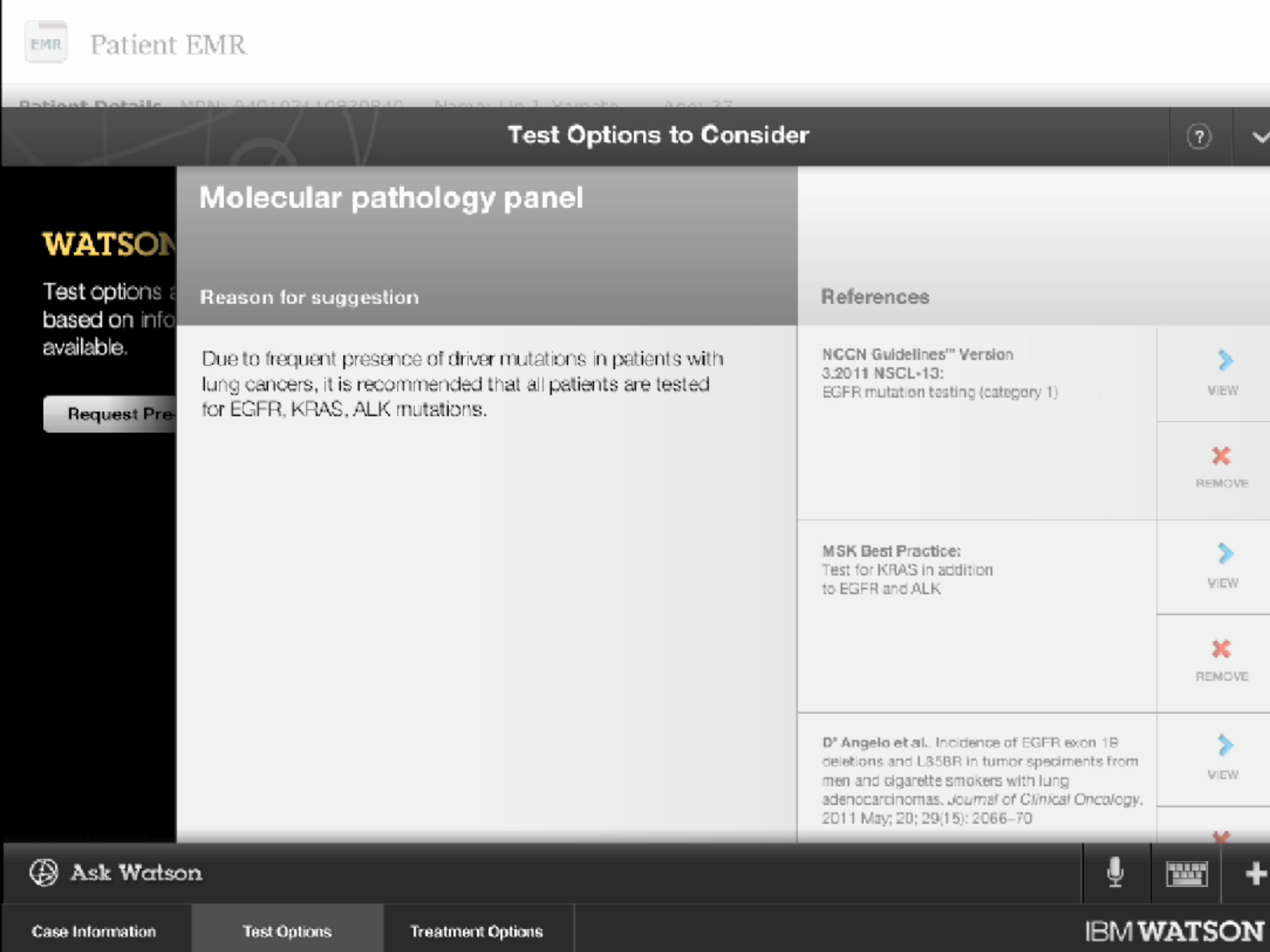
Does the patient have normal hearing? — EMR — EVIDENCE

Ask Watson

Case Information | Test Options | Treatment Options

IBM WATSON


Patient EMR
Test Options to Consider
WATSON:
Test options are identified based on information available.
Request Pre-auth
Type of Disease Evaluation
Molecular pathology panel
EVIDENCE
Extent of Disease Evaluation
MRI of the brain
EVIDENCE
Pre-treatment Assessment
Baseline EKG
EVIDENCE
Hepatitis B test
EVIDENCE
Pregnancy test
Ask Watson
Case Information
Test Options
Treatment Options
IBM WATSON


EMR
Patient EMR
Test Options to Consider
WATSON
Test options a
based on info
available.
Request Pre
Molecular pathology panel
Reason for suggestion
Due to frequent presence of driver mutations in patients with lung cancers, it is recommended that all patients are tested for EGFR, KRAS, ALK mutations.
References
NCCN Guidelines™ Version 3.2011 NSCL-13: EGFR mutation testing (category 1)
VIEW
REMOVE
MSK Best Practice: Test for KRAS in addition to EGFR and ALK
VIEW
REMOVE
D' Angelo et al. Incidence of EGFR exon 18 deletions and L858R in tumor specimens from men and cigarette smokers with lung adenocarcinomas. Journal of Clinical Oncology. 2011 May; 20; 29(15): 2066–70
VIEW
Ask Watson
Case Information
Test Options
Treatment Options
IBM WATSON

Patient EMR

Test Options to Consider

WATSON

Test options a
based on info
available.

Request Pre

Molecul

Reference

Reason for

Due to freque
lung cancers
for EGFR, KF

Purpose: EGFR mutations underlie the sensitivity of lung cancers to erlotinib and gefitinib and can occur in any patient with this illness. Here we examine the frequency of EGFR mutations in smokers and men.

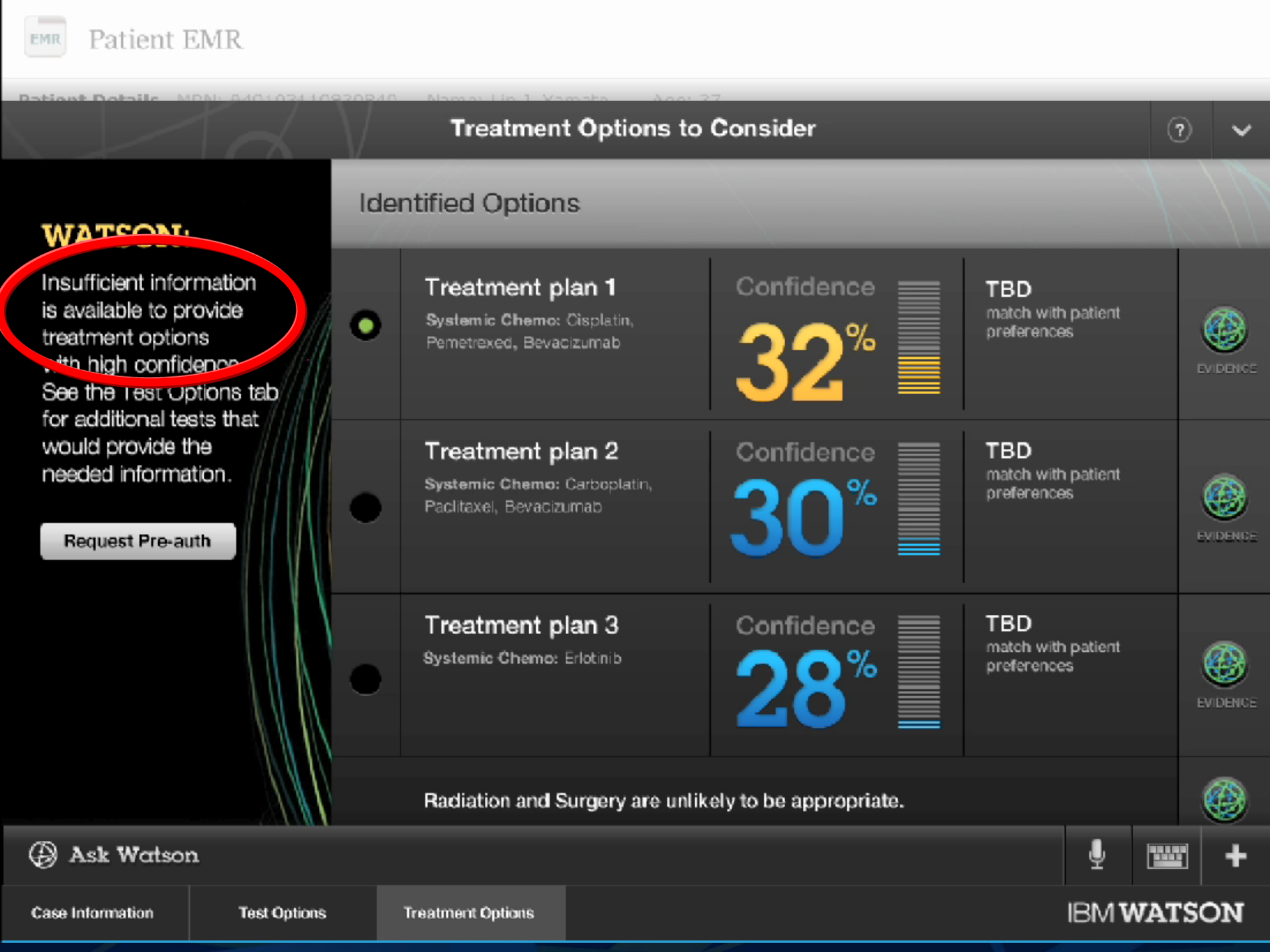
Results: We tested 2,142 lung adenocarcinoma specimens for the presence of EGFR exon 19 deletions and L858R. EGFR mutations were found in 15% of tumors from former smokers (181 of 1,218; 95% CI, 13% to 17%), 6% from current smokers (20 of 344; 95% CI, 4% to 9%), and 52% from never smokers (302 of 580; 95% CI, 48% to 56%; P < .001 for ever v never smokers). EGFR mutations in former or current smokers represented 40% of all those detected (201 of 503; 95% CI, 36% to 44%). EGFR mutations were found in 19% (157 of 827; 95% CI, 16% to 22%) of tumors from men and 26% (346 of 1,315; 95% CI, 24% to 29%) of tumors from women (P < .001). EGFR mutations in men represented 31% (157 of 503; 95% CI, 27% to 35%) of all those detected.

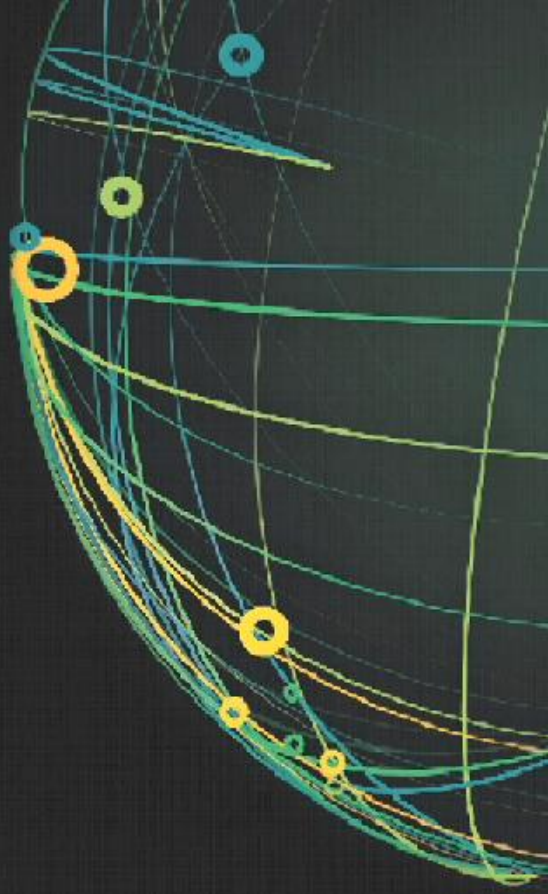
Conclusion: A
men and people who smoked cigarettes. If only women who were never smokers were tested,
57% of all EGFR mutations would be missed. Testing for EGFR mutations should be considered
for all patients with adenocarcinoma of the lung at diagnosis, regardless of clinical characteristics.
This strategy can extend the use of EGFR tyrosine kinase inhibitors to the greatest number
individuals

Ask Watson

Case Information | Test Options | Treatment Options

IBM WATSON

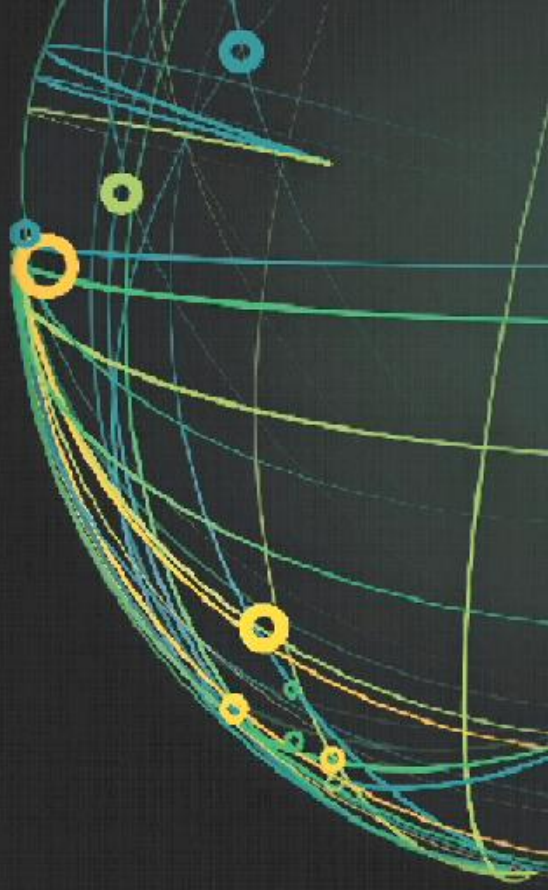

Patient EMR
Treatment Options to Consider
WATSON:
Insufficient information is available to provide treatment options with high confidence.
See the Test Options tab for additional tests that would provide the needed information.
Request Pre-auth
Identified Options
Treatment plan 1
Systemic Chemo: Cisplatin, Pemetrexed, Bevacizumab
Confidence
32%
TBD
match with patient preferences
EVIDENCE
Treatment plan 2
Systemic Chemo: Carboplatin, Paclitaxel, Bevacizumab
Confidence
30%
TBD
match with patient preferences
EVIDENCE
Treatment plan 3
Systemic Chemo: Erlotinib
Confidence
28%
TBD
match with patient preferences
EVIDENCE
Radiation and Surgery are unlikely to be appropriate.
Ask Watson
Case Information
Test Options
Treatment Options
IBM WATSON



First Consultation

- Case is discussed with patient
- Patient preferences discussed
- Patient is examined
- Tests are ordered

IBM WATSON



Preparation for Doctor's Second Consultation with Patient

- 10 days have elapsed since the first consultation
- Test results are now available

IBM WATSON

Patient EMR

Patient Details MRN: 040103110830840 Name: Lin J. Yamato Age: 37

SUMMARY | ENCOUNTERS | CONDITIONS | ALLERGIES | MEDICATIONS | LABS | PATHOLOGY | IMMUNIZATIONS | IMAGING | PROCEDURES | DOCUMENTS | CLINICAL SUMMARY

Imaging Report

From date: To date: Show Show all

Last: Units: Send to EMR Reset

Imaging

Sort By:

- Modality
- Ordered by
- Date

Expand all Collapse all

CT (3) +

MRI (1) −

MRI Brain (1)

03/01/2012: Mark Kris / Brain

Report

Brain MRI Report

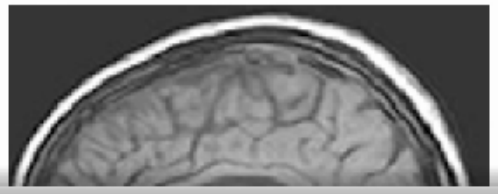
Referring Physician
Dr. Mark Kris

Source
N/A

Referral Date
01/05/2012

Electronically Signed
Dr. Joanne Cameron

HIDE IMAGE −



Imaging Details

Ordered by
Dr. Mark Kris

Indication
Rule out brain metastasis

Status
Signed

Case Information 2 | Test Options | Treatment Options

IBM WATSON

EMR Patient EMR

Case Information

The IBM Watson case information does not obviate the need to review the EMR record in detail

PATIENT	DEMOGRAPHICS	CURRENT CONDITION
Lin J. Yamato	**Gender:** Female	**DX:** Lung Adenocarcinoma
Patient ID: 000-0000	**DOB:** Jan 15, 1975 (37)	**Smoking History:** Never smoker
Provider ID: 00-0000-0	**Place of Birth:** Osaka, Japan	

Diagnosis	Location	Stage
Adenocarcinoma of lung origin	3.1 cm lesion in the right upper lobe of the lung	T2N0M1
Adenocarcinoma of lung origin	1.7 cm lesion in the right adrenal gland	

Key Points *2 Updates

* **03/06/12** – Molecular pathology shows EGFR exon 20 insertion — EMR EVIDENCE

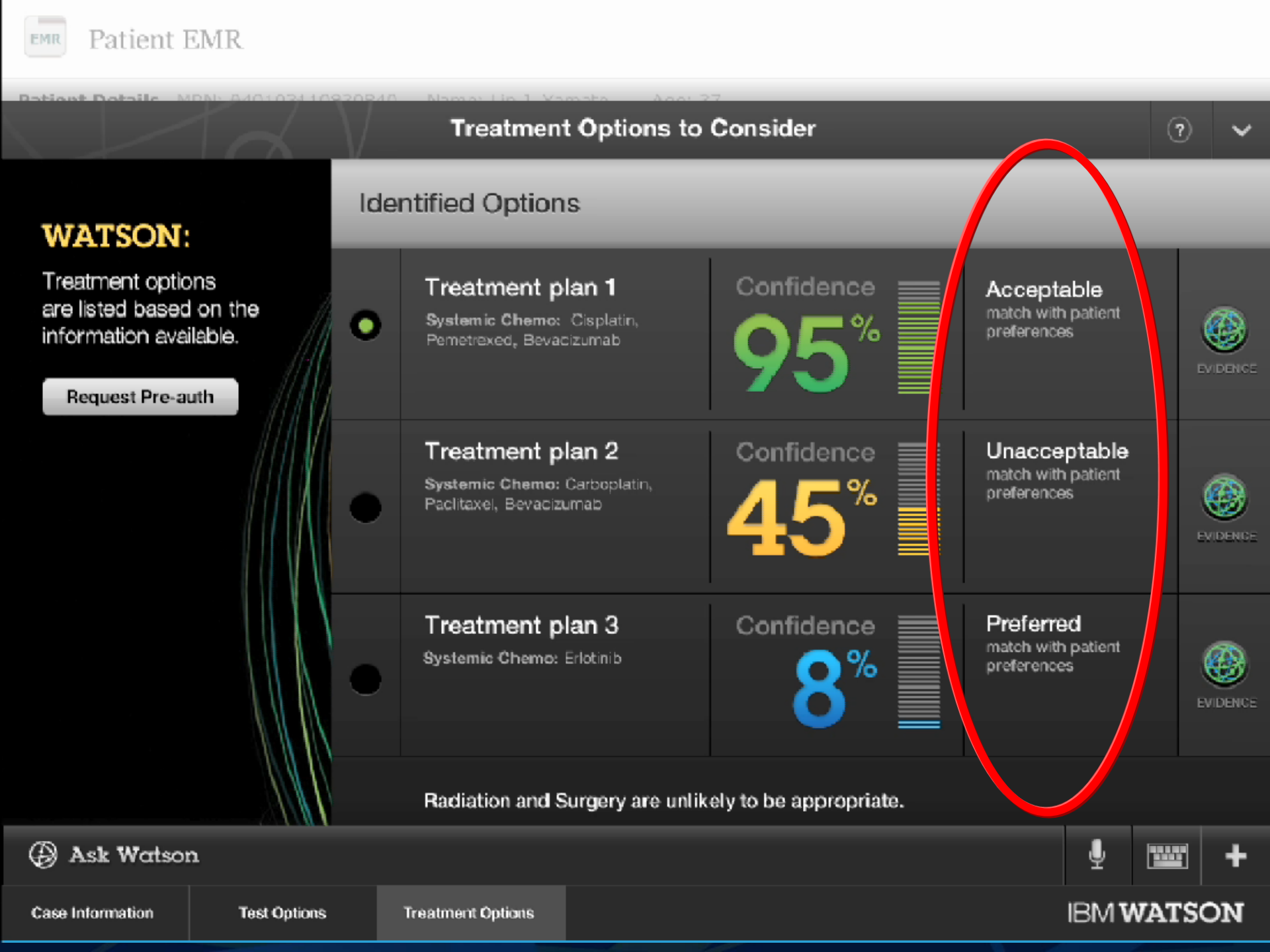
* **03/01/12** – Brain MRI is negative for metastases — EMR EVIDENCE

2/16/12 – Pathology report from CT biopsy of right adrenal gland: Metastatic adenocarcinoma; morphologically consistent with specimen 312-647

Ask Watson

Case Information | Test Options | Treatment Options

IBM WATSON


Patient EMR
Treatment Options to Consider
WATSON:
Treatment options are listed based on the information available.
Request Pre-auth
Identified Options
Treatment plan 1
Systemic Chemo: Cisplatin, Pemetrexed, Bevacizumab
Confidence
95%
Acceptable
match with patient preferences
EVIDENCE
Treatment plan 2
Systemic Chemo: Carboplatin, Paclitaxel, Bevacizumab
Confidence
45%
Unacceptable
match with patient preferences
EVIDENCE
Treatment plan 3
Systemic Chemo: Erlotinib
Confidence
8%
Preferred
match with patient preferences
EVIDENCE
Radiation and Surgery are unlikely to be appropriate.
Ask Watson
Case Information
Test Options
Treatment Options
IBM WATSON

Treatment Options to Consider

WATSON

Treatment op
are listed bas
information av

Request Pre

Treatment plan 1

Reason for suggestion

Stage IV disease requires systemic therapy. Since the tumor harbors EGFR TKI resistant mutation, the recommended treatment is Cisplatin, Pemetrexed, and Bevacizumab.

Surgery: not recommended for this patient due to the presence of metastatic disease.

RT: not recommended for this patient due to the presence of metastatic disease.

Of the medically appropriate regimens, this treatment is least likely to cause alopecia.

Usage Statistics:
This treatment plan has been selected 154 times out of 257 similar patient cases.

References

NCCN Guidelines™ Version 3.2011
NSCL-14: Adenocarcinoma, Large Cell, NSCLC NOS: EGFR mutation negative OR unknown

VIEW
REMOVE

Wu et al. Lung Cancer with Epidermal Growth Factor Receptor Exon 20 Mutations is Associated with Poor Gefitinib Treatment Response. *Clinical Cancer Research*. 2008 14:4877-4882

VIEW
REMOVE

Wu et al. Effectiveness of tyrosine kinase inhibitors on "uncommon" epidermal growth factor receptor mutations of unknown clinical significance in non-small cell lung cancer. *Clinical Cancer Research*. 2011 Jun 1; 17(11): 3812-21.

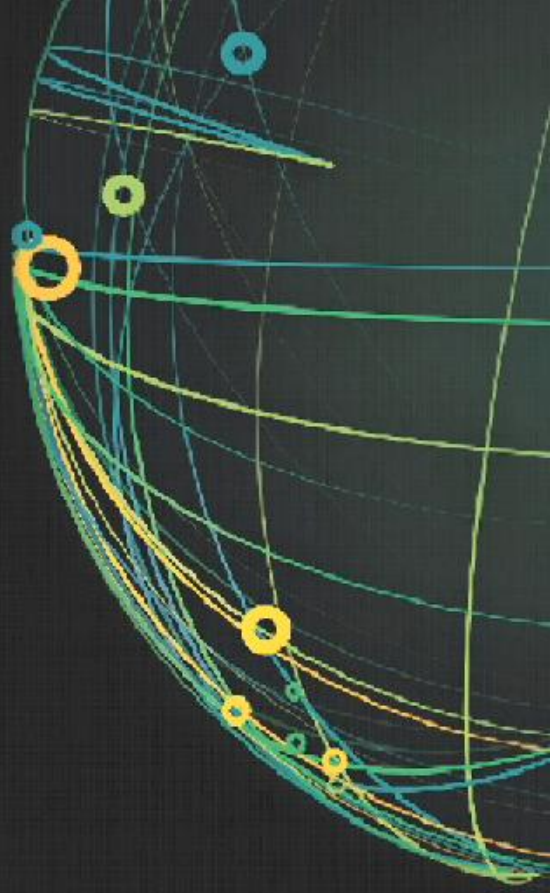
VIEW
REMOVE

Ask Watson

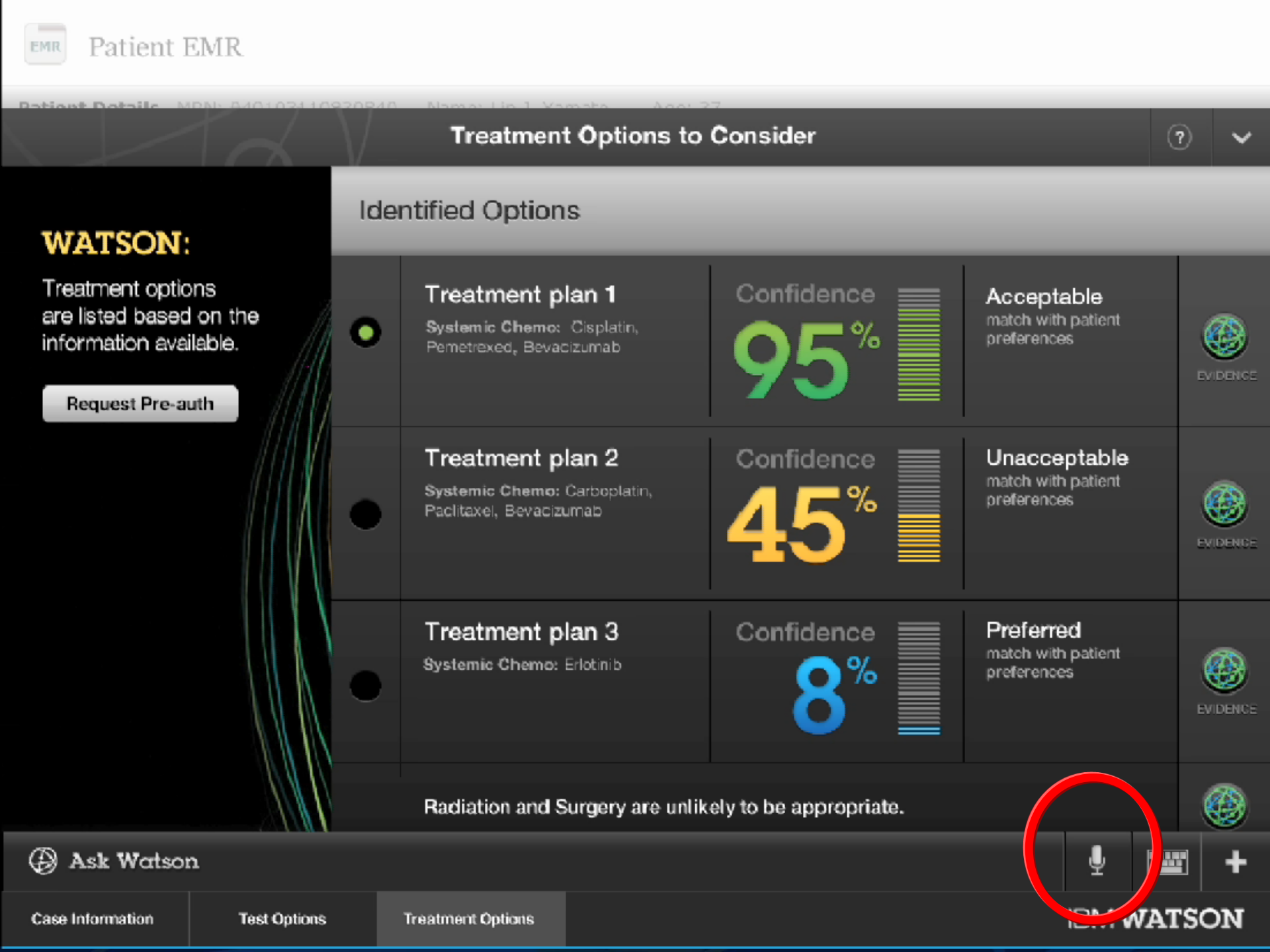
Case Information | Test Options | Treatment Options

IBM WATSON

Second Consultation



IBM WATSON


Patient EMR
Treatment Options to Consider
WATSON:
Treatment options are listed based on the information available.
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Identified Options
Treatment plan 1
Systemic Chemo: Cisplatin, Pemetrexed, Bevacizumab
Confidence
95%
Acceptable
match with patient preferences
EVIDENCE
Treatment plan 2
Systemic Chemo: Carboplatin, Paclitaxel, Bevacizumab
Confidence
45%
Unacceptable
match with patient preferences
EVIDENCE
Treatment plan 3
Systemic Chemo: Erlotinib
Confidence
8%
Preferred
match with patient preferences
EVIDENCE
Radiation and Surgery are unlikely to be appropriate.
Ask Watson
Case Information
Test Options
Treatment Options
IBM WATSON

Patient EMR

Treatment Options to Consider

Ask Watson

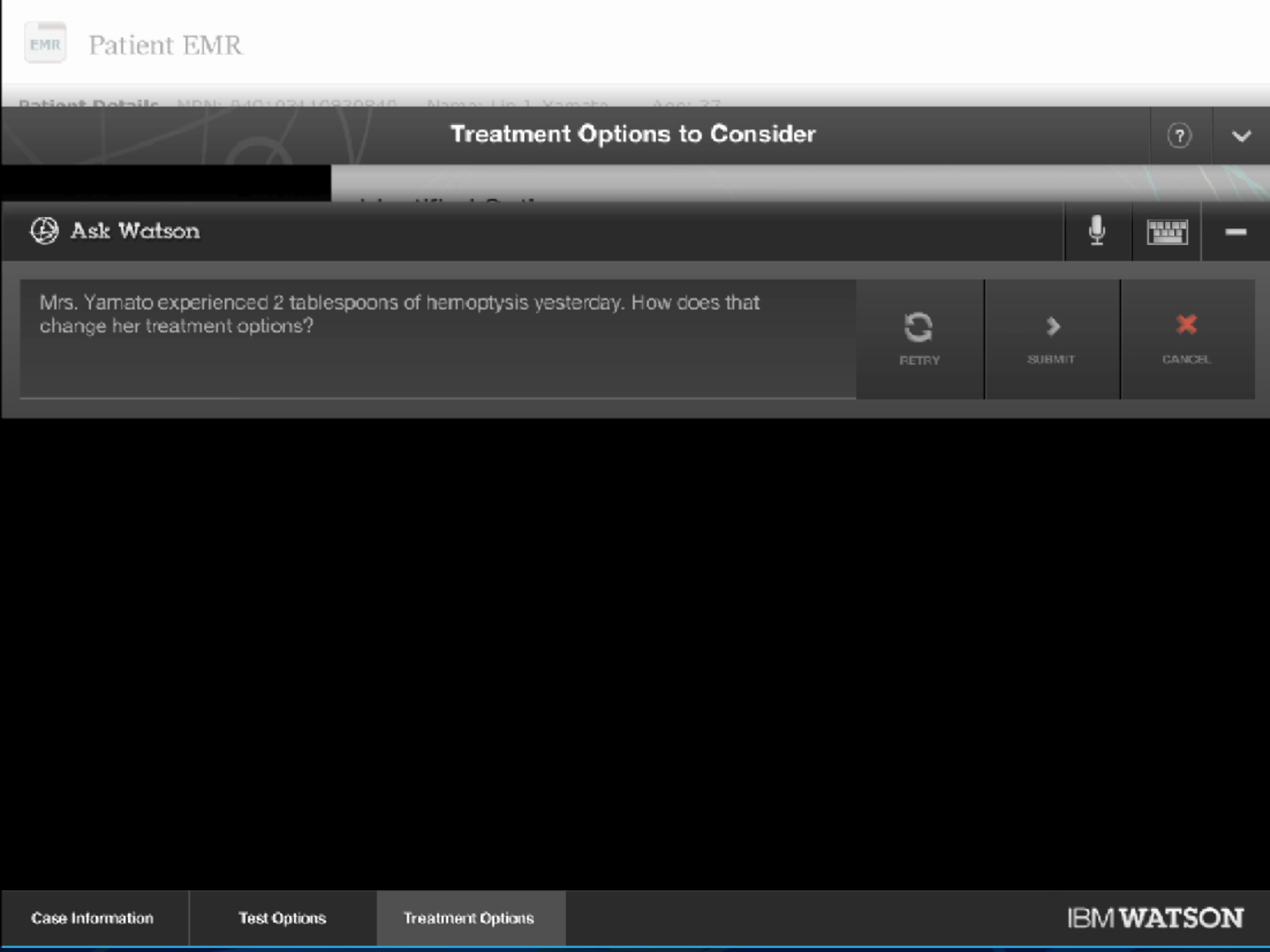
Watson is listening...

FINISHED SPEAKING

CANCEL

Case Information | Test Options | Treatment Options

IBM WATSON


Patient EMR
Treatment Options to Consider
Ask Watson
Mrs. Yamato experienced 2 tablespoons of hemoptysis yesterday. How does that change her treatment options?
RETRY
SUBMIT
CANCEL
Case Information
Test Options
Treatment Options
IBM WATSON

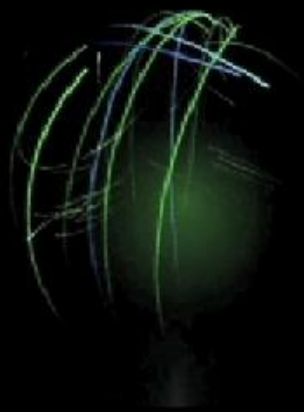
Patient EMR

Treatment Options to Consider

Ask Watson

Dr. Mark Kris

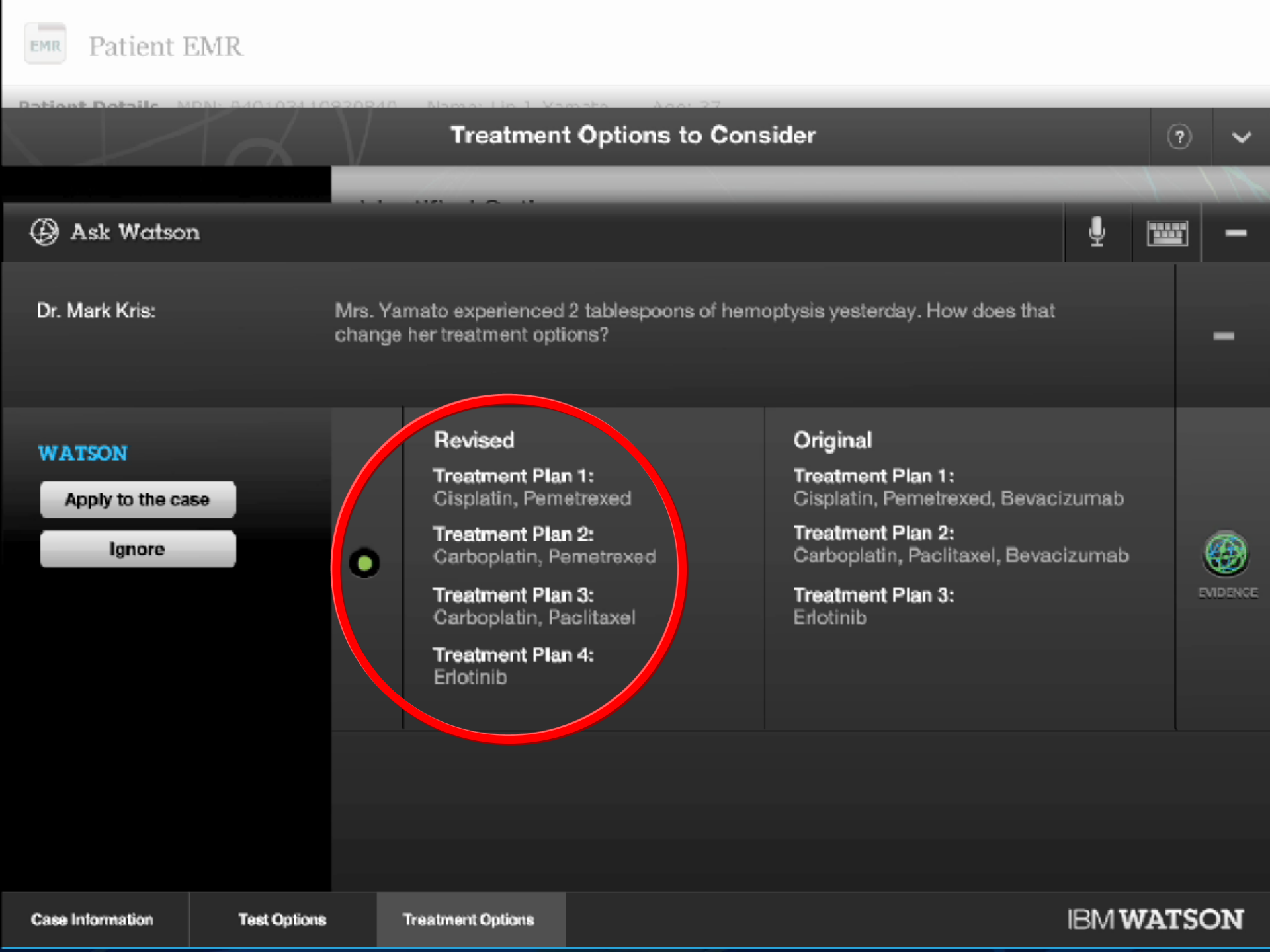
Mrs. Yamato experienced 2 tablespoons of hemoptysis yesterday. How does that change her treatment options?

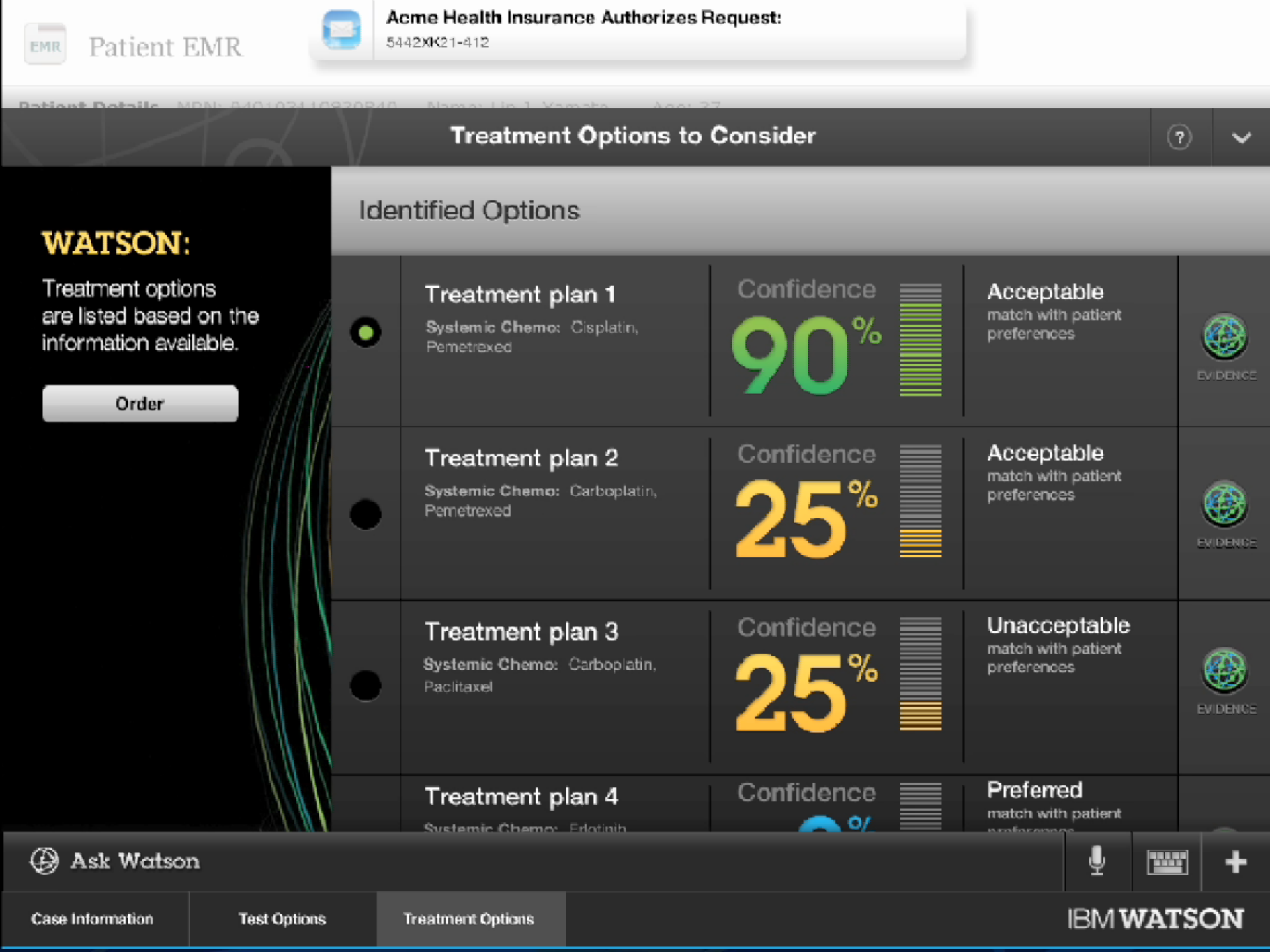


Watson is gathering information...

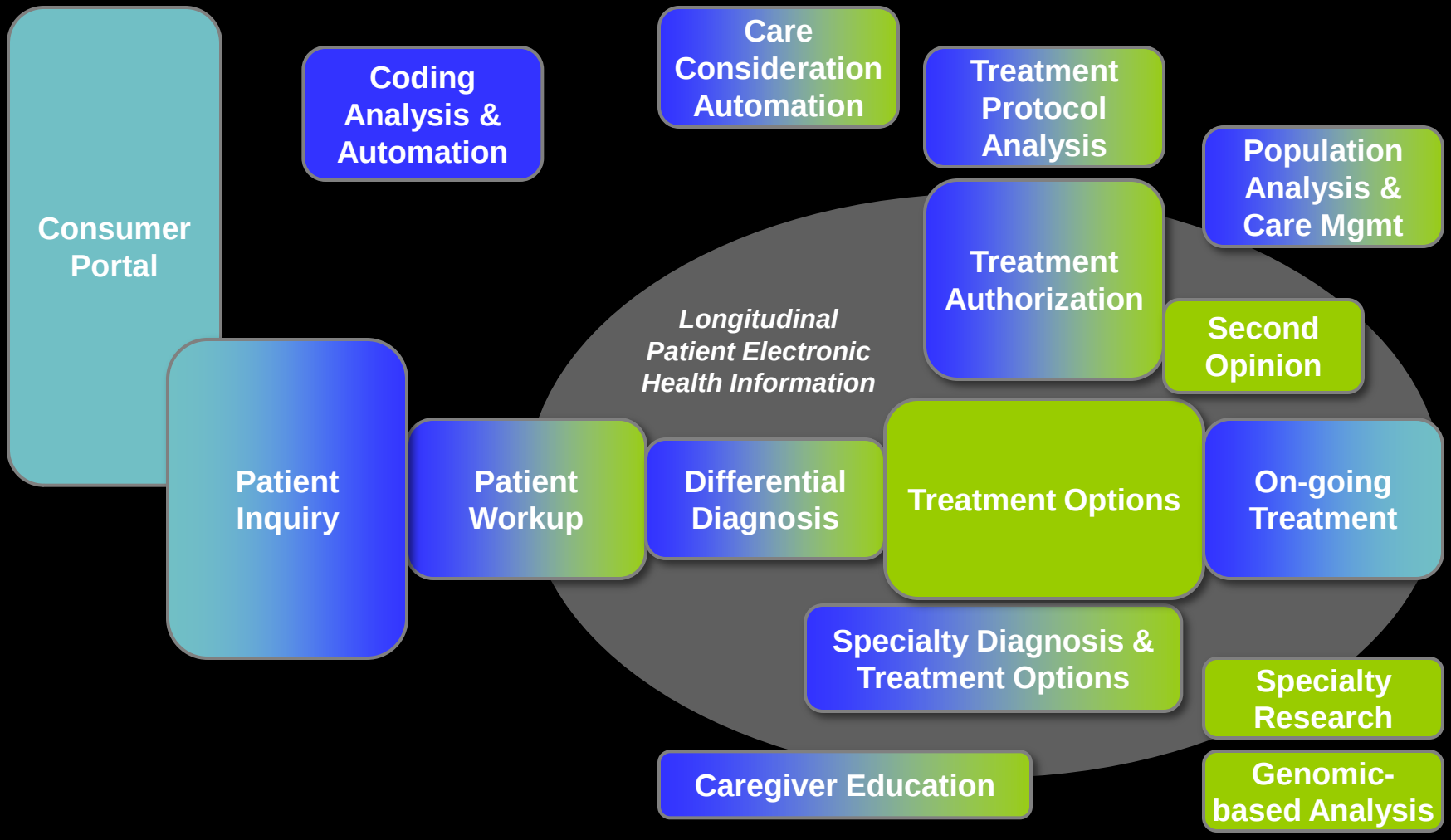
Case Information | Test Options | Treatment Options

IBM WATSON


Patient EMR
Treatment Options to Consider
Ask Watson
Dr. Mark Kris:
Mrs. Yamato experienced 2 tablespoons of hemoptysis yesterday. How does that change her treatment options?
WATSON
Apply to the case
Ignore
Revised
Treatment Plan 1:
Cisplatin, Pemetrexed
Treatment Plan 2:
Carboplatin, Pemetrexed
Treatment Plan 3:
Carboplatin, Paclitaxel
Treatment Plan 4:
Erlotinib
Original
Treatment Plan 1:
Cisplatin, Pemetrexed, Bevacizumab
Treatment Plan 2:
Carboplatin, Paclitaxel, Bevacizumab
Treatment Plan 3:
Erlotinib
EVIDENCE
Case Information
Test Options
Treatment Options
IBM WATSON


Patient EMR
Acme Health Insurance Authorizes Request:
5442XK21-412
Treatment Options to Consider
WATSON:
Treatment options are listed based on the information available.
Order
Identified Options
Treatment plan 1
Systemic Chemo: Cisplatin, Pemetrexed
Confidence
90%
Acceptable
match with patient preferences
EVIDENCE
Treatment plan 2
Systemic Chemo: Carboplatin, Pemetrexed
Confidence
25%
Acceptable
match with patient preferences
EVIDENCE
Treatment plan 3
Systemic Chemo: Carboplatin, Paclitaxel
Confidence
25%
Unacceptable
match with patient preferences
EVIDENCE
Treatment plan 4
Confidence
Preferred
match with patient
Ask Watson
Case Information
Test Options
Treatment Options
IBM WATSON

A Range of Watson-enabled Healthcare Solutions

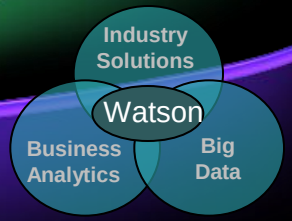


Learning systems are ushering a new era of computing

Cognitive Computing

Programmatic Computing

Tabulation



Traditional IT

- Structured data (local)
- Deterministic Applications
- Search Oriented
- Machine Language
- Systems of records

Emerging IT

- Structured & unstructured (global)
- Probabilistic Applications
- Discovery Oriented
- Natural Language
- Systems of engagement

1900- 1950- 2011-