

# Artificial Intelligence in Rural Community Hospitals: How Can it Work for You?

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One day I was in clinic....



Visiting student rendition

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## Case Presentation

- 60-year-old sister of a 65-year-old patient with multiple myeloma

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### Case Presentation

- 60 year old sister of a 65 year old patient with multiple myeloma
- “Doctor, should I increase the amount of exercise I do to protect against myeloma?”

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### Hell of a question



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I always think exercise is helpful, and I would do it for general health and well-being and particularly cardiovascular disease.



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- “Didn’t you read the new study, doctor?”



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- Didn't you read the new study?



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- Didn't you read the new study?



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- Didn't you read the new study?



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Study: Getting Enough Exercise Lowers Risk of 7 Cancers



Getting recommended amounts of physical activity is linked to a lower risk for 7 cancer types, according to a study from the American Cancer Society, the National Cancer Institute, and the Harvard T.H. Chan School of Public Health.

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Amount and Intensity of Leisure-Time Physical Activity and Lower Cancer Risk

Charles E. Matthews, PhD<sup>1</sup>, Steven C. Moore, PhD<sup>1</sup>, Hannah Arem, PhD<sup>2</sup>, Michael B. Cook, PhD<sup>3</sup>, Britton Trabert, PhD<sup>4</sup>, Niclas Eriksson, PhD<sup>5</sup>, Suzanne C. Larsson, PhD<sup>6</sup>, Alicja Wolk, DrMedSci<sup>7,8</sup>, Susan M. Gapstur, PhD<sup>9</sup>, Bridget M. Lynch, PhD<sup>10</sup>, Roger L. Milne, PhD<sup>11</sup>, Neal D. Freedman, PhD<sup>12</sup>, Wen-Fu Huang, PhD<sup>13</sup>, Amy Berrington de Gonzalez, DPhil<sup>14</sup>, Carl M. Klotzke, PhD<sup>15</sup>, Martha S. Linet, MD<sup>16</sup>, Eric J. Shawne, ScD<sup>17</sup>, Sven Sundin, PhD<sup>18,19</sup>, Ann T. Pahl, PhD<sup>20</sup>, and I-Min Lee, ScD<sup>1</sup>

**PURPOSE** To determine whether recommended amounts of leisure-time physical activity (ie, 7.5-15 metabolic equivalent task [MET] hours/week) are associated with lower cancer risk, describe the shape of the dose-response relationship, and explore associations with moderate- and vigorous-intensity physical activity.

**METHODS** Data from 9 prospective cohorts with self-reported leisure-time physical activity and follow-up for cancer incidence were pooled. Multivariable Cox regression was used to estimate adjusted hazard ratios (HRs) and 95% CIs of the relationships between physical activity with incidence of 15 types of cancer. Dose-response relationships were modeled with restricted cubic spline functions that compared 7.5, 15.0, 22.5, and 30.0 MET hours/week to no leisure-time physical activity, and statistically significant associations were determined using tests for trend ( $P < .05$ ) and 95% CIs ( $< 1.0$ ).

**RESULTS** A total of 755,459 participants (median age, 62 years [range, 32-91 years]; 53% female) were followed for 10.1 years, and 50,620 incident cancers accrued. Engagement in recommended amounts of activity (7.5-15 MET hours/week) was associated with a statistically significant lower risk of 7 of the 15 cancer types studied, including colon (8%-14% lower risk in men), breast (6%-10% lower risk), endometrial (10%-18% lower risk), kidney (11%-17% lower risk), myeloma (14%-19% lower risk), liver (18%-27% lower risk), and non-Hodgkin lymphoma (11%-18% lower risk in women). The dose response was linear in shape for half of the associations and nonlinear for the others. Results for moderate- and vigorous-intensity leisure-time physical activity were mixed. Adjustment for body mass index eliminated the association with endometrial cancer but had limited effect on other cancer types.

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statistically significant lower risk of 7 of the 15 cancer types studied,

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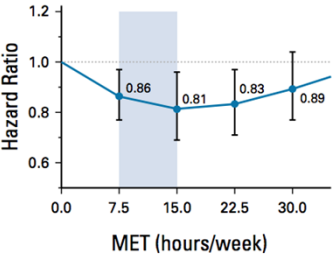
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**Myeloma**  
Cancers, n = 1,370  
Overall association,  $P = .05$   
Nonlinear association,  $P = .03$



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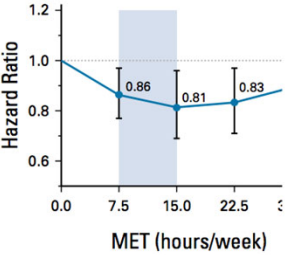
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**Myeloma**  
Cancers, n = 1,370  
Overall association,  $P = .05$   
Nonlinear association,  $P = .03$



| Physical activity   | MET                      |
|---|--------------------------|
| Light intensity activities                                      |                          |
| writing, desk work, using computer                              | 1.5 <sup>[10]</sup>      |
| walking slowly  | 2.0 <sup>[10]</sup>      |
| Moderate intensity activities                                   |                          |
| walking, 3.0 mph (4.8 km/h)                                     | 3.0 <sup>[10]</sup>      |
| sweeping or mopping floors, vacuuming carpets                   | 3 to 3.5 <sup>[10]</sup> |
| yoga session with asanas and pranayama                          | 3.3 <sup>[11]</sup>      |
| Tennis doubles  | 5.0 <sup>[10]</sup>      |
| sexual activity, aged 22  | 5.8 <sup>[12]</sup>      |
| Vigorous intensity activities                                   |                          |
| bicycling, on flat, 10–12 mph (16–19 km/h), light effort        | 6.0 <sup>[10]</sup>      |
| sun salutation (Surya Namaskar, vigorous with transition jumps) | 7.4 <sup>[11]</sup>      |
| basketball game   | 8.0 <sup>[10]</sup>      |
| swimming moderately to hard                                     | 8 to 11 <sup>[10]</sup>  |
| jogging, 5.6 mph (9.0 km/h)                                     | 8.8 <sup>[13]</sup>      |
| rope jumping (66/min)   | 9.8 <sup>[13]</sup>      |
| rope jumping (84/min)   | 10.6 <sup>[13]</sup>     |
| rope jumping (100/min)  | 11.0 <sup>[13]</sup>     |
| jogging, 6.8 mph (10.9 km/h)                                    | 11.2 <sup>[13]</sup>     |

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| Physical activity  | MET                      |
|--|--------------------------|
| <b>Light intensity activities</b>  | <b>&lt; 3</b>            |
| writing, desk work, using computer                                       | 1.5 <sup>[10]</sup>      |
| walking slowly   | 2.0 <sup>[10]</sup>      |
| <b>Moderate intensity activities</b>                                     | <b>3 to 6</b>            |
| walking, 3.0 mph (4.8 km/h)  | 3.0 <sup>[10]</sup>      |
| sweeping or mopping floors, vacuuming carpets                            | 3 to 3.5 <sup>[10]</sup> |
| yoga session with <i>asanas</i> and <i>pranayama</i>                     | 3.3 <sup>[11]</sup>      |
| Tennis doubles   | 5.0 <sup>[10]</sup>      |
| sexual activity, aged 22   | 5.8 <sup>[12]</sup>      |
| <b>Vigorous intensity activities</b>                                     | <b>&gt; 6</b>            |
| bicycling, on flat, 10–12 mph (16–19 km/h), light effort                 | 6.0 <sup>[10]</sup>      |
| sun salutation ( <i>Surya Namaskar</i> , vigorous with transition jumps) | 7.4 <sup>[11]</sup>      |
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| jogging, 6.8 mph (10.9 km/h)   | 11.2 <sup>[13]</sup>     |

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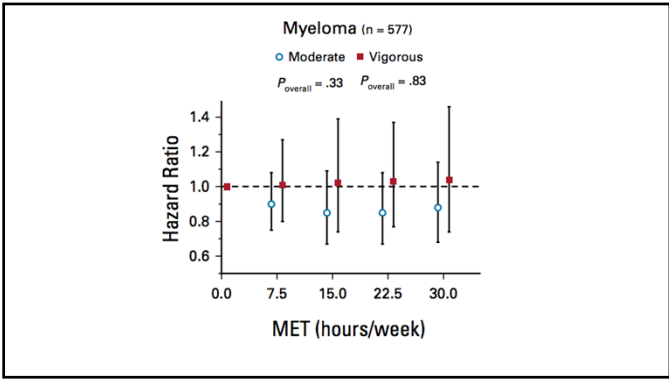
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How did I feel?

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- Implausible finding
- Potential for multiple hypothesis testing
- Confounding – being ill makes you both less likely to exercise and more likely to develop cancer
- Measurement error – self-reported is not true

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Curiosity, I asked Gemini

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Should I exercise more to avoid getting multiple myeloma

- While exercise is incredibly beneficial for overall health, it's important to understand its relationship with multiple myeloma:
  - Exercise and Multiple Myeloma Risk:**
    - Currently, there's no definitive scientific evidence that increased exercise directly prevents multiple myeloma. The exact causes of multiple myeloma are still being researched.
    - However, maintaining a healthy lifestyle, which includes regular exercise, can contribute to overall well-being and may indirectly influence risk factors.
  - Exercise for People with Multiple Myeloma:**
    - For individuals who already have multiple myeloma, exercise is often recommended to improve quality of life, maintain bone health, and manage symptoms.
    - However, it's crucial to consult with a doctor or physical therapist before starting any exercise program. They can provide personalized recommendations based on your individual condition.

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How did I feel?

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- Not bad



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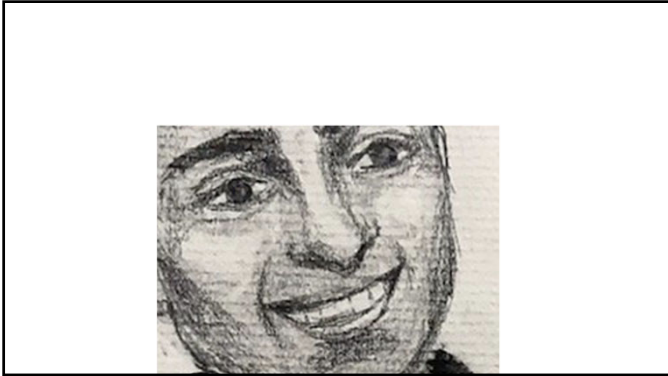
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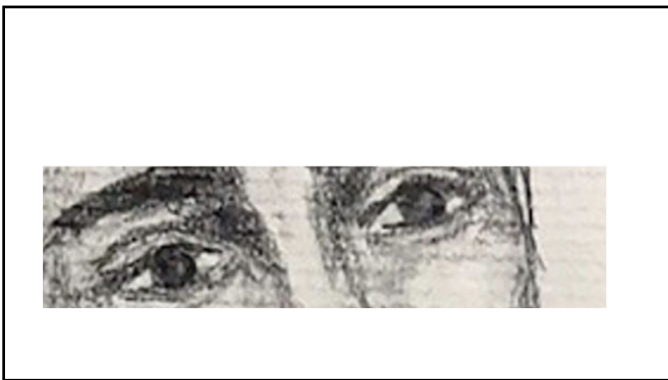
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AI is gaining traction in our hospitals

- We shouldn't fear it but embrace it.

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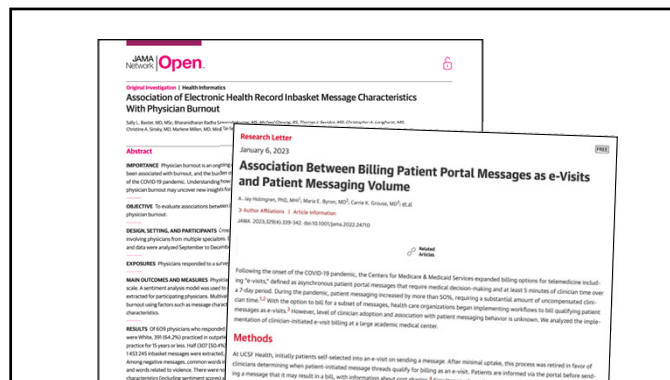
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## AI has come of age

- Chat capabilities

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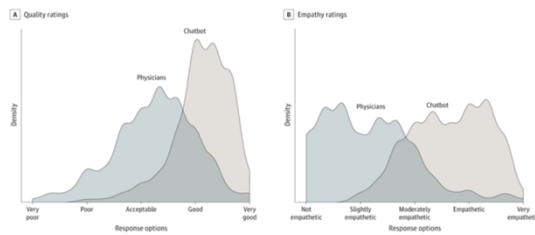
AI for Patient Messages (Ayers et al. JAMA IM 2023)

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1. Real Messages
2. Real Physician Answers
3. A Patient's Perspective
  1. Quality of response (very poor, poor, acceptable, good, or very good)
  2. Empathy of response (not empathetic, slightly empathetic, moderately empathetic, empathetic, and very empathetic).

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**Figure. Distribution of Average Quality and Empathy Ratings for Chatbot and Physician Responses to Patient Questions**



Kernel density plots are shown for the average across 3 independent licensed health care professional evaluators using principles of crowd evaluation. A, The overall quality metric is shown. B, The overall empathy metric is shown.

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## AI is not cur

It's always a good idea to pay attention to changes in your health, especially if they are persistent. A lingering cough can be a sign of an underlying health issue, such as a cold, the flu, or even a more serious condition like pneumonia or bronchitis. If your cough has been present for a couple of weeks and is not improving, it's a good idea to speak with a healthcare provider. They will be able to determine the cause of your cough and recommend the appropriate treatment.

In the meantime, there are a few things you can try to help alleviate your cough:

1. Drink plenty of fluids, including water and warm liquids like tea or broth, to help thin out mucus and make it easier to cough up.
2. Use a humidifier or take a hot shower to add moisture to the air, which can help loosen mucus and make it easier to cough up.
3. Avoid irritants like tobacco smoke, strong perfumes, and pollution, as they can make your cough worse.
4. Try over-the-counter cough medications, such as cough suppressants or expectorants, to help relieve your cough.

It's also important to practice good hygiene, such as washing your hands frequently and covering your mouth and nose when you cough or sneeze, to help prevent the spread of germs.

Common to have a residual cough for a few weeks after being sick, especially if you have any persistent nasal secretions/post nasal drip. Again, if your cough persists, it's a good idea to speak with a healthcare provider.

You can try using some pseudoephedrine to dry it up for a few days, but you'll get some rebound congestion in the meantime. Realistically just takes time. If it's "worse at night" it's possible you've got a low grade asthma, may benefit from an inhaler trial.

AI for Patient Messages (Ayers et al. JAMA IM 2023)

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AI has potential to answer medical questions in health care but also to provide comfort.

- Advantage is it does not fatigue, can be verbose and responsive
- Perhaps it may not always be correct, but neither are physicians

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What about downsides?

- Is it possible we encourage anxiety by letting people ask questions all day?

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One additional role in health care, imo

- To translate the chart into a readable document



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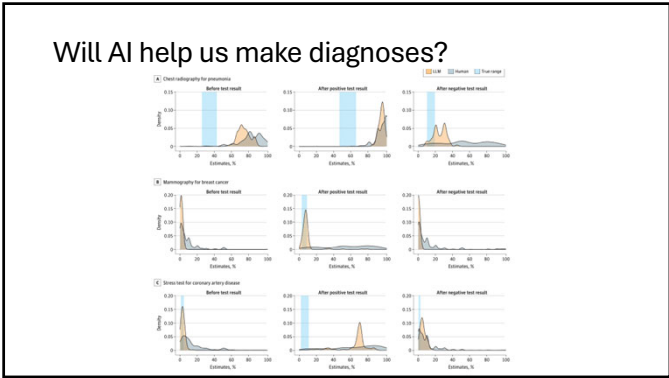
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Research Letter

April 1, 2024

**Clinical Reasoning of a Generative Artificial Intelligence Model Compared With Physicians**

Stephanie Cabral, MD<sup>1</sup>; Daniel Restrepo, MD<sup>2</sup>; Zahir Kanjee, MD, MPH<sup>1</sup>; et al

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|                                     |  |  |   |  |
|-------------------------------------|--|--|---|--|
| I – Interpretive Summary            | the patient's main problem(s). The presence or absence of the following features is assessed:<br><br>a) Key risk factors;<br>b) Chief complaint;<br>c) Illness time course; and<br>d) Use of semantic qualifiers (e.g. monocardiac vs polyarticular) or unified medical concepts (e.g. volume overload, cardiovascular risk factors).<br><br>NB: Some problems have an implied time course (e.g. syncope, seizure).                | 1 feature present  | 1 |  |
|                                     |  | 2 features present   | 2 |  |
|                                     |  | 3 features present   | 3 |  |
|                                     |  | 4 features present   | 4 |  |
| D – Differential Diagnosis          | Offers more than one relevant diagnostic possibility, committing to what is most likely and considering what is less likely or unlikely yet important to consider for the main chief complaint. If the chief complaint is a diagnosis or syndrome (e.g., acute on chronic systolic heart failure) then differential to rate may be around the differential for that exacerbation (e.g., medication non-compliance vs. arrhythmia). | No differential  | 0 |  |
|                                     |  | Differential is implicitly stated, given as a diagnostic category (e.g., "cardiac"), OR implicitly prioritized | 1 |  |
| E – Explanation of Lead Diagnosis   | Explains the reasoning behind the lead diagnosis, including the epidemiology and key features and how these compare with the patient's presentation. If objective data points are not clearly linked to the lead diagnosis or alternative diagnosis, then only designate points to lead OR alternative diagnosis and NOT both.   | Differential is explicitly stated AND explicitly prioritized   | 2 |  |
|                                     |  | No explanation   | 0 |  |
| A – Alternative Diagnosis Explained | Explains the reasoning behind alternative diagnoses, including the epidemiology and key features and how these compare with  | 1 objective data point in explanation of lead diagnosis  | 1 |  |
|                                     |  | >2 objective data points in explanation of lead diagnosis  | 2 |  |
|                                     |  | No explanation for any alternative diagnosis   | 0 |  |
|                                     |  |  |   |  |

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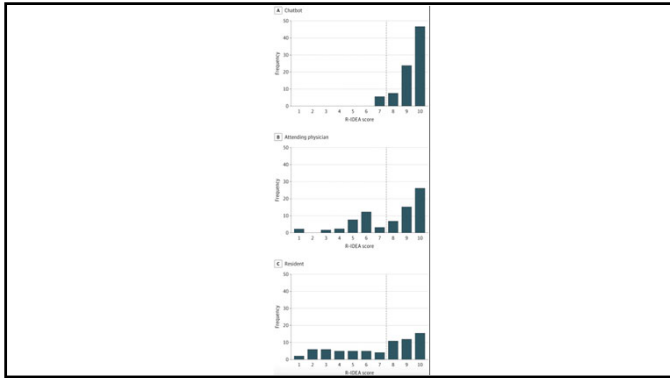
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AI in clinical medicine

- Mammography
- Colon polyps
- Knee radiographs

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- In all these cases, AI is used to ask can I find
  - More invasive ductal adenocarcinoma
  - More polyps
  - Radiographic findings that correlate with pain

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- In all these cases, AI is used to ask can I find
  - More invasive ductal adenocarcinoma
  - More polyps
  - Radiographic findings that correlate with pain
- AI is not being asked
  - Find lesions that should be cut out
  - Find polyps that should be removed
  - Find radiographic findings that tell me a person will benefit from TKA

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### We are asking AI

- To optimizing finding the problem
- Rather than asking it to find people who benefit from therapies
- A subtle distinction with big implications

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### Knee replacement

ARTICLES

<https://doi.org/10.1038/s41591-020-01902-7>

nature

medicine

 Check for updates

#### An algorithmic approach to reducing unexplained pain disparities in underserved populations

Emma Pierson<sup>1,2</sup>, David M. Cutler<sup>3</sup>, Jure Leskovec<sup>4,5</sup>, Sendhil Mullainathan<sup>6,102</sup> and Ziad Obermeyer<sup>4</sup>

Underserved populations experience higher levels of pain. These disparities persist even after controlling for the objective severity of disease like osteoarthritis, as graded by human physicians using medical images, raising the possibility that underserved patients' pain stems from factors external to the knee, such as stress. Here we use a deep learning approach to measure the severity of osteoarthritis, by using knee X-rays to predict patients' experienced pain. We show that this approach dramatically reduces unexplained racial disparities in pain. Relative to standard measures of severity graded by radiologists, which accounted for only 9% (95% confidence interval (CI), 3–16%) of racial disparities in pain, algorithmic predictions accounted for 43% of disparities, or 4.7x more (95% CI, 3.2–11.8x), with similar results for lower-income and less-educated patients. This suggests that much of underserved patients' pain stems from factors within the knee not reflected in standard radiographic measures of severity. We show that the algorithm's ability to reduce unexplained disparities is rooted in the racial and socioeconomic diversity of the training set. Because algorithmic severity measures better capture underserved patients' pain, and severity measures influence treatment decisions, algorithmic predictions could potentially redress disparities in access to treatments like arthroplasty.

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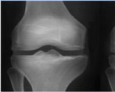
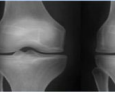
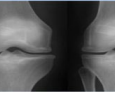
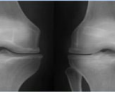
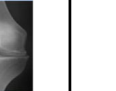
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| Kellgren–Lawrence grading scale |   |   |   |   |   |
|---------------------------------|---|---|---|---|---|
| X-Ray                           |  |  |  |  |  |
| OA Grade                        | Grade 0 (Normal)  | Grade 1 (Doubtful)  | Grade 2 (Mild)  | Grade 3 (Moderate)  | Grade 4 (Severe)  |
| JSN                             | No radiographic features of OA are present  | Doubtful  | Possible  | Definite  | Marked  |
| Osteophytes                     |   | Possible  | Definite  | Multiple  | Large   |

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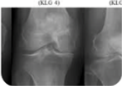
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The Kellgren-Lawrence (KLG) score is a semi-quantitative method for assessing the severity of knee osteoarthritis (OA) on X-rays:

- 0: No evidence of OA
- 1: Possible joint space narrowing and osteophyte formation
- 2: Definite osteophyte formation and possible joint space narrowing
- 3: Multiple osteophytes, definite joint space narrowing, sclerosis, and possibly bone deformity
- 4: End-stage OA, marked by severe sclerosis, joint space narrowing, and large osteophytes

A KLG score of less than 2 is considered mild OA, a score of 2 is considered moderate OA, and a score of greater than 2 is considered severe OA. The KLG score is commonly used in clinical assessment and diagnosis of OA.



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- Pain due to visual abnormalities in the knee is amenable to knee replacement, pain outside the knee is not.

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**Table 3 | Potential eligibility for surgery: comparing KLG and ALG-P**

|                 | Knees potentially eligible for surgery (%) |                   | Knees in severe pain and not eligible for surgery (%) |                   |
|-----------------|--|-------------------|---|-------------------|
|                 | Using KLG                                  | Using ALG-P       | Using KLG   | Using ALG-P       |
| Black           | 11%<br>(7%, 15%)                           | 22%<br>(17%, 27%) | 51%<br>(45%, 57%)                                     | 40%<br>(34%, 46%) |
| Lower-income    | 10%<br>(8%, 12%)                           | 13%<br>(10%, 15%) | 36%<br>(33%, 40%)                                     | 34%<br>(31%, 38%) |
| Lower-education | 9%<br>(7%, 11%)                            | 14%<br>(11%, 16%) | 38%<br>(35%, 42%)                                     | 33%<br>(30%, 37%) |

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- Pain from 1 to 10 (bad)
- 10 → 1
- 8 → 6
- Who should get surgery?

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- Pain from 1 to 10 (bad)
- 10 → 10
- 8 → 1
- Who should get surgery?

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- Pain from 1 to 10 (bad)
- 10 → 6
- 8 → 3
- Who should get surgery?

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### More complicated

- Pain from 1 to 10 (bad)
- 10 → 9 (No surgery), but 10→ 6 (Surgery)
- 8 → 4 (No surgery), but 8 -> 3 (Surgery)
- Who should get surgery?

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- People who have knee pain which can be \*seen\* on XR (whether by humans or AI) are more likely to benefit from replacing the knee than those who do not.
- But this is a big untested assumption.
- We have little idea who benefits from replacement.
- It is possible that it isn't something about what's going on in the knee, but what is going on in the entire body, and desire to feel better.
- New method finds people who do WORSE with surgery.

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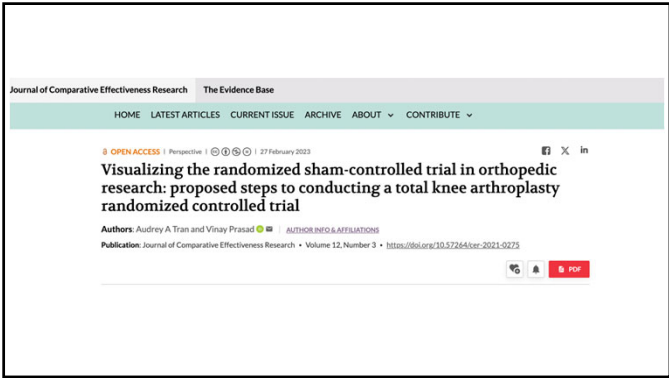
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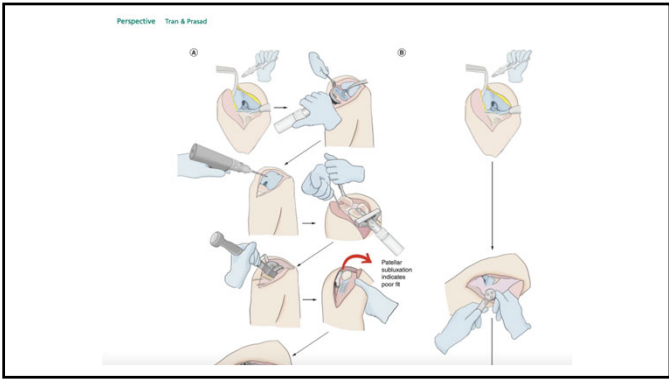
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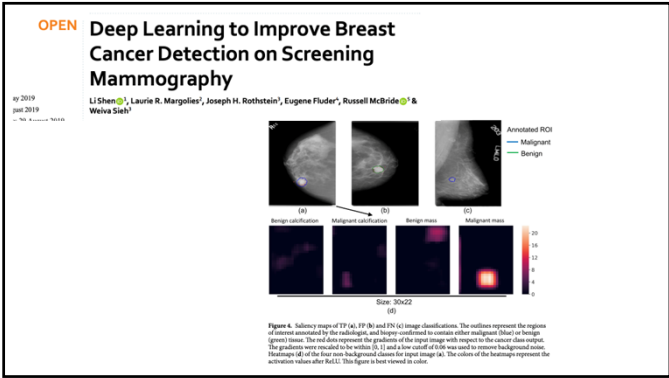
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
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Article | Published: 01 January 2020

## International evaluation of an AI system for breast cancer screening

[Scott Mayer-McKinney](#) , [Marcin Sieniek](#), [Varun Godbole](#), [Jonathan Godwin](#), [Natasha Antropova](#), [Hutan Ashrafian](#), [Trevor Back](#), [Mary Chesus](#), [Greg S. Corrado](#), [Ara Darzi](#), [Mozziyar Etemadi](#), [Florescia Garcia-Vicente](#), [Fiona J. Gilbert](#), [Mark Halling-Brown](#), [Demis Hassabis](#), [Sunny Jansen](#), [Alan Karthikesalingam](#), [Christopher J. Kelly](#), [Dominic King](#), [Joseph R. Ledsam](#), [David Melnick](#), [Hormuz Mostofi](#), [Lily Peng](#), [Joshua Jay Reicher](#), ... [Shravya Shetty](#)  [+ Show authors](#)

*Nature* **577**, 89–94 (2020) | [Cite this article](#)

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clinical setting, we curated a large representative dataset from the UK and a large enriched dataset from the USA. We show an absolute reduction of 5.7% and 1.2% (USA and UK) in false positives and 9.4% and 2.7% in false negatives. We provide evidence of the ability of the system to generalize from the UK to the USA. In an independent study of six radiologists, the AI

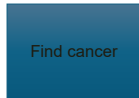
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## Mammography

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## Screening

- The purpose of screening



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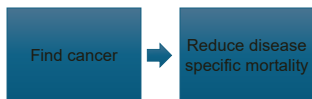
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## Screening

The purpose of screening



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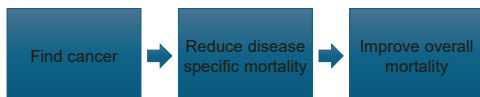
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## Screening

The purpose of screening



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- You can't find cancer that was never going to spread.
- You can't find cancer that has spread already.
- You can't find a cancer that was going to be felt a year later and safety removed them.
- You have to find a cancer that wasn't going to be felt in the future, was going to spread, but by finding it now and catching it, you prevented it from spreading.

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### It's all about what we ask AI

- Find more cancer
- Find more lesions that we should cut out today because if we don't, we will miss them until it is too late.\*
- \*No one knows based on mammography, which lesions these are.

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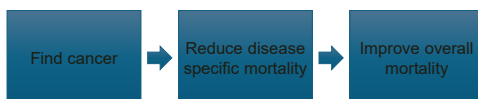
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### Screening

The purpose of screening



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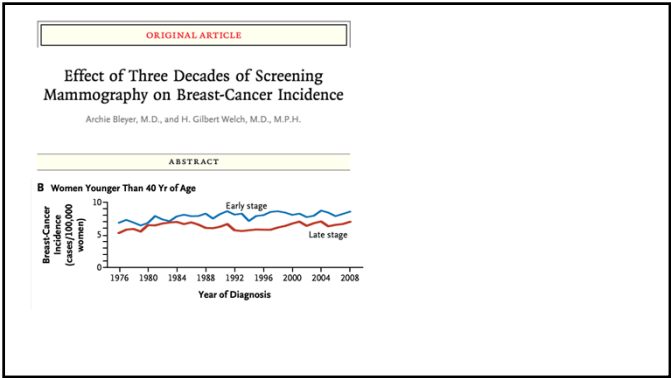
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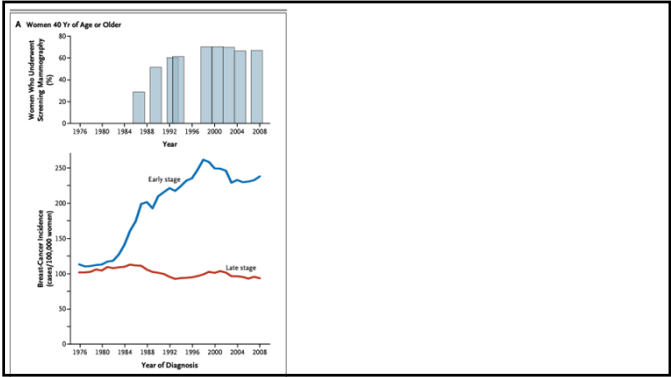
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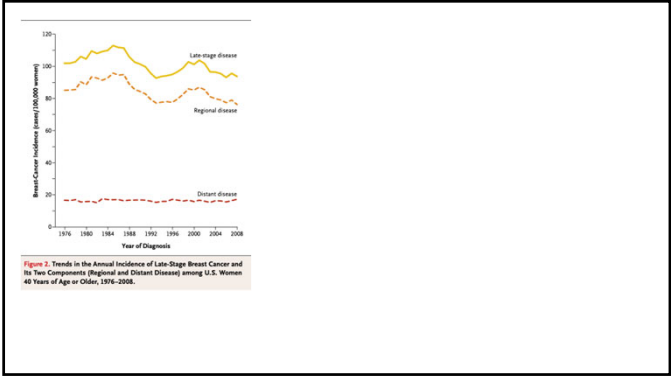
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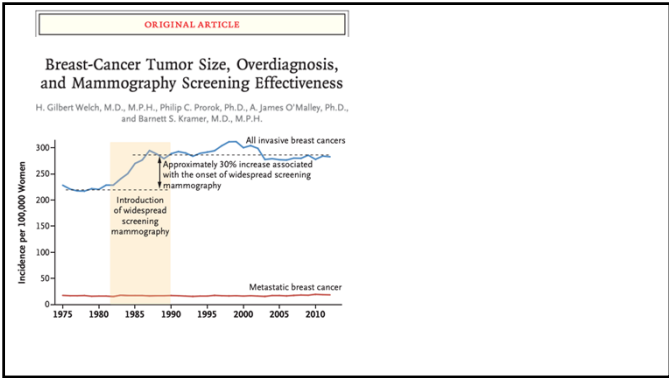
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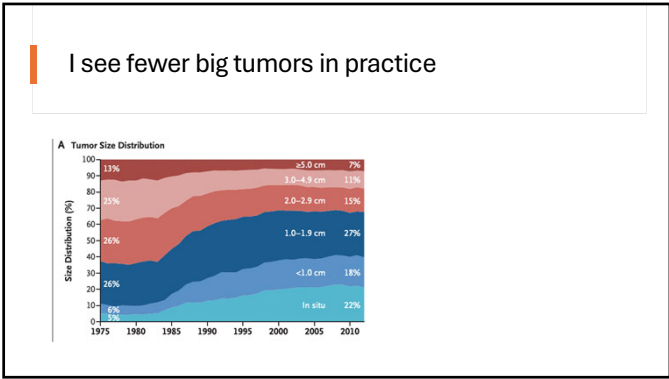
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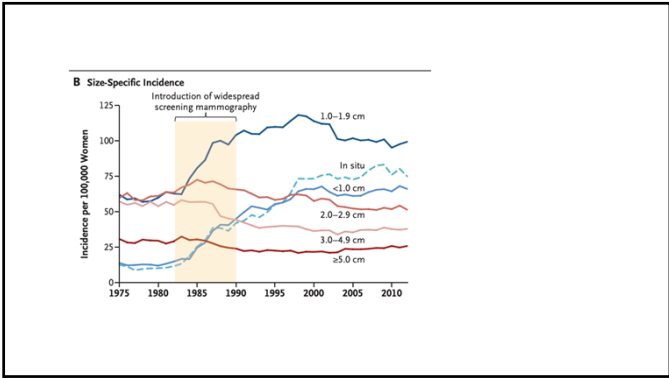
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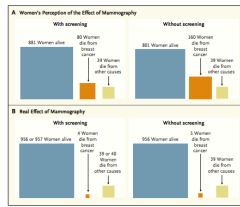
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## Cancer Screening

### Abolishing Mammography Screening Programs? A View from the Swiss Medical Board

Nikola Biller-Andorno, M.D., Ph.D., and Peter Juni, M.D.



Panel A shows the view of 10-year-old women in the United States regarding the effect of mammography every 2 years on the 10-year risk of death from breast cancer (left), as compared with no screening (right). The area of the squares are proportional to the number of women per 1000 who would be alive (blue), die from breast cancer (orange), or die from other causes (yellow). The numbers were calculated from women's perceived relative and absolute risk reductions for breast cancer deaths (Domenighetti et al.) and U.S. mortality statistics for 2008 from the Centers for Disease Control and Prevention. Panel B shows the actual effect of mammography screening on breast cancer deaths, with numbers calculated from breast cancer mortality data for only from

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Home » Internal Newsletters » Pressby Bulletin » Testing the Power of AI to Better Detect Colon Polyps

### Testing the Power of AI to Better Detect Colon Polyps

March 01, 2023

Recently, physicians from Penn Presbyterian Medical Center (PPMC)'s division of Gastroenterology and Hepatology launched a three-year pilot program to determine if artificial intelligence (AI) technology could improve precancerous polyp detection in screening colonoscopies.

Colorectal cancer is the third-most common cancer in the world and the second-most common cause of cancer deaths. It is also among the most preventable cancers with regular screening colonoscopies, but "even if you are adherent to a standard schedule of screening and surveillance colonoscopies for a lifetime, there is still a small but real five- to nine-percent risk of developing colon cancer because there may be small polyps in the colon that are missed," said gastroenterologist **Nellanjan Nandi, MD, FACP**, who coordinates the new AI platform.

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- Are you finding more polyps? -- current AI question
- You want to find polyps and precancer that are going to advance and cause morbidity or mortality and not
  - Ones that will be caught on the next screening
  - Ones that have already spread
  - Ones that were never going to cause harm

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AI can blunder

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JAMA Internal Medicine | Original Investigation  
External Validation of a Widely Implemented Proprietary Sepsis Prediction Model in Hospitalized Patients

Andrew Heng MD, John Chen, Ming, et al; Jern-Huey MD, Andrew Evans, PhD, Jeffrey McLaughlin, PhD, Shih-Chieh Tsai, MD, Scott Pearson, MD, John P. Heffley, Dr, John Evans, MD, PhD, Lauren Peters, MD, PhD, Michael Chiu, MD, Karande Singh, MD, MPH

**Importance:** The Epic Sepsis Model (ESM), a proprietary sepsis prediction model, is implemented at a network of 13 hospitals. The ESM's ability to identify patients with sepsis has not been adequately evaluated despite widespread use.

**Objective:** To externally validate the ESM in the prediction of sepsis and evaluate its potential clinical value compared with usual care.

**Design:** A 30-day, non-interventive, retrospective cohort study was conducted among 27 837 patients aged 18 years or older admitted to Michigan Medicine, the authors' health system at University of Michigan, Ann Arbor, with 38 452 hospitalizations between December 6, 2018, and October 20, 2019.

**Location:** The ESM score, calculated every 15 minutes.

**Main Results:** Using the ESM, sepsis, as defined by a composite of (1) the Centers for Disease Control and Prevention operational criteria and (2) International Classification of Diseases and Related Health Problems, tenth revision diagnostic codes accompanied by a positive laboratory response to systemic illness and organ dysfunction criterion within 4 hours of one another. Model discrimination was assessed using the area under the receiver operating characteristic curve at the hospitalization level and each prediction horizon of 4, 8, 12, and 24 hours. Model calibration was evaluated with calibration plots. The potential clinical benefit associated with the ESM was assessed by estimating the added benefit of the ESM score compared with contemporary clinical practice based on binary administration of antibiotics. After 4 days, the ESM was evaluated by comparing the clinical value at different starting horizons.

**Conclusion:** We identified 27 837 patients who had 38 452 hospitalizations (27 834 women [79%], median age, 64 years) during the study. At 48 hours, testing the ESM score, of whom were exposed to 252 179s. The ESM did not identify patients under the ESM score (sensitivity, 0.40; 95% CI, 0.38–0.42). The ESM identified 18% of 252 patients with sepsis (7%) who did not receive timely administration of antibiotics, highlighting the low specificity of the ESM in comparison with contemporary clinical practice. The ESM also did not identify 1500 patients with sepsis (57%) despite generating alerts for an ESM score of 4 or higher for 48% of all 38 452 hospitalized patients (45%), thus missing a large fraction of alert targets.

**Conclusion and Relevance:** The external validation cohort study suggests that the ESM has poor discrimination and calibration in predicting the onset of sepsis. The widespread adoption of the ESM appears to pose performance risks for patients, as well as sepsis management on a national level.

Editorial page 1043  
Webcasts  
Supplemental content  
DOI: 10.1001/jama.2020.10433  
JAMA. 2020;324(18):1643-1650.

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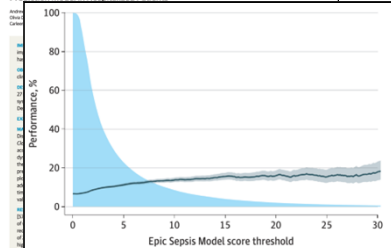
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JAMA Internal Medicine | Original Investigation  
External Validation of a Widely Implemented Proprietary Sepsis Prediction Model in Hospitalized Patients



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Research

JAMA Internal Medicine | Original Investigation

External Validation of a Widely Implemented Proprietary Sepsis Prediction Model in Hospitalized Patients

Article

October 1, 2022

Among 2552 hospitalized patients that developed sepsis, only 7% who did not already receive early treatment were identified by the system. Moreover, the system did not identify 67% of patients who developed sepsis.

an AUC score of 0.5 is higher for 88% of all 38 453 hospitalized patients (92%), then creating a single threshold and trigger.

[View content and metrics](#) This external validation cohort study suggests that the ESM heuristic demonstrates poor calibration in predicting the onset of sepsis. The misdiagnosis

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### AI in rural hospitals

- It can help us manage the paperwork of medicine
- It can help improve our diagnoses
- It can improve quality but also backfire
- It can lead to innovation but also find things we don't want to
- It has great potential, and we should use it wisely

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### Future things to explore if you liked this talk


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
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
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
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
Teclistamab | MagisTEC1 | ASCO2022 | Is this trial practicing changing?

Vinay Prasad MD MPH




A 100% Complete Response Rate??? | breakdown Dostarlimab in MSI-H Stage I/III Rectal | ASCO Update

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ASCO2022 DESTINY BREAST 04 - How can we interpret a trial without pre or post treatment information?

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ASCO2022 - DETERMINATION trial - Determined to keep transplanting myeloma? | Break it down

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Plenary Session

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Host: Vinay Prasad, MD MPH from University of California, San Francisco.  
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SEP 2, 2022

**5.12 - Academics Vs Industry - A.Goodman S.Loghavi D.Steensma V.P. a** >

How do careers vary between the academy and industry? We have a panel of the best: Sanam Loghavi from MD Anderson, Aaron Goodman UCSF, and David Steensma Novartis (formerly Farber) Mayo and VP of Real talk

▶ PLAY

1 hr 29 min

AUG 25, 2022

**5.11 - Malignant Book Club - Part 5 a** >

Timothée Oliver joins me as we explore part 3 of the book Crossover, sample size, observational vs RCTs

▶ PLAY

52 min

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Questions

MALIGNANT

How Bad Policy and Bad Evidence  
Harm People with Cancer

VINAYAK K. PRASAD, MD, MPH

• [Vinayak.prasad@ucsf.edu](mailto:Vinayak.prasad@ucsf.edu)

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