

Digital und personalisiert – Wie wir Digitalisierung für die Weiterentwicklung unsere Gesundheitssysteme nutzen können

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Herwig Ostermann^{1,2}

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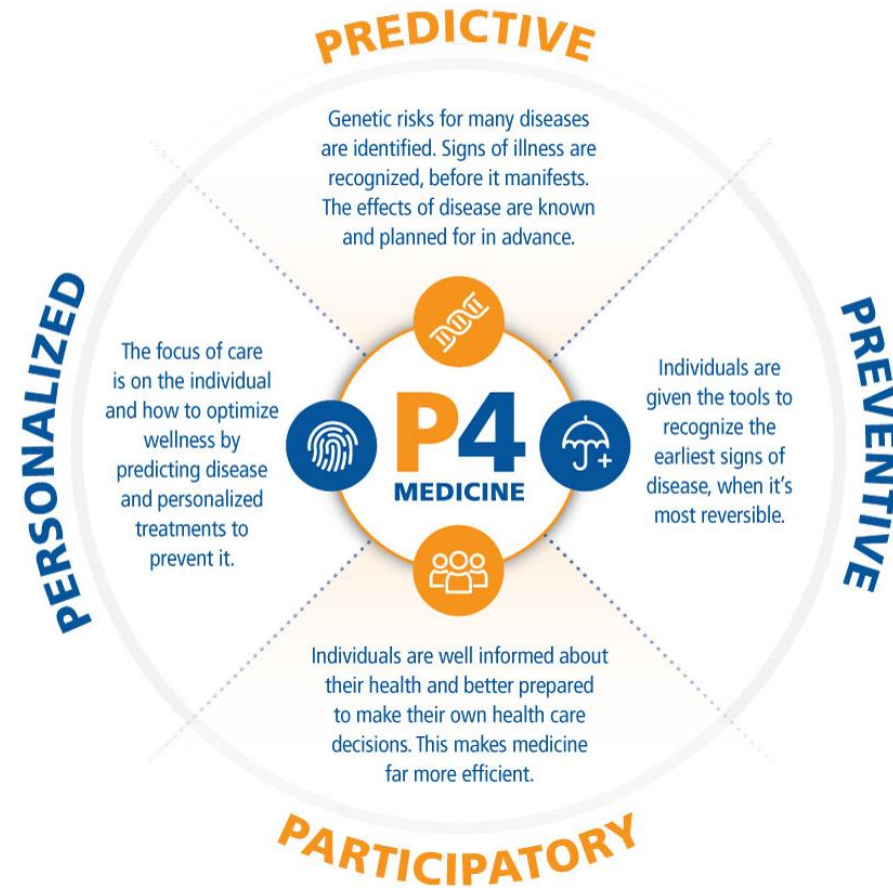
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Hall in Tirol

Digital und individualisiert – Wie wir die Digitalisierung zur Weiterentwicklung unserer Gesundheitssysteme einsetzen können

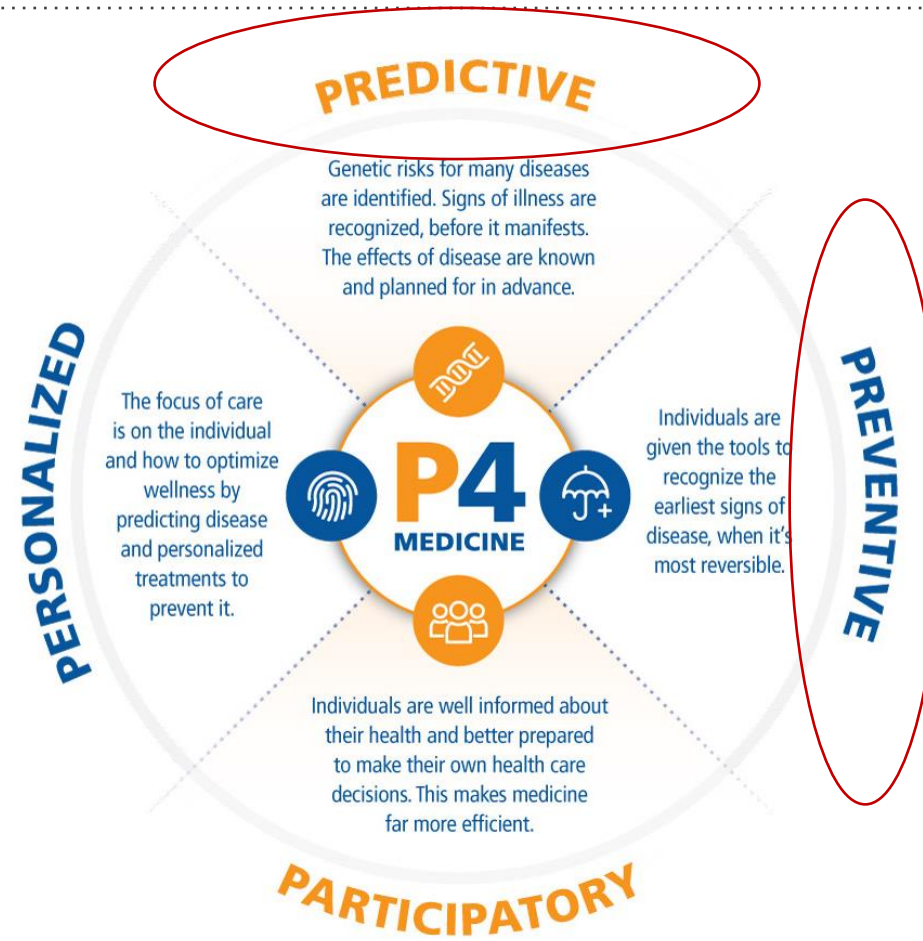
- Agenda
 - Die Möglichkeiten der personalisierten/präzisen Medizin
 - Die Möglichkeiten der Künstlichen Intelligenz
 - Was das möglicherweise für Gesundheitssysteme bedeuten kann
 - An der Stelle von abschließenden Bemerkungen...

Die Möglichkeiten der personalisierten/präzisen Medizin

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Die Möglichkeiten der personalisierten/präzisen Medizin



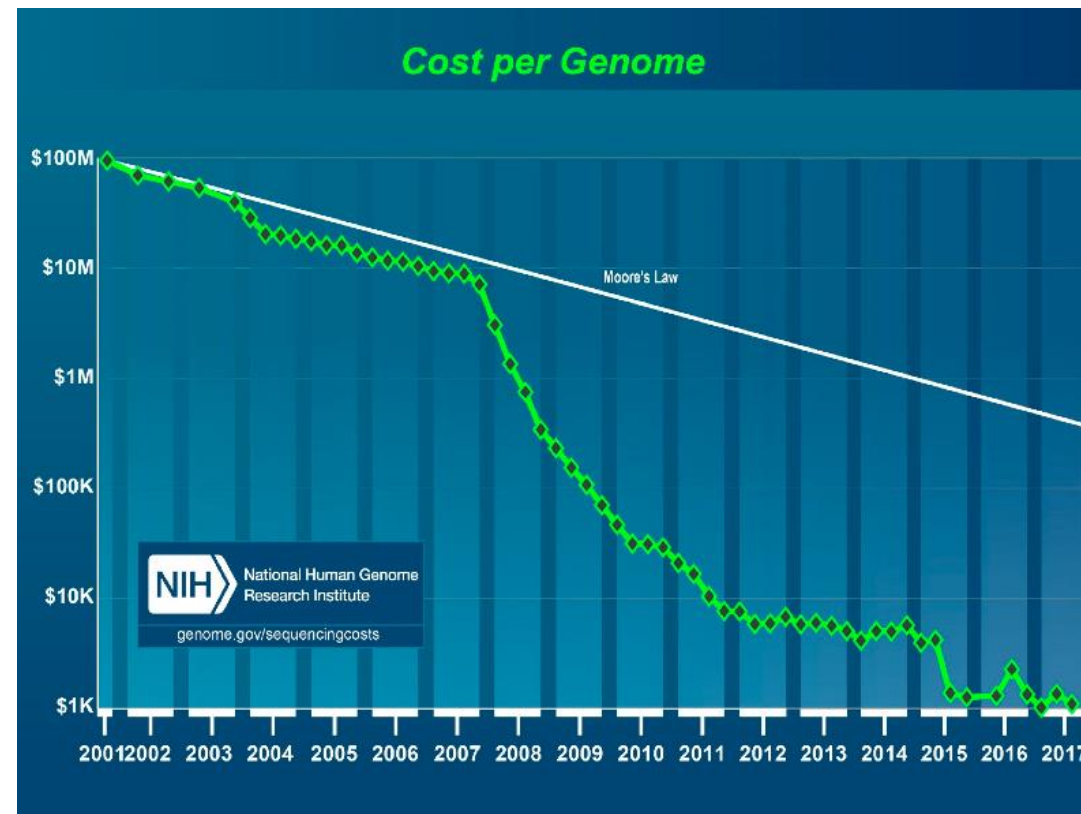
Die Möglichkeiten der personalisierten/präzisen Medizin

- Der Ausgangspunkt...



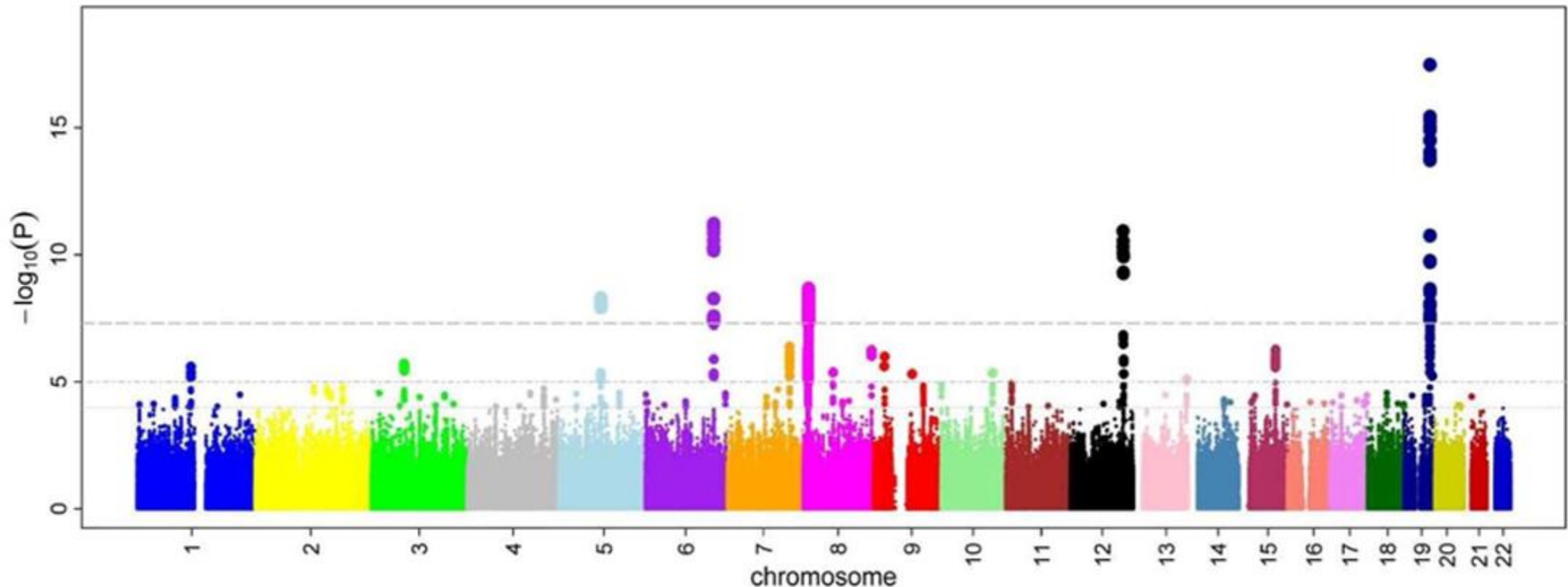
Die Möglichkeiten der personalisierten/präzisen Medizin

- Heute ...



Die Möglichkeiten der personalisierten/präzisen Medizin

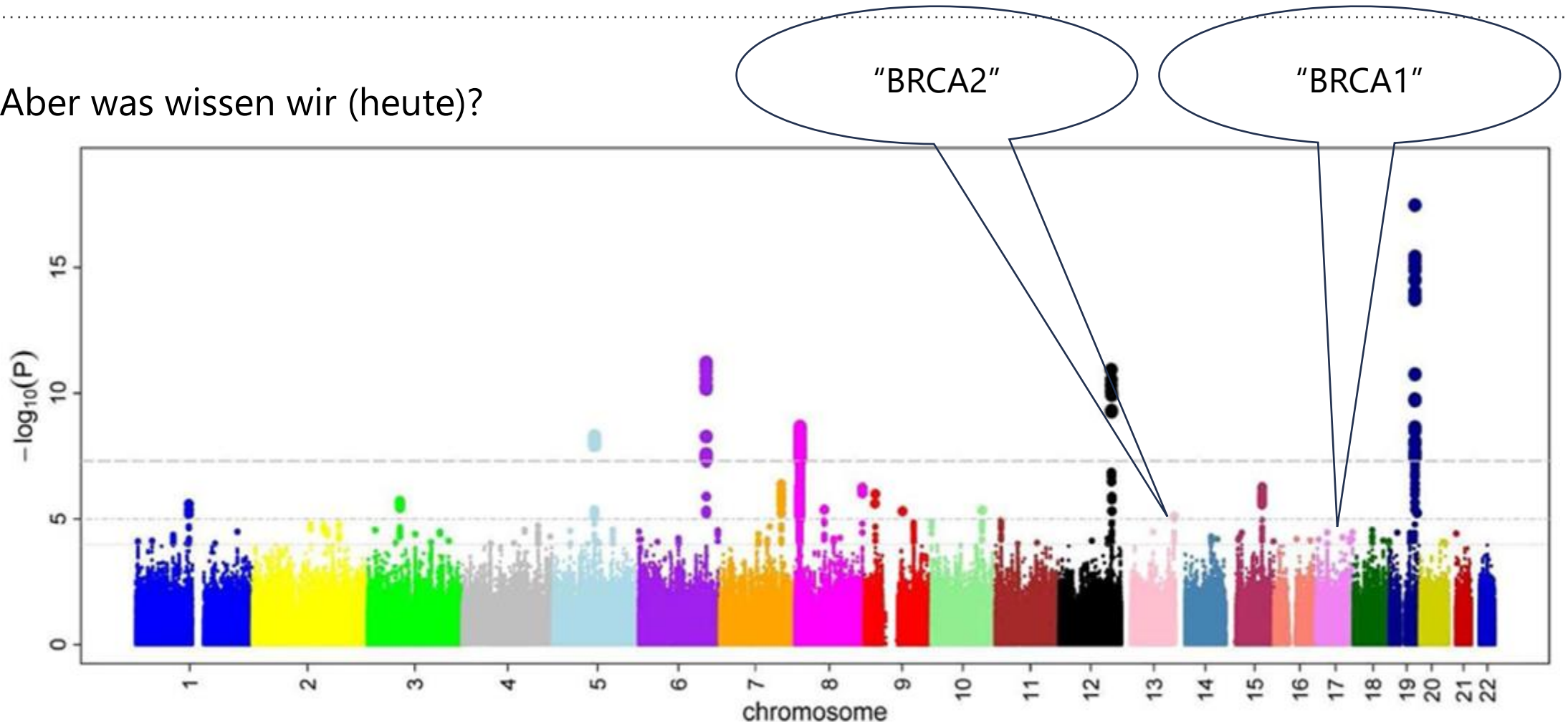
- Aber was wissen wir (heute)?



Quelle: https://en.wikipedia.org/wiki/Genome-wide_association_study

Die Möglichkeiten der personalisierten/präzisen Medizin

- Aber was wissen wir (heute)?



Die Möglichkeiten der personalisierten/präzisen Medizin

- Prädiktiv

Wien Klin Wochenschr
DOI 10.1007/s00508-012-0173-6

Wiener klinische Wochenschrift
The Central European Journal of Medicine

Leitlinie zur Prävention und Früherkennung von Brust- und Eierstockkrebs bei Hochrisikopatientinnen, insbesondere bei Frauen aus HBOC (Hereditary Breast and Ovarian Cancer) Familien

Christian F. Singer, Muy-Kheng Tea, Gunda Pristauz, Michael Hubalek, Christine Rappaport, Christopher Riedl, Thomas Helbich

Eingegangen: 8. Dezember 2011 / Angenommen: 19. April 2012
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Keywords: BRCA, Hereditary breast and ovarian cancer, Breast cancer early detection, Guideline

Zusammenfassung Die vorliegende österreichische Leitlinie zur Prävention und Früherkennung von Brust- und Eierstockkrebs bei Hochrisikopatientinnen – insbesondere bei Frauen aus HBOC-Familien – wurde unter der besonderen Berücksichtigung des aktuellen EUSOMA (European Society of Breast Cancer Specialists) Positionspapiers von oben angeführten Experten gemeinsam erstellt. Die Leitlinie soll die Betreuung von Frauen mit einem erhöhtem Lebenszeitrisko für Brust- und/oder Eierstockkrebs standardisieren und vereinfachen.

Schlüsselwörter: BRCA, Hereditärer Brustkrebs, Früherkennung, Prophylaktische Operationen

Begriffsbestimmung

Hereditary Breast and Ovarian Cancer (HBOC) Familie

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Cancer Type	General Population Risk	Risk for Malignancy ¹	
		BRCA1	BRCA2
Breast	12%	46%-87%	38%-84%
Second primary breast	2% within 5 years	21.1% within 10 yrs 83% by age 70	10.8% within 10 yrs 62% by age 70
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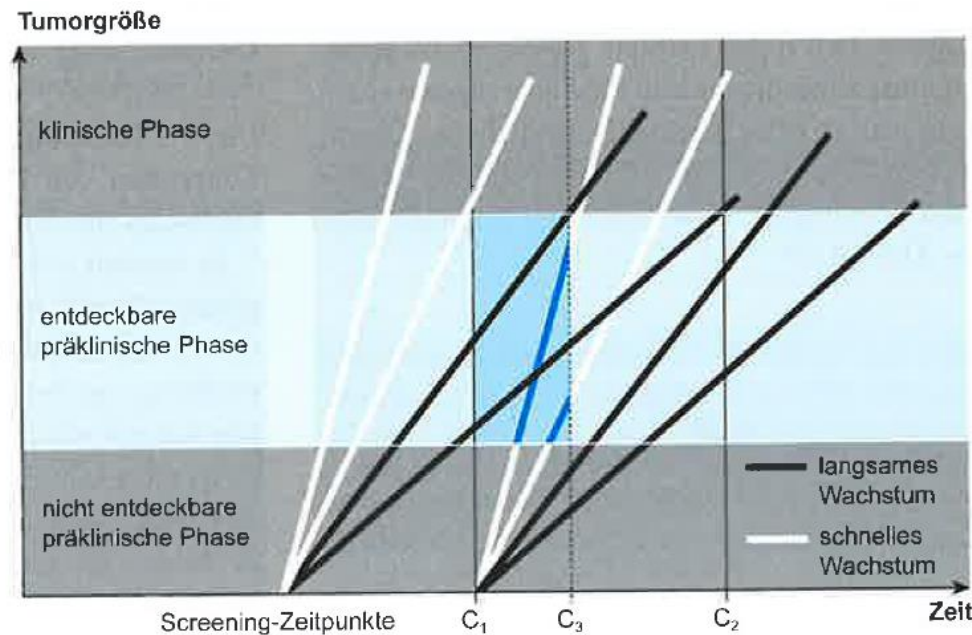
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CAVE: GTG
→ Es braucht eine effektive
Präventions- bzw. Behandlungsstrategie

Die Möglichkeiten der personalisierten/präzisen Medizin

- Präventiv

Abb. 10.16 Length-time-bias (Tumoren): Schnell wachsende Tumoren werden wahrscheinlicher vor oder zwischen periodischen Screening-Terminen (C1 und C2) durch übliche Symptome entdeckt als langsam wachsende (schematische Wachstumskurven, log., nach [78]). Das Dazwischenschieben eines zusätzlichen Screeningtermins (C3) könnte im dargestellten Beispiel zwei schnelle Verläufe zusätzlich erfassen.



Tab. 3. Früherkennungsuntersuchungen für Frauen mit familiärem Risiko

Art der Untersuchung	Ab 18 LJ	Ab 25 LJ	Ab 35 LJ	Bei Bedarf
Gyn Untersuchung	1 × jährlich			
Ärztl Brustuntersuchung	1 × jährlich			
Mamma Sono ^a				×
Mammographie ^{b, c}			1 × jährlich	
Brust MRT ^{b, c, d, e}		1 × jährlich		
Vaginalsonographie ^{e, f}			1 × jährlich	
TU Marker (CA 125) ^{e, f}			1 × jährlich	

^afalls eine MRT nicht zur Verfügung steht; außerdem bei einer schwangeren oder stillenden Patientin – in 3-monatlichem Abstand

^bDie jährlichen MG und MRT Untersuchungen können gemeinsam oder alternierend im Abstand von 6 Monaten durchgeführt werden

^cbzw. Beginn der Untersuchung 5 Jahre vor dem jüngsten Erkrankungsfall in der Familie

^dIst eine prophylaktische Mastektomie geplant, sollte in einem 3-monatigen Zeitraum vor der Operation eine MRT durchgeführt werden, um eventuelle okkulte Karzinome zu entdecken

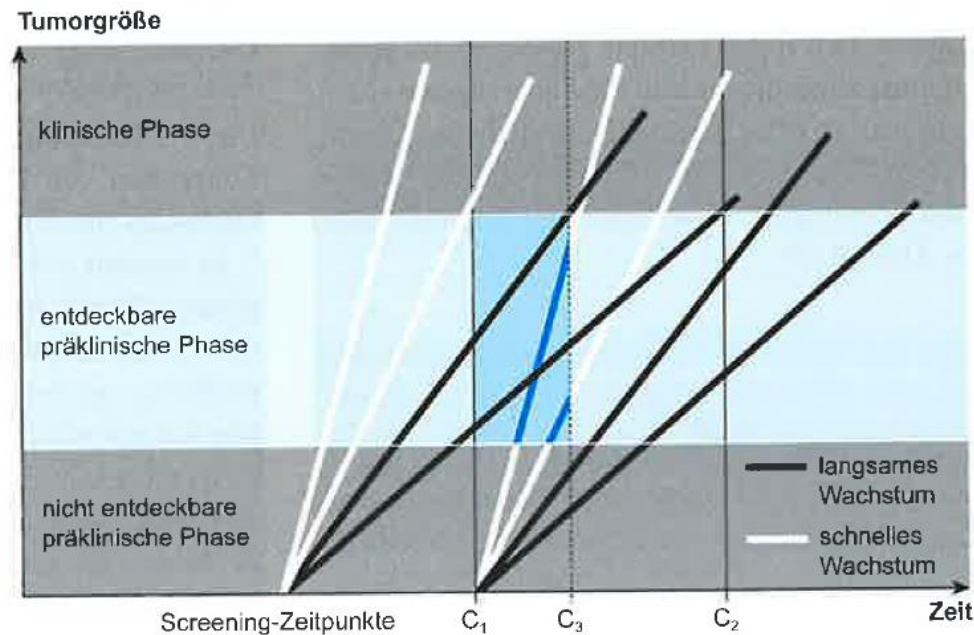
^eHat eine Patientin gestillt, sollte im Verdachtsfall frühestens 2 Monate nach dem Abstillen eine MR-MG durchgeführt werden

^fwenn gleich der Benefit dieser Untersuchung nicht wissenschaftlich belegt ist

Die Möglichkeiten der personalisierten/präzisen Medizin

- Präventiv → Personalisierte Screening Strategien

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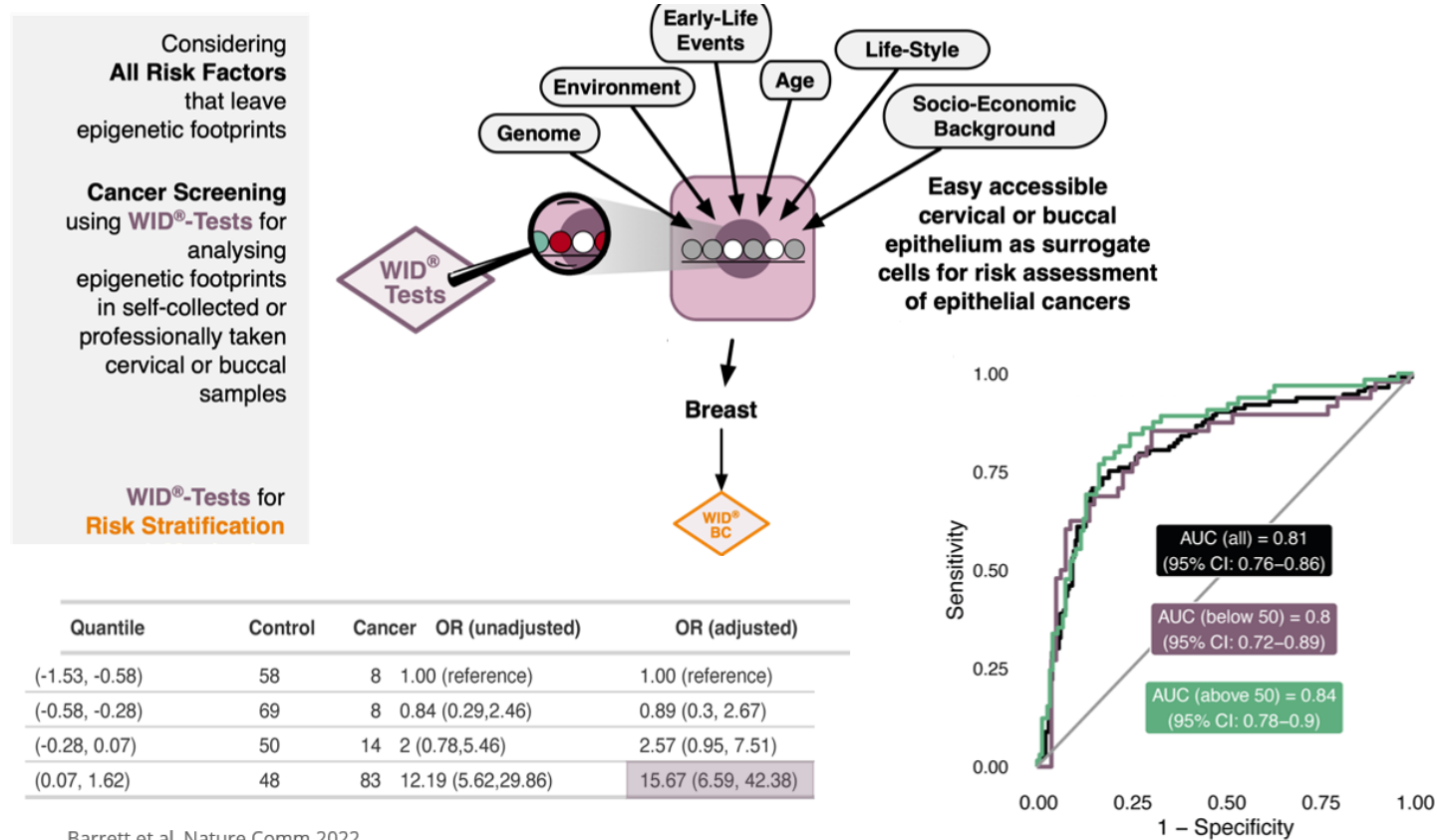
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Die Möglichkeiten der personalisierten/präzisen Medizin

- Präventiv → Personalisierte Risikostratifikation



Die Möglichkeiten der Künstlichen Intelligenz

Die Möglichkeiten der künstlichen Intelligenz

- Maschine Learning



March 2016 sees AlphaGo face its next professional opponent, the world's top Go player Lee Sedol. [Follow the match here.](#)

A computer has beaten a human professional for the first time at Go — an ancient board game that has long been viewed as one of the greatest challenges for artificial intelligence (AI).

The best human players of chess, draughts and backgammon have all been outplayed by computers. But a hefty handicap was needed for computers to win at Go. Now Google's London-based AI company, DeepMind, claims that its machine has mastered the game.

DeepMind's program AlphaGo beat Fan Hui, the European Go champion, five times out of five in tournament conditions, the firm reveals in research published in *Nature* on 27 January¹. It also defeated its silicon-based rivals, winning 99.8% of games against the current best programs. The program has yet to play the Go equivalent of a world champion, but a match against South Korean professional Lee Sedol, considered by many to be the world's strongest player, is scheduled for March. "We're pretty confident," says DeepMind co-founder Demis Hassabis.



Die Möglichkeiten der künstlichen Intelligenz

- Maschine Learning und klinische Routinen



NATURE | NEWS

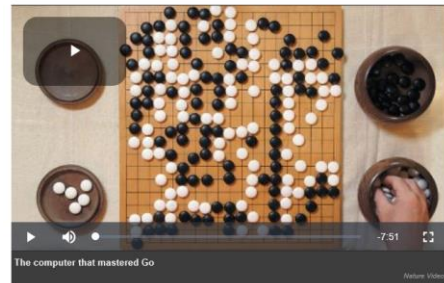
Google AI algorithm masters ancient game of Go

Deep-learning software defeats human professional for first time.

Elizabeth Gibney

27 January 2016

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Study Finds Robots can Detect Breast Cancer as well as Radiologists

Breast cancer is the most common cancer in women, and despite important improvements in therapy, it is still a major cause for cancer-related mortality, accounting for approximately 500,000 annual deaths worldwide. Breast cancer screening programs using mammography are effective in reducing breast cancer-related mortality.

[READ MORE](#)

A New Machine Learning Model can Classify Lung Cancer Slides at the Pathologist Level

Machine learning has improved dramatically in recent years and shown great promise in the field of medical image analysis. A team of research specialists at Dartmouth's Norris Cotton Cancer Center have utilized machine learning capabilities to assist with the challenging task of grading tumor patterns and subtypes of lung adenocarcinoma, the most common form of the leading cause of cancer-related deaths worldwide.

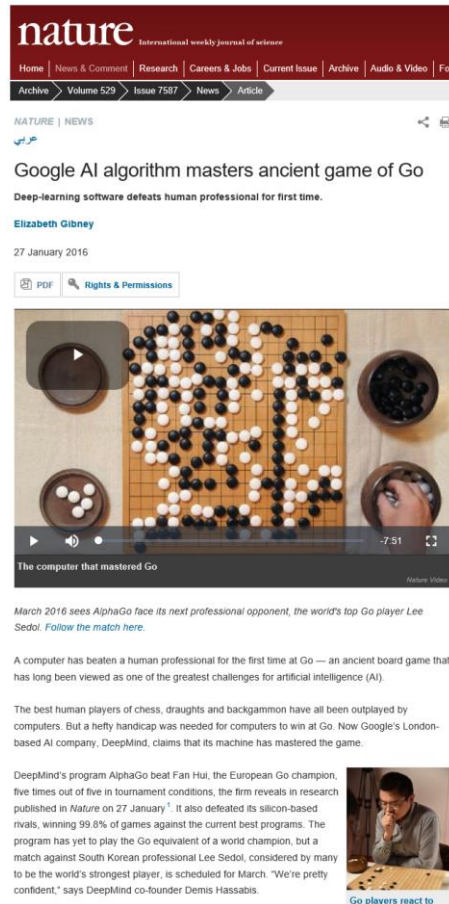
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Bringing more Human Intelligence to AI, Data Science and Digital Automation

The advent of data science, wireless connectivity and sensors, artificial intelligence (AI), and the Internet of Things (IoT) has raised the prospects for digital automation, smart hospital design and the home health care industry for an aging population. A new horizon scanning analysis described why AI, data science, and digital automation need more of the human element.

Die Möglichkeiten der künstlichen Intelligenz

- Maschine Learning und klinische Routinen



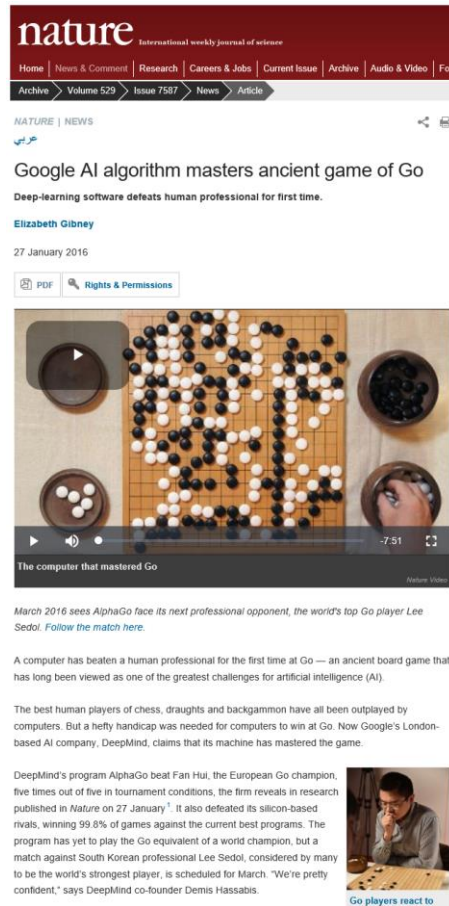
Study Finds Robots can Detect Breast

Vier-Felder-Tafel		Mensch		
		Richtig	Falsch	Gesamt
Maschine	Richtig	a	b	a+b
	Falsch	c	d	c+d
	Gesamt	a+c	b+d	a+b+c+d



data science, and digital automation need more of the human element.

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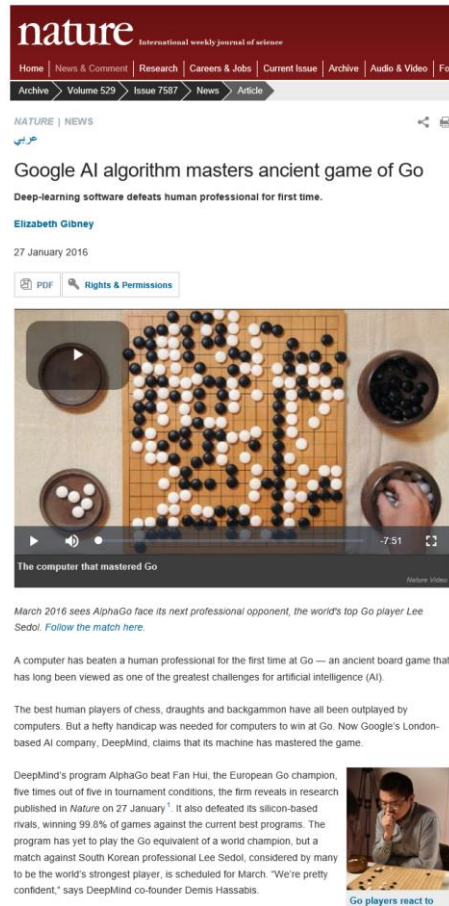
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Vier-Felder-Tafel		Mensch		
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Maschine	Richtig		b	a+b
	Falsch	c		c+d
	Gesamt	a+c	b+d	a+b+c+d



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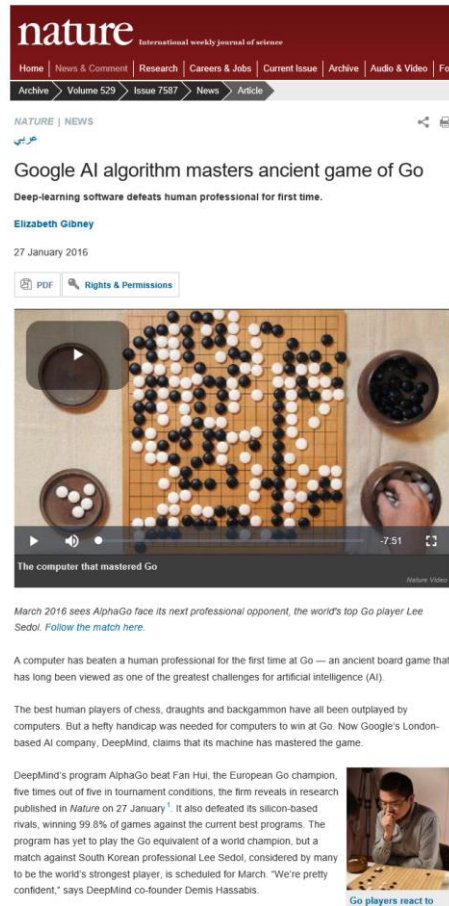
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Die Möglichkeiten der künstlichen Intelligenz

- Maschine Learning und Interaktion



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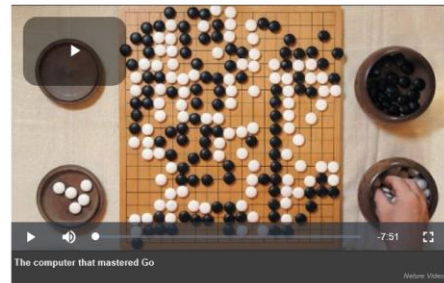
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Elizabeth Gibney

27 January 2016

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Study Finds Robots can Detect Breast Cancer as well as Radiologists

Breast cancer is the most common cancer in women, and despite important improvements in therapy, it is still a major cause for cancer-related mortality, accounting for approximately 500,000 annual deaths worldwide. Breast cancer screening programs using mammography are effective in reducing breast cancer-related mortality.

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A New Machine Learning Model can Classify Lung Cancer Slides at the Pathologist Level

Machine learning has improved dramatically in recent years and shown great promise in the field of medical image analysis. A team of research specialists at Dartmouth's Norris Cotton Cancer Center have utilized machine learning capabilities to assist with the challenging task of grading tumor patterns and subtypes of lung adenocarcinoma, the most common form of the leading cause of cancer-related deaths worldwide.

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Bringing more Human Intelligence to AI, Data Science and Digital Automation

The advent of data science, wireless connectivity and sensors, artificial intelligence (AI), and the Internet of Things (IoT) has raised the prospects for digital automation, smart hospital design and the home health care industry for an aging population. A new horizon scanning analysis described why AI, data science, and digital automation need more of the human element.

A Comprehensive Survey of ChatGPT and its Applications Across Domains

Recent advancements in natural language processing (NLP) have ushered in a new era with the emergence of powerful language models, most notably the Generative Pretrained Transformer (GPT) series, which includes substantial language models such as ChatGPT (GPT-3.5 and GPT-4).

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When Digital Transformation Hits the Reality of Healthcare at Full Speed - Chat GPT can do Medicine

13 - 16 November 2023, Düsseldorf, Germany.

In recent years, digitalisation has entered almost every area of daily life. Healthcare is not an exception. As early as the mid-80s, when the history of health IT was really getting started, the internationally leading medical trade fair MEDICA in Düsseldorf featured intensive coverage of the issue in its programme. In the beginning, these were offers related to hardware and software for so-called "office EDP".



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Mayo Clinic's AI Innovation Inspires Hope in Early Detection of Pancreatic Cancer

Estimated to become the second leading cause of cancer deaths in the U.S. by 2030, pancreatic cancer has a grim prognosis with nearly 70% of patients facing mortality within the first year of diagnosis. Unfortunately, 40% of small pancreatic cancers elude detection on CT scans until they've advanced to an incurable stage.

READ MORE

AI Language Models could Help Diagnose Schizophrenia

Scientists at the UCL Institute for Neurology have developed new tools, based on AI language models, that can characterise subtle signatures in the speech of patients diagnosed with schizophrenia.

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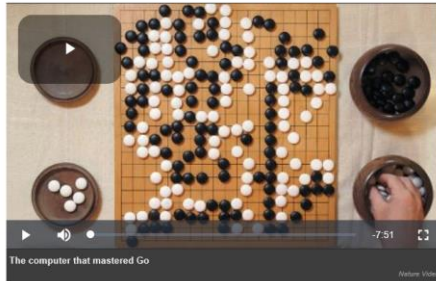


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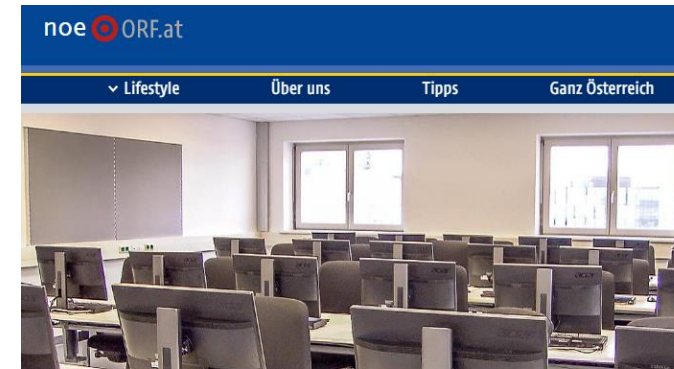
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BILDUNG

ChatGPT besteht Zentralmatura

Die Landesschüler:innenvertretung Niederösterreich hat die Aufgaben der letzten Zentralmatura durch das Künstliche-Intelligenz-Tool ChatGPT lösen lassen. Das Programm hätte die Matura bestanden. Die Schüler fordern nun Änderungen im Unterricht.

Online seit heute, 5:49 Uhr

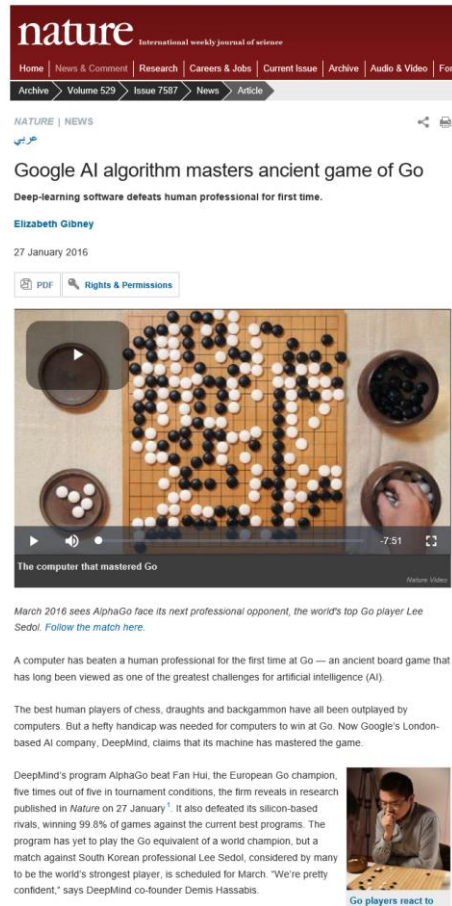
Teilen

Die Aufgaben, die im vergangenen Jahr in Deutsch, Mathematik und Englisch zur Zentralmatura gestellt wurden, wurden ChatGPT gestellt. In Deutsch korrigierte die ChatGPT-Ergebnisse eine Lehrperson, in Mathematik und Englisch wurden die Lösungen mit den bekannten Lösungen verglichen. Das Ergebnis: Das Tool für künstliche Intelligenz hätte bestanden, und zwar mit einem Genügend in Deutsch und Mathematik sowie mit einem Befriedigend in Englisch.

Betont wurde außerdem, dass die Lösungen mit der Version 3 des Chatbots erarbeitet wurden. Mittlerweile ist eine schnellere und deutlich erweiterte Version verfügbar. AHS-Landesschulsprecher Marco Gayer sagte: „Es ist ein klassisches Aufzeigen von unserem technischen Stand aktuell und auch ein Aufzeigen, dass das Bildungssystem in unserer Zeit doch auch ein Stück hinterherhinkt.“

Die Möglichkeiten der künstlichen Intelligenz

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JAMA Internal Medicine | [Original Investigation](#)

Comparing Physician and Artificial Intelligence Chatbot Responses to Patient Questions Posted to a Public Social Media Forum

John W. Ayers, PhD, MA; Adam Poliak, PhD; Mark Dredze, PhD; Eric C. Leas, PhD, MPH; Zechariah Zhu, BS; Jessica B. Kelley, MSN; Dennis J. Faix, MD; Aaron M. Goodman, MD; Christopher A. Longhurst, MD, MS; Michael Hogarth, MD; Davey M. Smith, MD, MAS

IMPORTANCE The rapid expansion of virtual health care has caused a surge in patient messages concomitant with more work and burnout among health care professionals. Artificial intelligence (AI) assistants could potentially aid in creating answers to patient questions by drafting responses that could be reviewed by clinicians.

OBJECTIVE To evaluate the ability of an AI chatbot assistant (ChatGPT), released in November 2022, to provide quality and empathetic responses to patient questions.

DESIGN, SETTING, AND PARTICIPANTS In this cross-sectional study, a public and nonidentifiable database of questions from a public social media forum (Reddit's r/AskDocs) was used to randomly draw 195 exchanges from October 2022 where a verified physician responded to a public question. Chatbot responses were generated by entering the original question into a fresh session (without prior questions having been asked in the session) on December 22 and 23, 2022. The original question along with anonymized and randomly ordered physician and chatbot responses were evaluated in triplicate by a team of licensed health care professionals. Evaluators chose "which response was better" and judged both "the quality of information provided" (*very poor, poor, acceptable, good, or very good*) and "the empathy or bedside manner provided" (*not empathetic, slightly empathetic, moderately empathetic, empathetic, and very empathetic*). Mean outcomes were ordered on a 1 to 5 scale and compared between chatbot and physicians.

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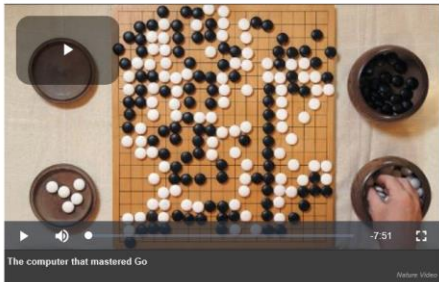
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Go players react to

Table. Example Questions with Physician and Chatbot Response ^a			
Question ^b	Physician response	Chatbot response ^c	Evaluation scores
Question about risk of dying following swallowing and ingesting a toothpick.	<p>If you've surpassed 2-6 h, chances are they've passed into your intestines. Which means it can't be retrieved easily.</p> <p>Many people can swallow razorblades and toothpicks without issue. In case you develop stomach ache, then don't hesitate seeking out an emergency room, and remember to point out the swallowed tooth pick.</p> <p>For now, they won't be doing much.</p>	<p>It's natural to be concerned if you have ingested a foreign object, but in this case, it is highly unlikely that the toothpick you swallowed will cause you any serious harm.</p> <p>Toothpicks are made of wood, which is not toxic and will not cause poisoning. However, it is possible for a toothpick to cause injury if it becomes stuck in the throat or if it punctures the digestive tract. However, this is unlikely to happen with a dull, cooked toothpick that is only 2 cm long.</p> <p>If you are experiencing any discomfort or symptoms such as abdominal pain, difficulty swallowing, or vomiting, it is important to contact a health care provider for further evaluation. However, if you are not experiencing any symptoms, it is safe to assume that the toothpick has passed through your digestive system and you do not need to be concerned.</p> <p>It's always a good idea to be cautious when consuming food and to remove any foreign objects before eating. It's understandable that you may be feeling paranoid, but try not to worry too much. It is highly unlikely that the toothpick will cause you any serious harm.</p>	<ul style="list-style-type: none">• 100% preferred the chatbot• 4.67 mean quality score (chatbot)• 3.33 mean quality score (physician)• 4.33 mean empathy score (chatbot)• 2.00 mean empathy score (physician)
Question about needing to see a physician following injury that occurred by hitting head on a metal bar while running, resulting in lump on head, headache, and sore neck.	<p>Things that signify you should see a doctor:</p> <ul style="list-style-type: none">• Nausea/vomiting• Dizziness• Severe or worsening headache• Loss of consciousness• Confusion• Neck stiffness• Problems with vision• Limb weakness <p>If you develop any of these in the next 24 h, rush to the emergency room.</p>	<p>It's always best to err on the side of caution when it comes to head injuries. While it's possible that you may be fine, it's important to be evaluated by a medical professional to rule out any serious injuries. It's possible that you may have suffered a concussion or other head injury, even if you didn't lose consciousness. Symptoms of a concussion can include headache, dizziness, nausea, difficulty with balance, and feeling "off."</p> <p>The location of the impact and the apparent force of the injury could potentially make a difference in the severity of the injury. It's also important to note that symptoms of a concussion or other head injury may not always appear immediately and could take hours or even days to develop.</p> <p>It's important to seek medical attention as soon as possible if you experience any of the following symptoms after a head injury:</p> <ul style="list-style-type: none">• Loss of consciousness, even if it's just for a few seconds• Severe or worsening headache• Nausea or vomiting• Slurred speech• Difficulty with balance or coordination• Seizures• Changes in behavior or personality• Clear fluid draining from the nose or ears <p>It's also a good idea to see a doctor if you experience neck pain after a head injury, as this could be a sign of a neck injury.</p> <p>In the meantime, try to rest and avoid activities that could potentially cause further injury to your head, such as contact sports or activities that involve high speeds or heights. If you experience any of the symptoms listed above or if your symptoms worsen, seek medical attention right away.</p>	<ul style="list-style-type: none">• 100% preferred the chatbot• 4.33 mean quality score (chatbot)• 4.67 mean quality score (physician)• 4.67 mean empathy score (chatbot)• 2.33 mean empathy score (physician)
Question about risk of going blind following bleach being splashed into an eye, resulting in irritated and dry eye.	<p>Sounds like you will be fine. You should flush the eye anytime you get a chemical or foreign body in the eye. You can also contact Poison Control 1-800-222-1222.</p>	<p>I'm sorry to hear that you got bleach splashed in your eye. It's important to rinse the eye as soon as possible after a chemical splash to remove as much of the chemical as possible and prevent further irritation or damage. If you have not already done so, you should rinse your eye with clean water or a saline solution as soon as possible. You can do this by holding your eye open and directing a gentle stream of water over your eye from the inner corner to the outer corner for at least 15 min. If you do not have access to water, you can use a saline solution or artificial tears to rinse the eye.</p> <p>If you are experiencing significant pain, redness, or vision changes, or if you are unable to rinse your eye properly, you should seek medical attention immediately. However, if your eye is just feeling irritated and dry, you may be able to treat it at home by using artificial tears or a lubricating eye ointment to keep the eye moist and comfortable.</p> <p>It is unlikely that you will go blind from getting bleach splashed in your eye, but it is important to take care of the eye and seek medical attention if necessary to prevent further irritation or damage.</p>	<ul style="list-style-type: none">• 100% preferred the chatbot• 4.00 mean quality score (chatbot)• 3.33 mean quality score (physician)• 4.67 mean empathy score (chatbot)• 2.33 mean empathy score (physician)

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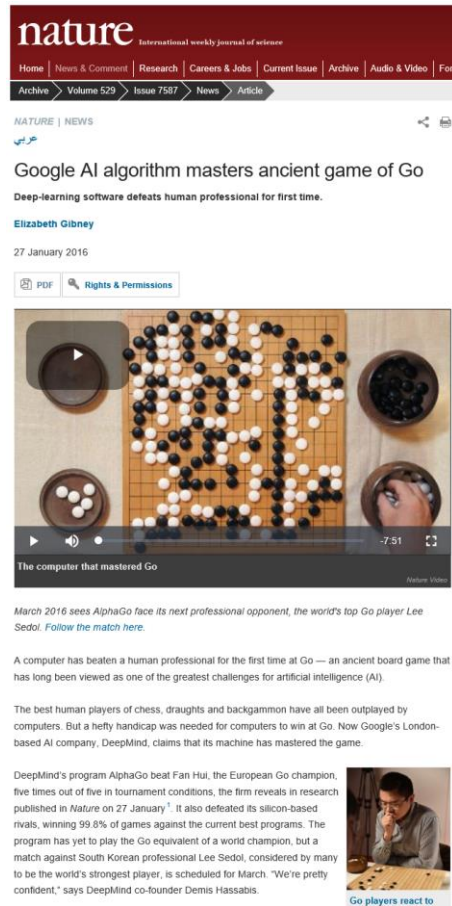
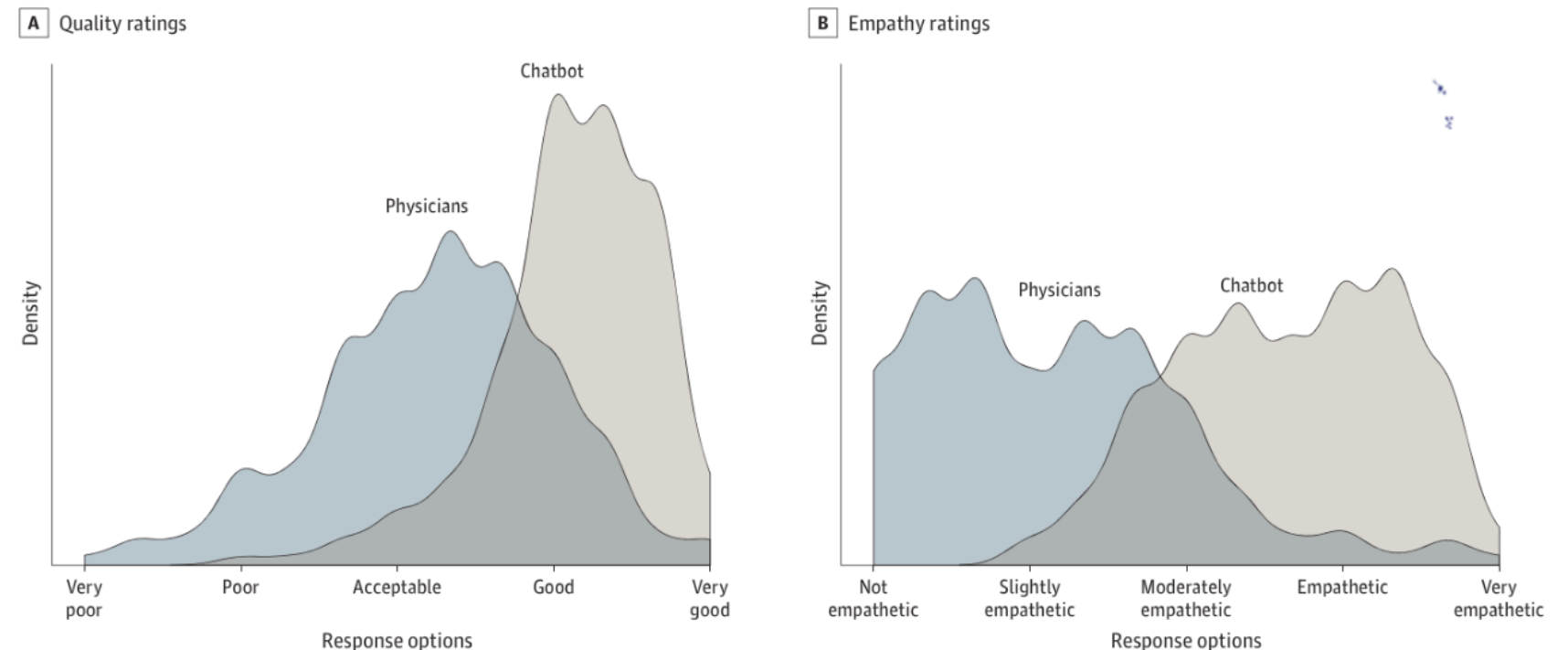


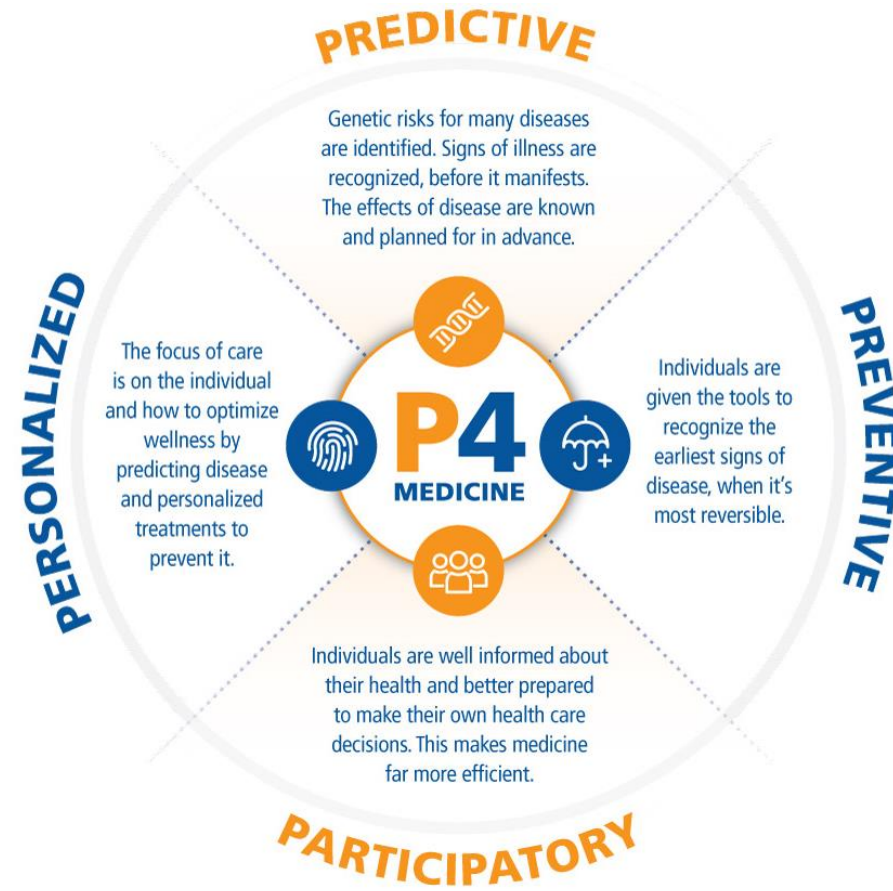
Figure. Distribution of Average Quality and Empathy Ratings for Chatbot and Physician Responses to Patient Questions



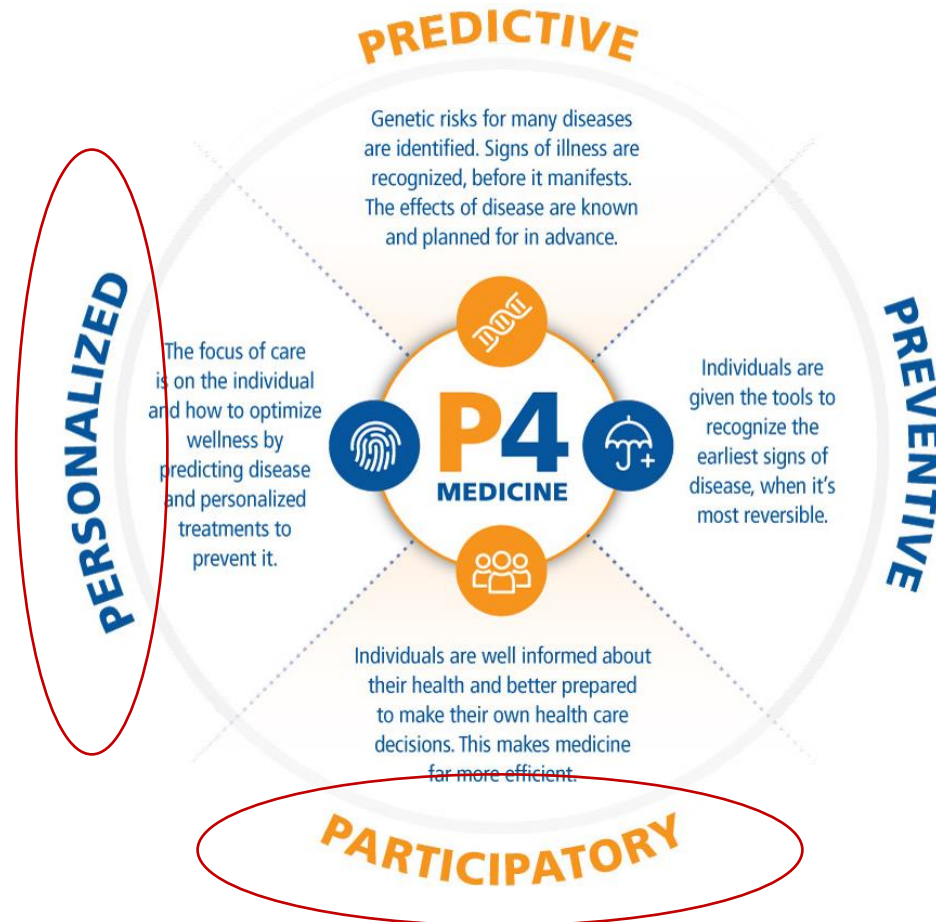
Kernel density plots are shown for the average across 3 independent licensed health care professional evaluators using principles of crowd evaluation. A, The overall quality metric is shown. B, The overall empathy metric is shown.

Was das möglicherweise für Gesundheitssysteme bedeuten kann

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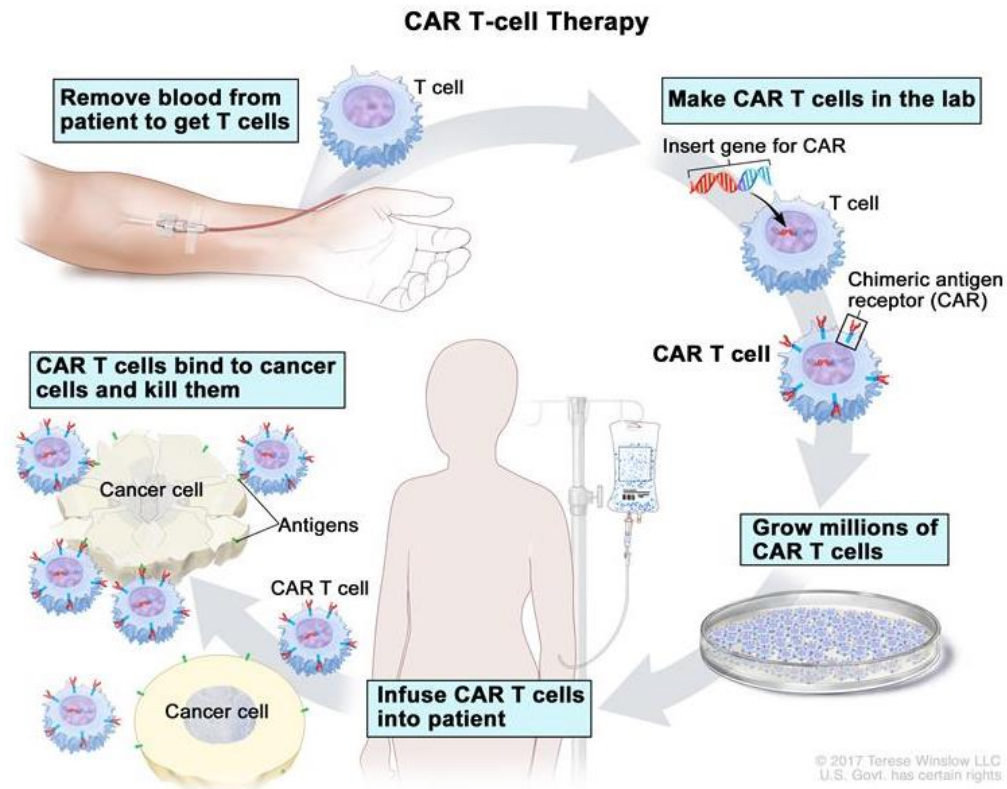


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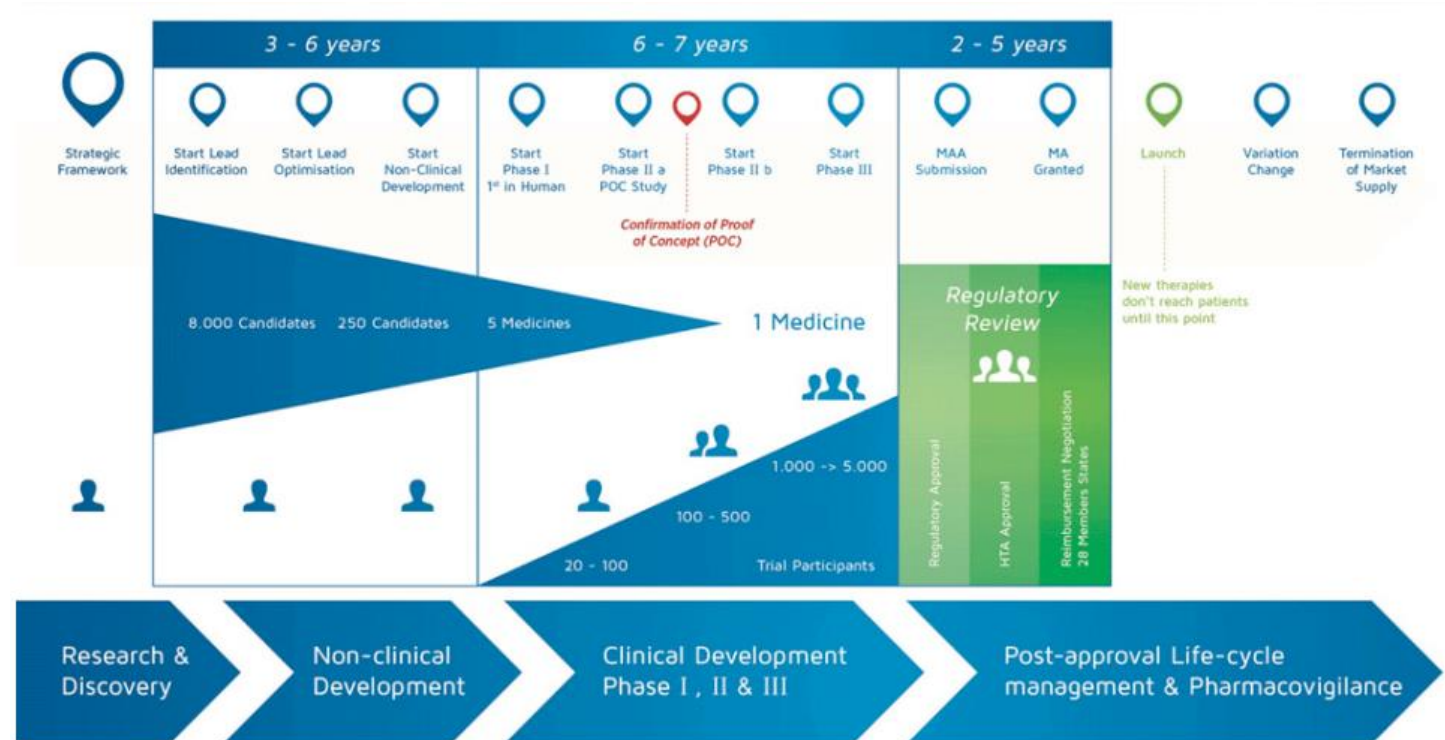
- Personalisiert
 - Personalisierte Wahrscheinlichkeiten auch für personalisierte Therapien



Source: <https://www.cancer.gov/images/cdr/live/CDR774647-750.jpg>

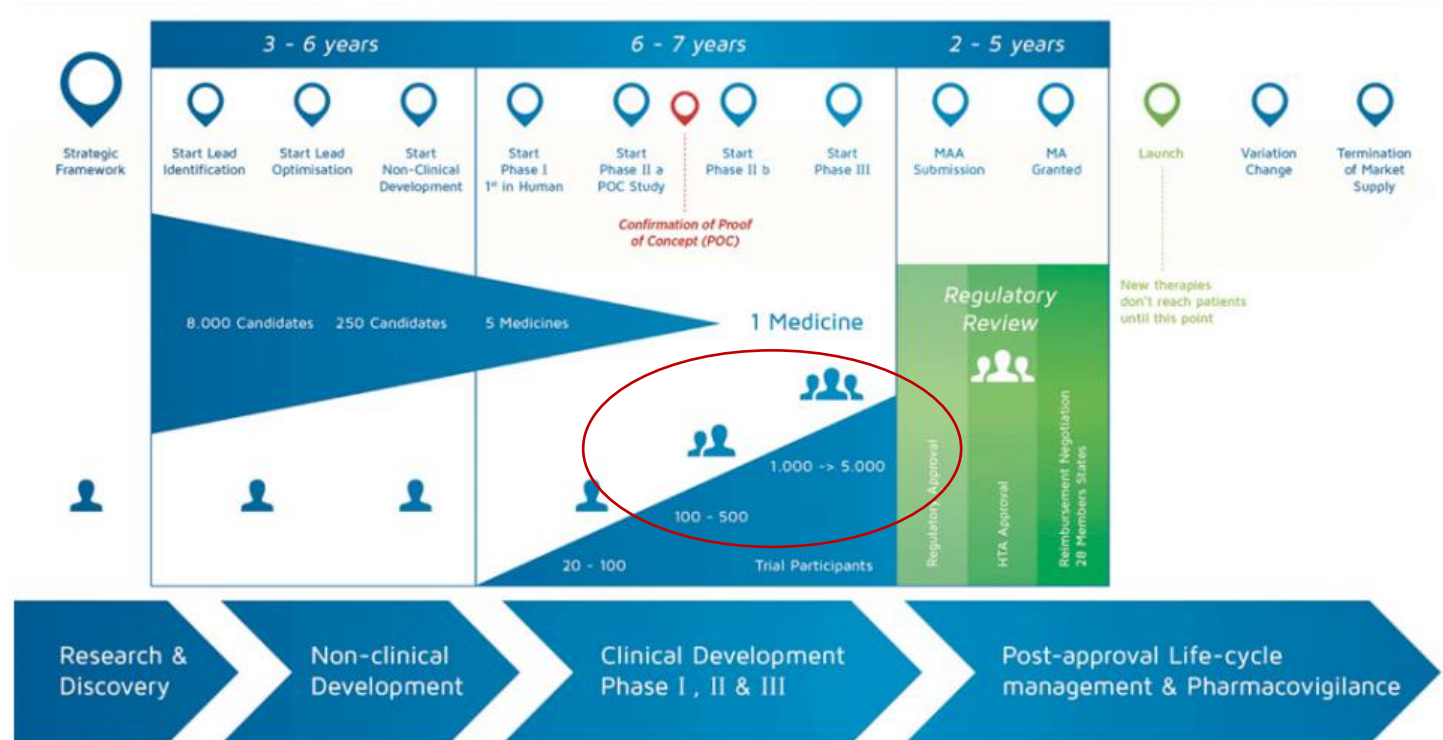
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 - Personalisierte Wahrscheinlichkeiten auch für personalisierte Therapien
 - CAVE 1: Studienpopulationen



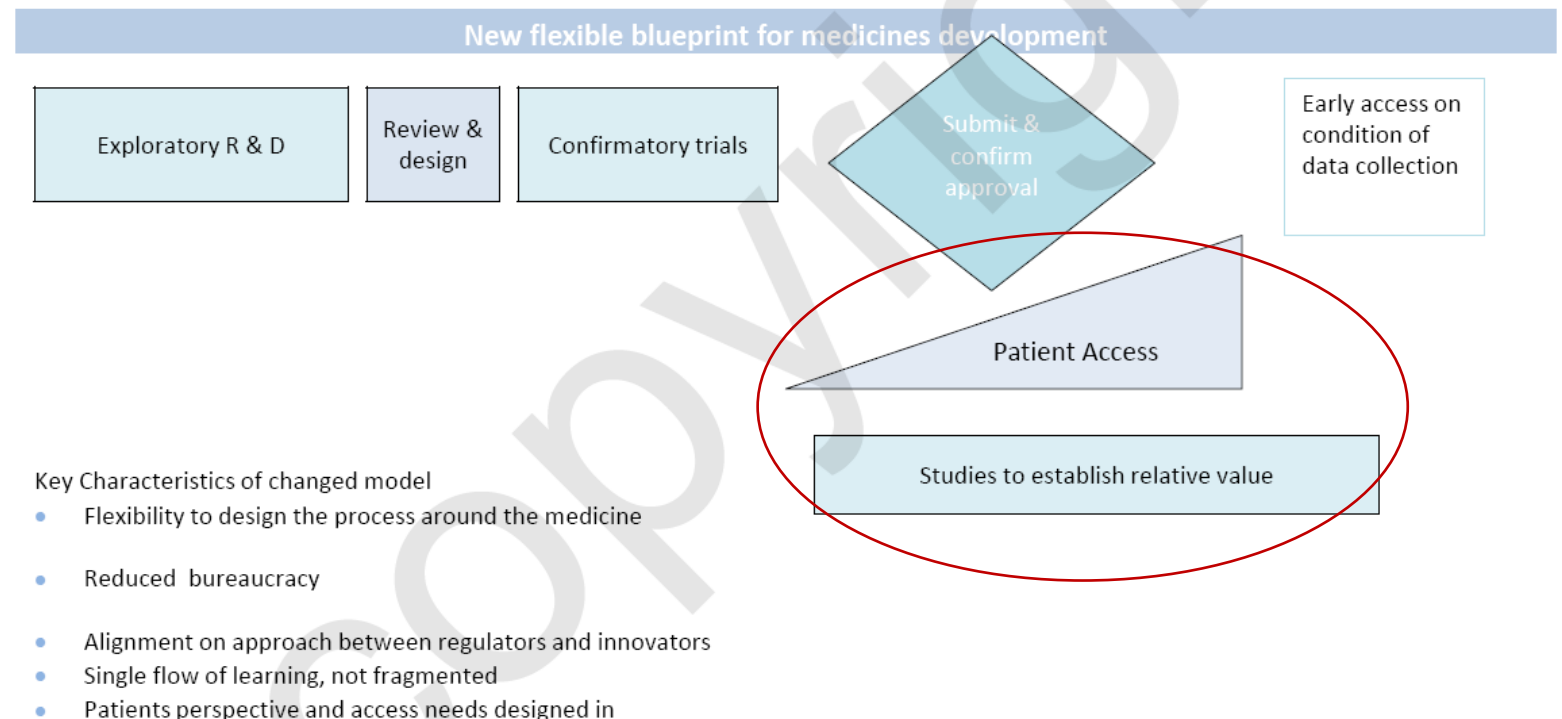
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 - CAVE 2: Routinen zur Ermittlung von RWE



Was das möglicherweise für Gesundheitssysteme bedeuten kann

- Personalisiert
 - Personalisierte Wahrscheinlichkeiten auch für personalisierte Therapien
 - CAVE 1: Studienpopulationen
 - CAVE 2: Routinen zur Ermittlung von RWE
 - CAVE 3: Grenzen der Zahlungsfähigkeit (individuell und kollektiv)



<https://www.publichealthnotes.com/daly-disability-adjusted-life-years/>

Was das möglicherweise für Gesundheitssysteme bedeuten kann

- Partizipativ
 - Risk Literacy

Health Literacy	Access/obtain information relevant for health	Understand information relevant for health	Appraise/judge/evaluate information relevant for health	Apply/use information relevant for health
Health Care	1) Ability to access information on medical or clinical issues	2) Ability to understand medical information and derive meaning	3) Ability to interpret and evaluate medical information	4) Ability to make informed decisions on medical issues
Disease Prevention	5) Ability to access information on risk factors	6) Ability to understand information on risk factors and derive meaning	7) Ability to interpret and evaluate information on risk factors	8) Ability to judge the relevance of information on risk factors
Health Promotion	9) Ability to update oneself on health issues	10) Ability to understand health-related information and derive meaning	11) Ability to interpret and evaluate information on health-related issues	12) Ability to form a reflected opinion on health issues

Source: Sørensen et al. (2012)

Hoffnungen und Herausforderungen der personalisierten Medizin

- Personalisiert
 - Risk Literacy
 - CAVE: keine RR

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DURCHBRUCH BEI
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ENTRESTO® lässt HI-Patienten länger und besser leben.¹

Effekt	Prozent
RELATIVE RISIKOREDUKTION DER KARDIOVASKULÄREN MORTALITÄT*	20%
RELATIVE RISIKOREDUKTION DER ERSTEN HI-BEDINGTEN HOSPITALISIERUNG ¹	21%

* Die PRAGUE-HF Studie wurde aufgrund des Überlebens der Daten von ENTRESTO® nach der ersten Intervallanalyse vorzeitig abgebrochen. Die TGA-gestützte ENTRESTO®- vs. „placebo-reine“ Behandlung¹ der LHM von „accelerated assessment“ Verfahren.
† Standardtherapie: ACE-Hemmer/ARB-Behandlung + Mineralocorticoidrezeptor-Antagonist, wenn indiziert/vertragen.
1 M. Sharma, D. Parker, M. Senni, et al. for the PRAGUE-HF Investigators and Committees. Regulating angiotensin-receptor inhibitors versus standard in heart failure. N Engl J Med. 2016;375(21):1913-1924. 2 Pressemitteilung der TGA vom 7. Mai 2015, <http://www.bfmg.gv.at/News/Entresto-Prag-HF-Studie-21-prozent-Risikoreduktion-der-ersten-HI-bedingten-Hospitalisierung>. 2015. 3 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. European Heart Journal 36 (2015) 1126-1199. 4 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. European Heart Journal 36 (2015) 1126-1199. 5 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. European Heart Journal 36 (2015) 1126-1199.

Source: <https://www.healthrelations.de/beliebtes-werbemotiv-durchbruch-in-healthcare-dos-and-donts/>

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Summary of findings 2. Radical prostatectomy compared to active monitoring for localised prostate cancer

Radical prostatectomy compared to active monitoring for localised prostate cancer						
Patient or population: localised prostate cancer Setting: multicentre hospitals in UK Intervention: radical prostatectomy Comparison: active monitoring						
Outcomes	Anticipated absolute effects* (95% CI) ^a		Relative effect (95% CI)	Nº of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with active monitoring	Risk with radical prostatectomy				
Time to death from any cause Median follow-up: 10 years	Study population		HR 0.93 (0.65 to 1.33)	1098 (1 RCT)	⊕⊕⊕⊖ MODERATE ^b	Radical prostatectomy likely results in little to no difference in time to death from any cause
	108 per 1000	101 per 1000 (72 to 141)				
Time to death from prostate cancer Median follow-up: 10 years	Study population		HR 0.63 (0.21 to 1.89)	1098 (1 RCT)	⊕⊕⊕⊖ MODERATE ^b	Radical prostatectomy likely results in little to no difference in time to death from prostate cancer
	15 per 1000	9 per 1000 (3 to 28)				
Time to disease progression Median follow-up: 10 years	Study population		HR 0.39 (0.27 to 0.56)	1098 (1 RCT)	⊕⊕⊕⊖ MODERATE ^c	Radical prostatectomy likely reduces time to disease progression
	206 per 1000	86 per 1000 (60 to 121)				
Incidence of metastatic disease Median follow-up: 10 years	Study population		RR 0.39 (0.21 to 0.73)	1098 (1 RCT)	⊕⊕⊕⊖ MODERATE ^c	Radical prostatectomy likely reduces incidence of metastatic disease
	61 per 1000	24 per 1000 (13 to 44)				

Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7270852/pdf/CD006590.pdf>

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	Risk with active monitoring	Risk with radical prostatectomy				
Health-related quality of life assessed with SF-12 (Mental Health Subscale). High scores indicate better outcomes. Median follow-up: 6 years	Mean health-related quality of life was 53 points	MD 0.5 points higher (0.65 lower to 1.65 higher)	-	856 (1 RCT)	⊕⊕⊕⊖ MODERATE ^c	Radical prostatectomy likely results in little to no difference in health-related quality of life
Urinary function assessed with ICIQ score. High scores indicate better outcomes. Median follow-up: 6 years	Mean urinary function was 88.9 points	MD 8.6 points lower (11.19 lower to 6.01 lower)	-	782 (1 RCT)	⊕⊕⊖⊖ LOW ^{c,d}	Radical prostatectomy may result in a large reduction in urinary function
Sexual function assessed with EPIC sexual summary score. High scores indicate better outcomes. Median follow-up: 6 years	Mean sexual function was 48.2 points	MD 14.9 points lower (18.54 lower to 11.26 lower)	-	756 (1 RCT)	⊕⊕⊖⊖ LOW ^{c,e}	Radical prostatectomy may result in a large reduction in sexual function

Was das möglicherweise für Gesundheitssysteme bedeuten kann

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 - Risk Literacy
 - Shared decision-making

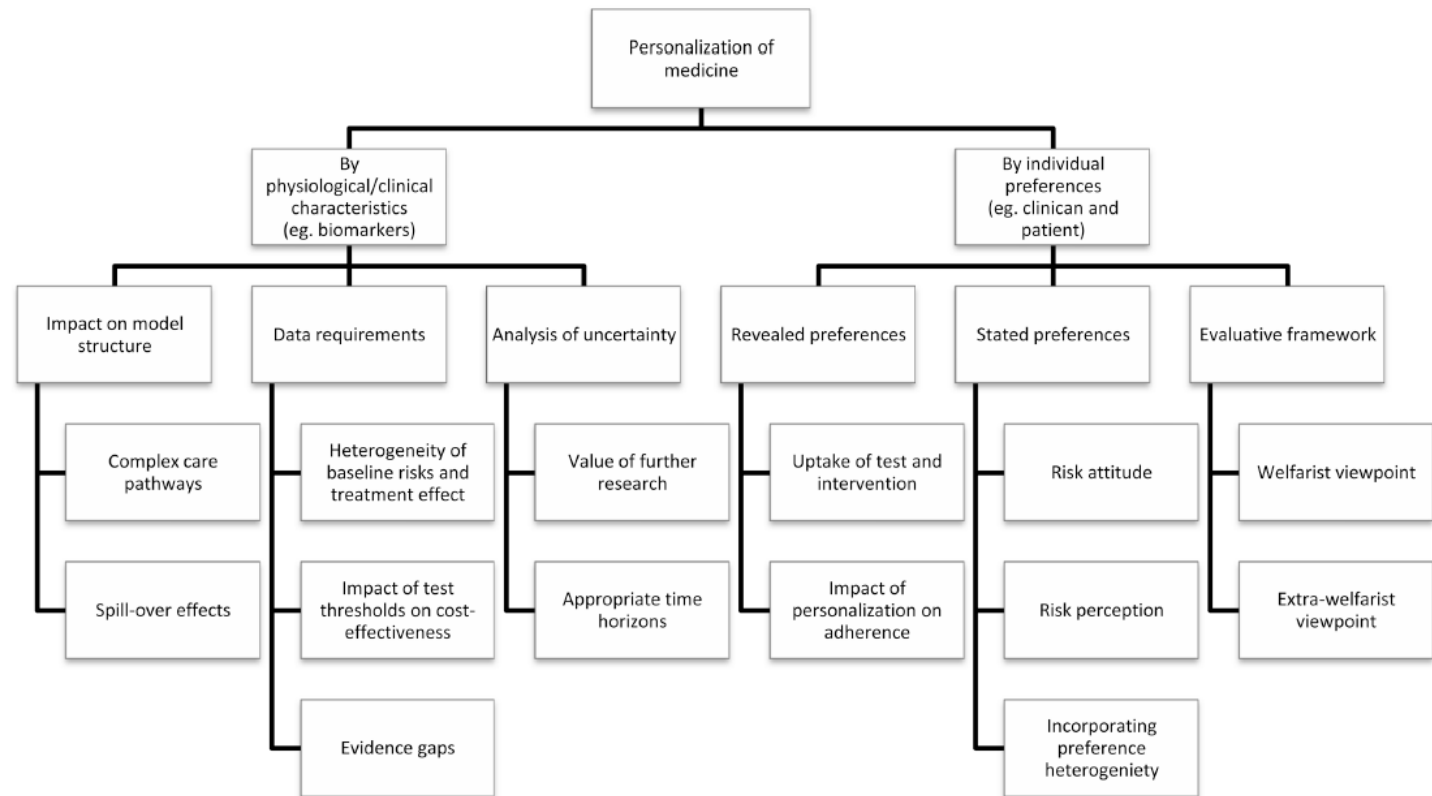


Figure 1. Structured overview of methodological issues in the economic evaluation of personalized medicine

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 - Risk Literacy
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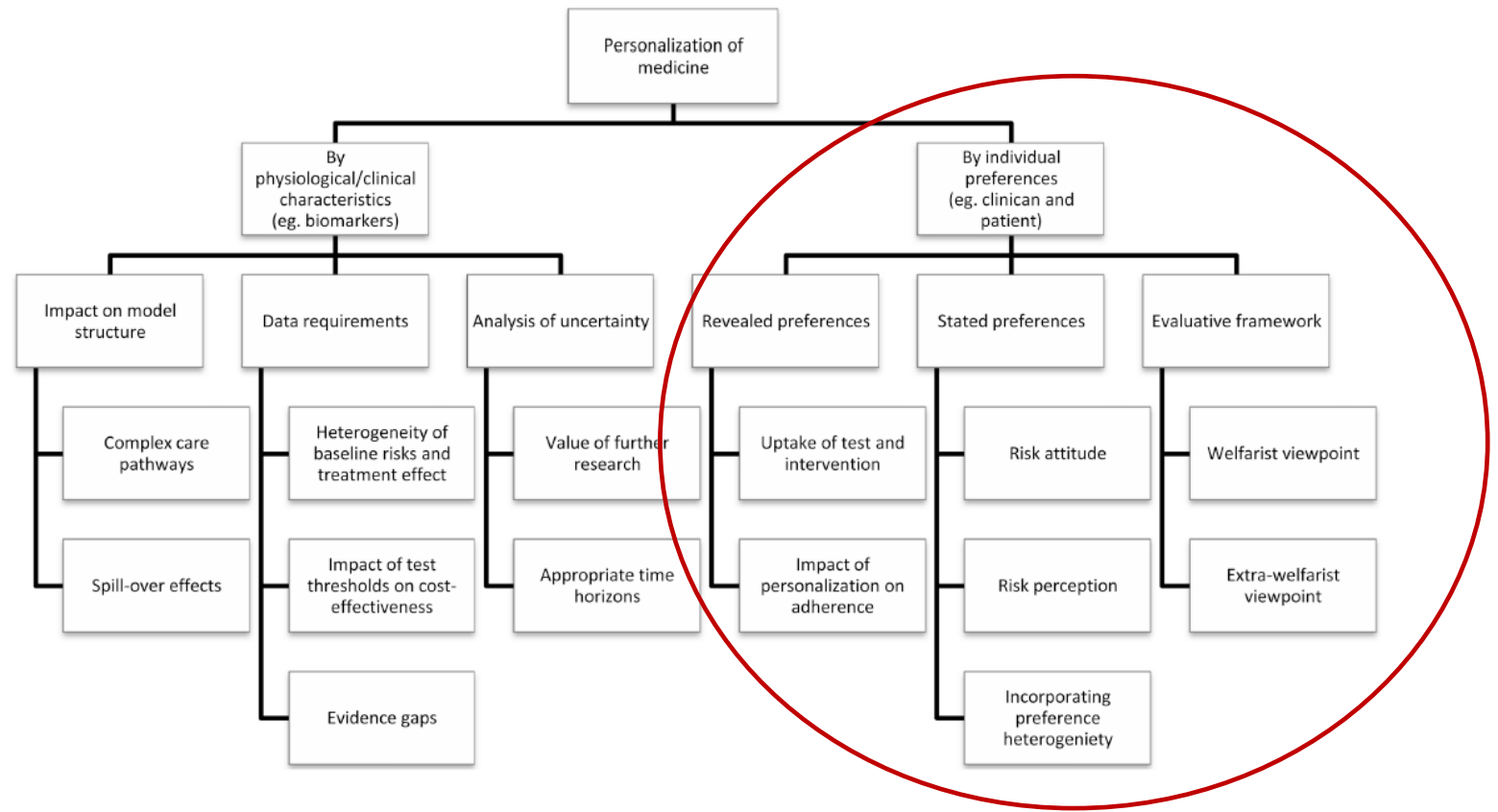
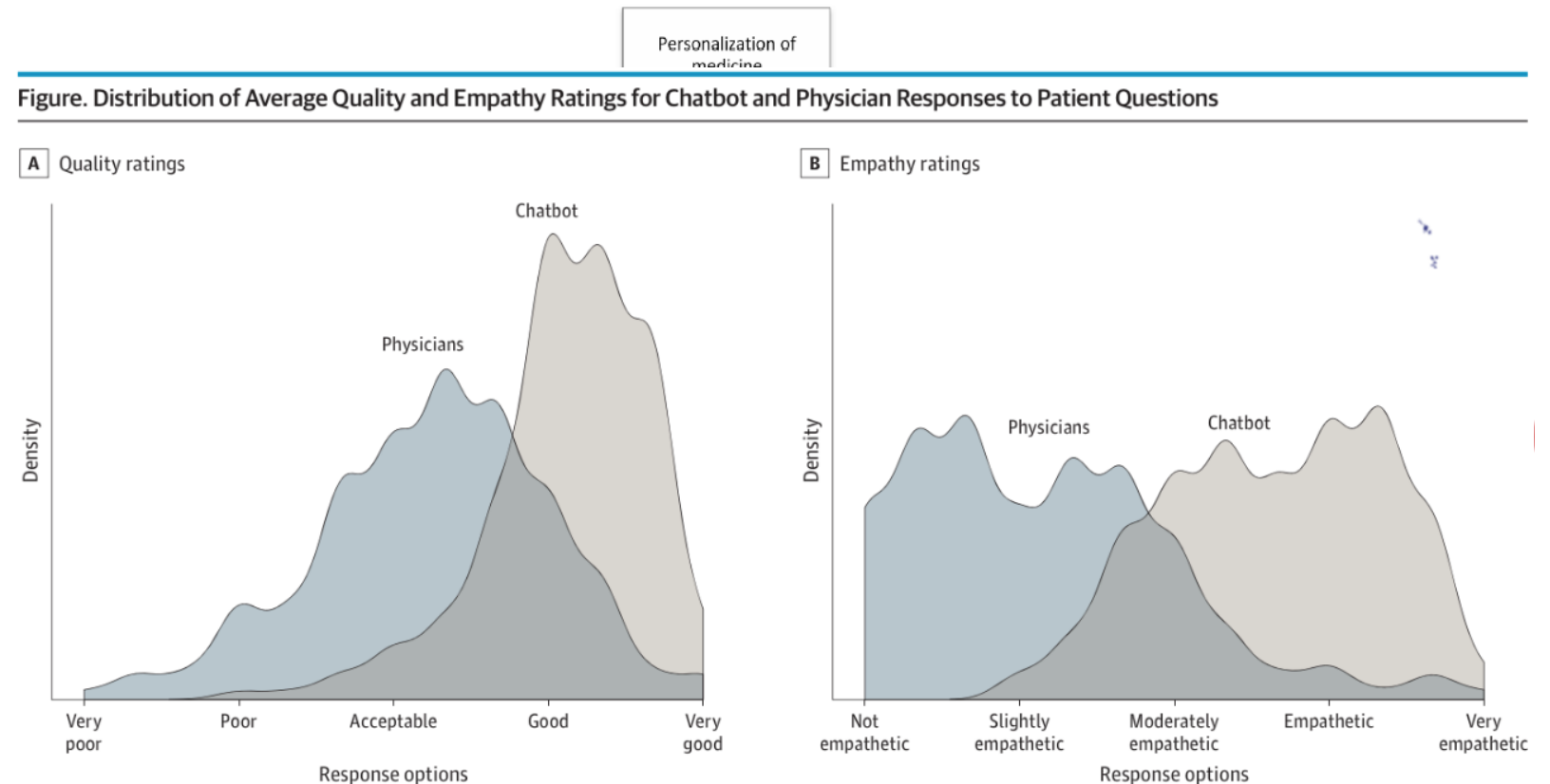


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 - Risk Literacy
 - Shared decision-making



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.

Abschließende Bemerkungen

An der Stelle von abschließenden Bemerkungen ...

- Eine kleine Wunschliste
 - Das Datenthema umfassend lösen und Zugang zu Daten sicherstellen
 - Steuerungsintelligenz (Analytics), Prozessintegration, F&E
 - Ausbildungen überarbeiten
 - Risk Literacy als Kernelement von Health Literacy
 - Frühzeitig mit KlinikerInnen sprechen
 - Horizon Scanning
 - KI als Chance in die Prozesse integrieren
 - Auch zur Verlagerung des Technologievektors

Vielen Dank für Ihre Aufmerksamkeit!
