Bezoek prostaatkankerstichting

Verbeteren van prostaatkankerdiagnostiek door zelflerende computers in de pathologie

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Radboud University Medical Center

Radboudumc

Wie ben ik?

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

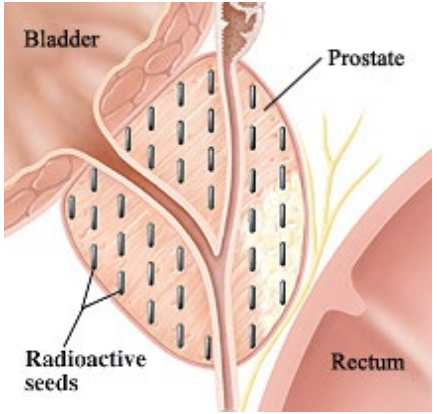
Prostaatkankerdiagnostiek

Behandeling prostaatkanker

75% van prostaatkankerpatiënten wordt invasief behandeld

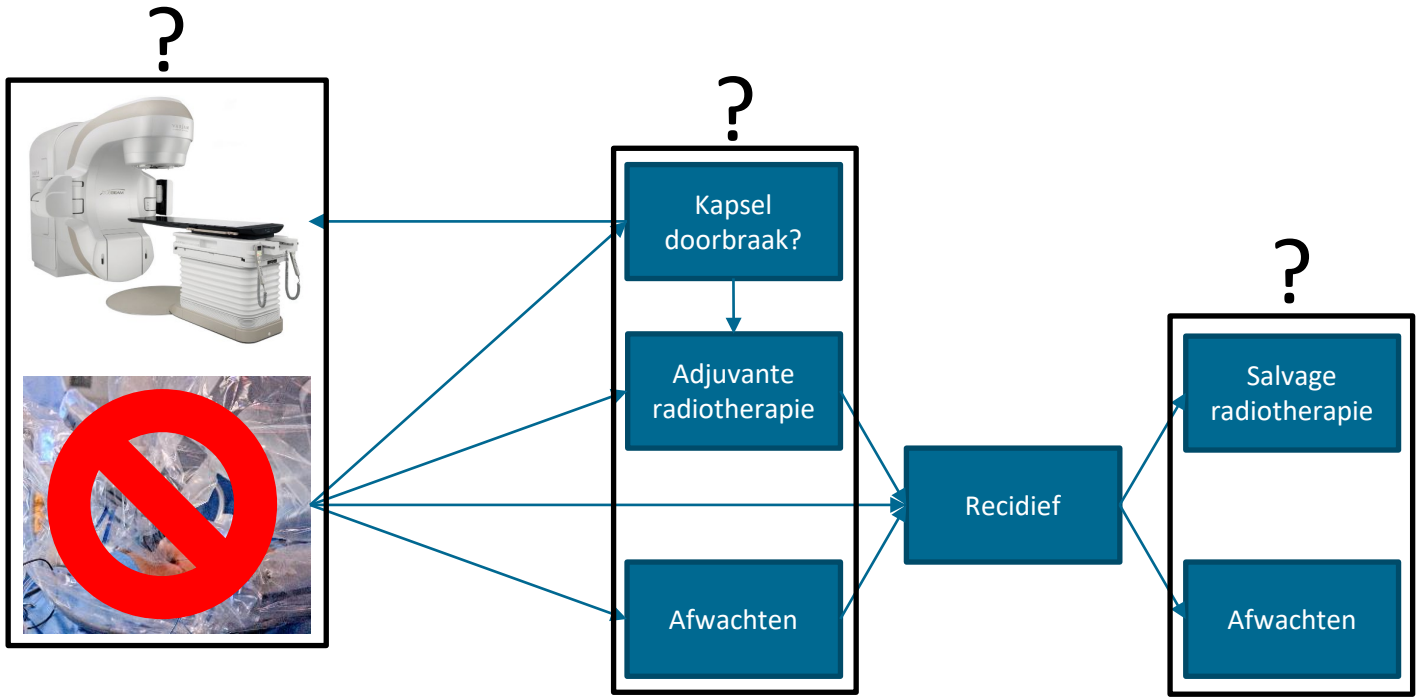
(Robotische) prostatectomie

Uitwendige bestraling



Brachytherapie

Na de eerste behandeling…



Risicomodellen

Huidige behandeltraject is gebaseerd op risicomodellen

Risico	Stadium	Prostaat specifiek antigeen (PSA) in bloed	Gleason score
Laag	T1c – T2a	< 10 ng/mL	< 7
Matig	T2b-c	10 – 20 ng/mL	7
Hoog	T3	>20 ng/mL	>7

1. IKNL, Kwaliteit van kankerzorg in Nederland. 2014

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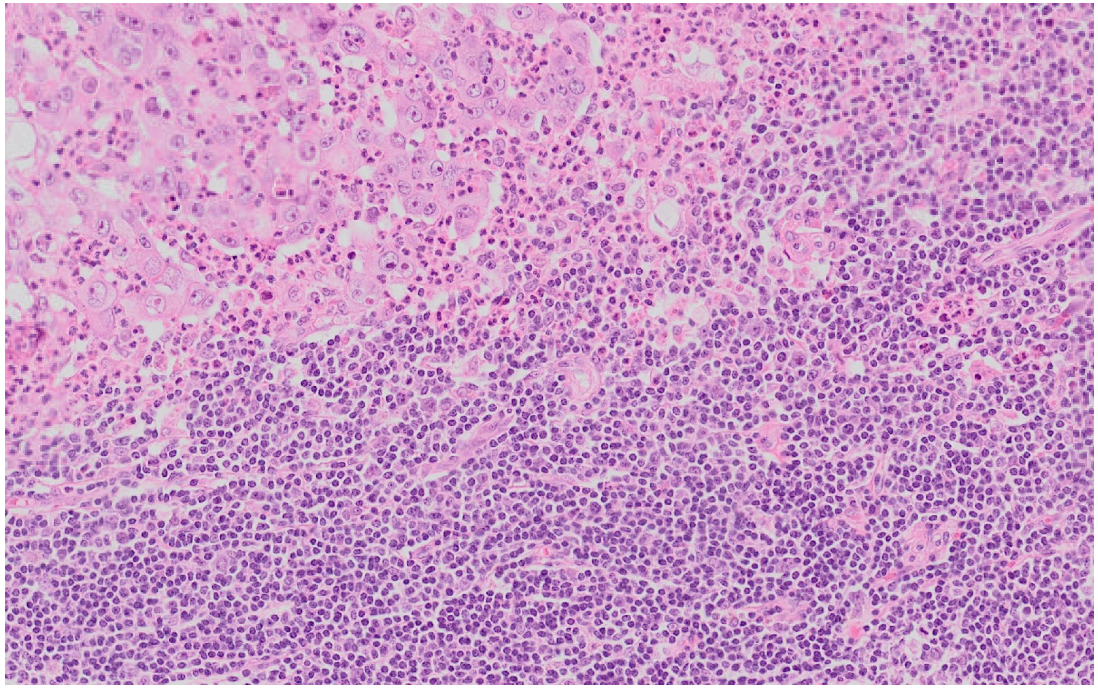
Wat is histopathologie?

Wat is histopathologie?

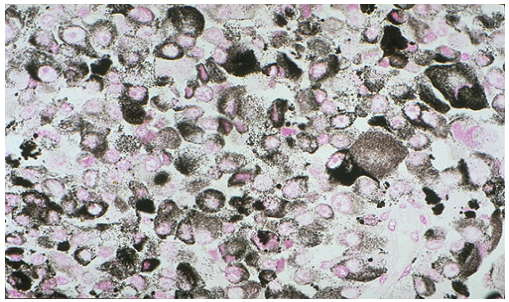
Microscopische inspectie van gekleurde weefsels om ziekten te detecteren en graderen

Weefsel verzamelen → Fixeren → Uitharden → Snijden → Kleuren → Inspectie

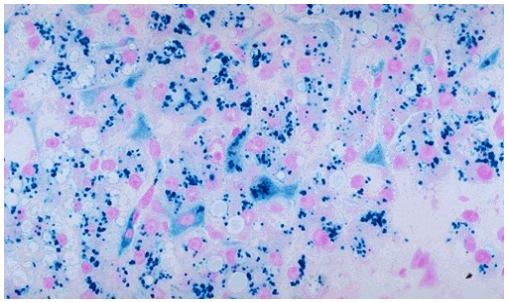
Kleuren



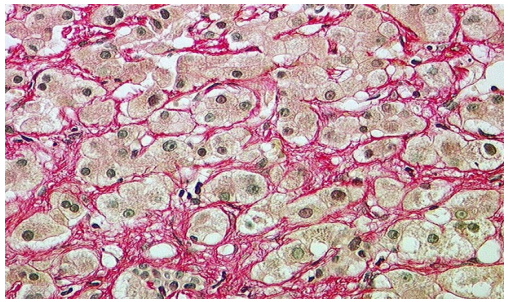
Kleuren



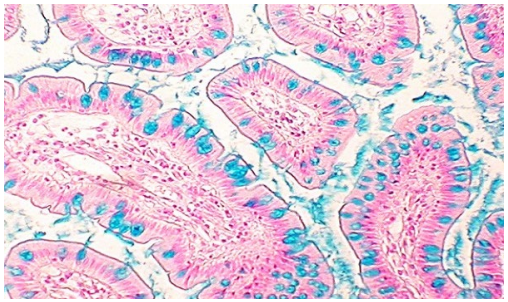
Fontana-Masson



Perl's iron stain



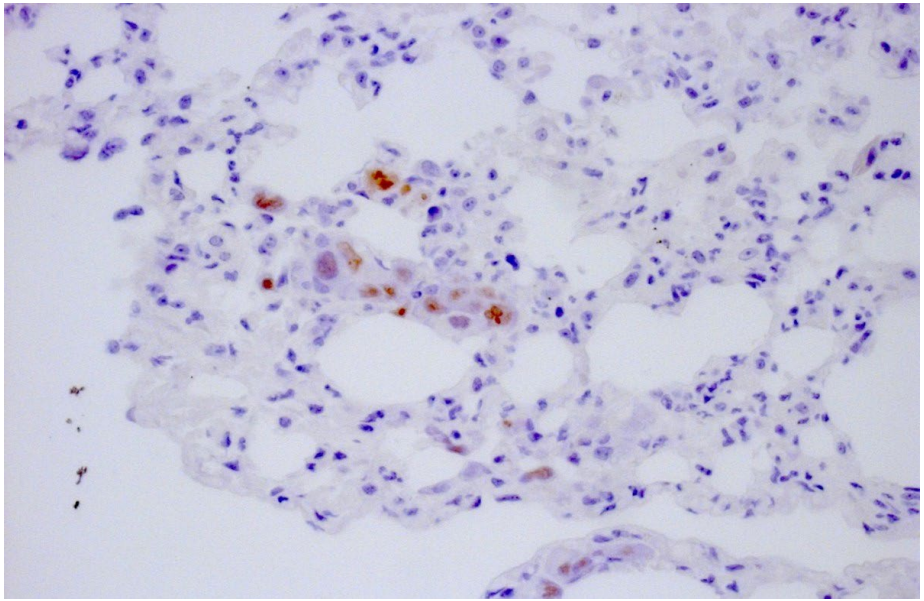
Sirius Red



Alcian blue

Immunohistochemisch kleuren

Gerichte kleuringen met gebruik van antilichamen

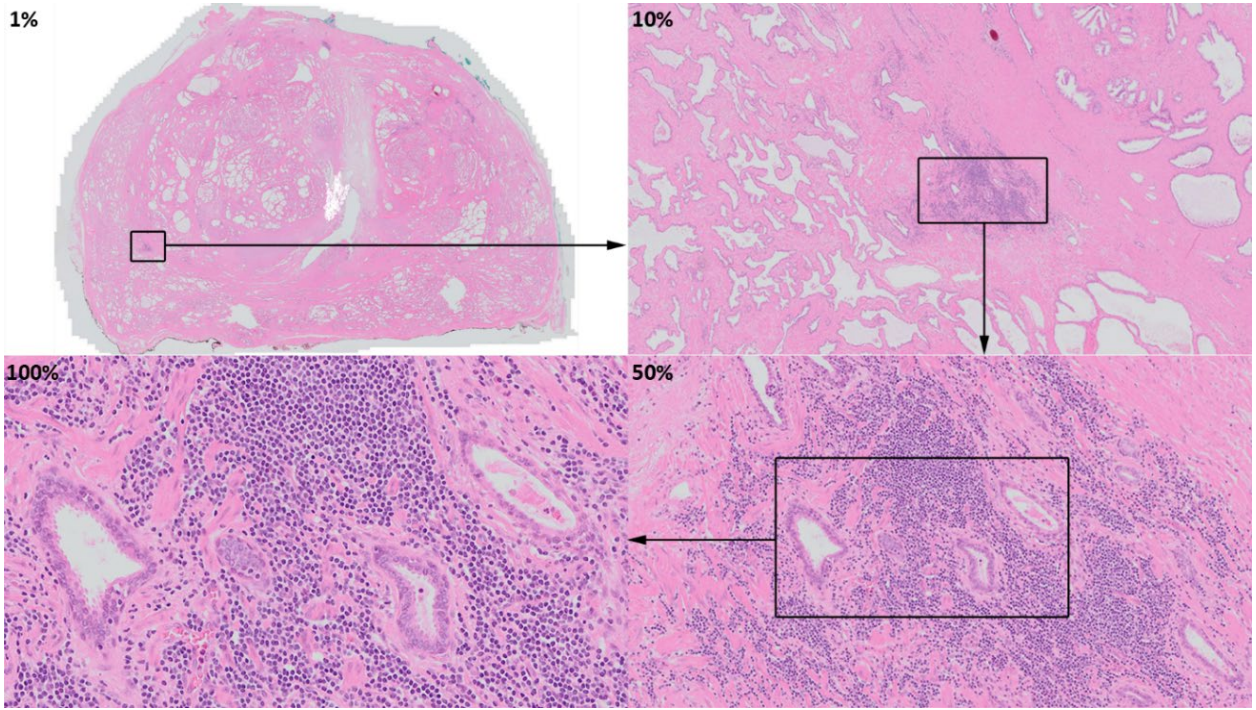


Ki67 kleuringen

Uitdagingen in de pathologie

Grote hoeveelheden weefsel

Handmatige inspectie grote hoeveelheden weefsel



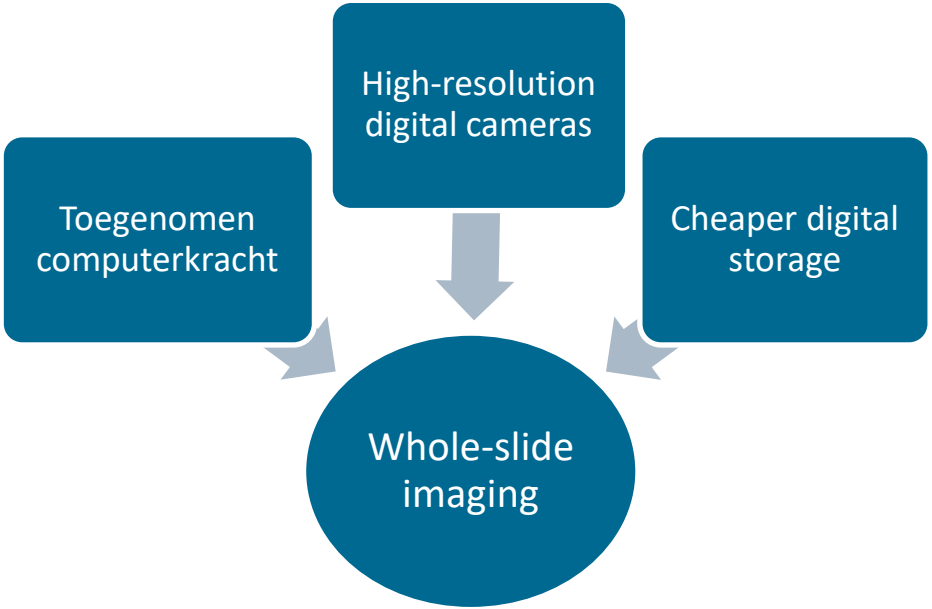
Uitdagingen in de pathologie

Grote hoeveelheden weefsel

Subjectief

Ervaring

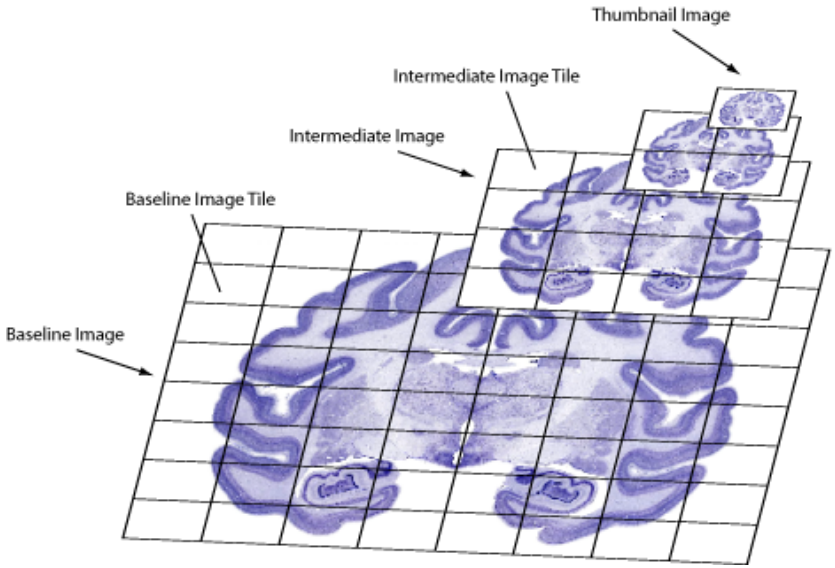
Oplossingen

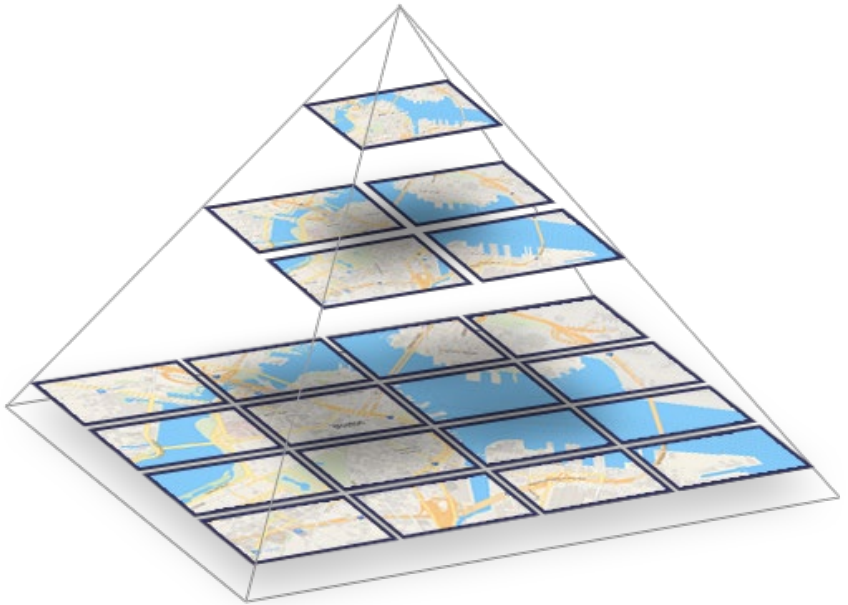


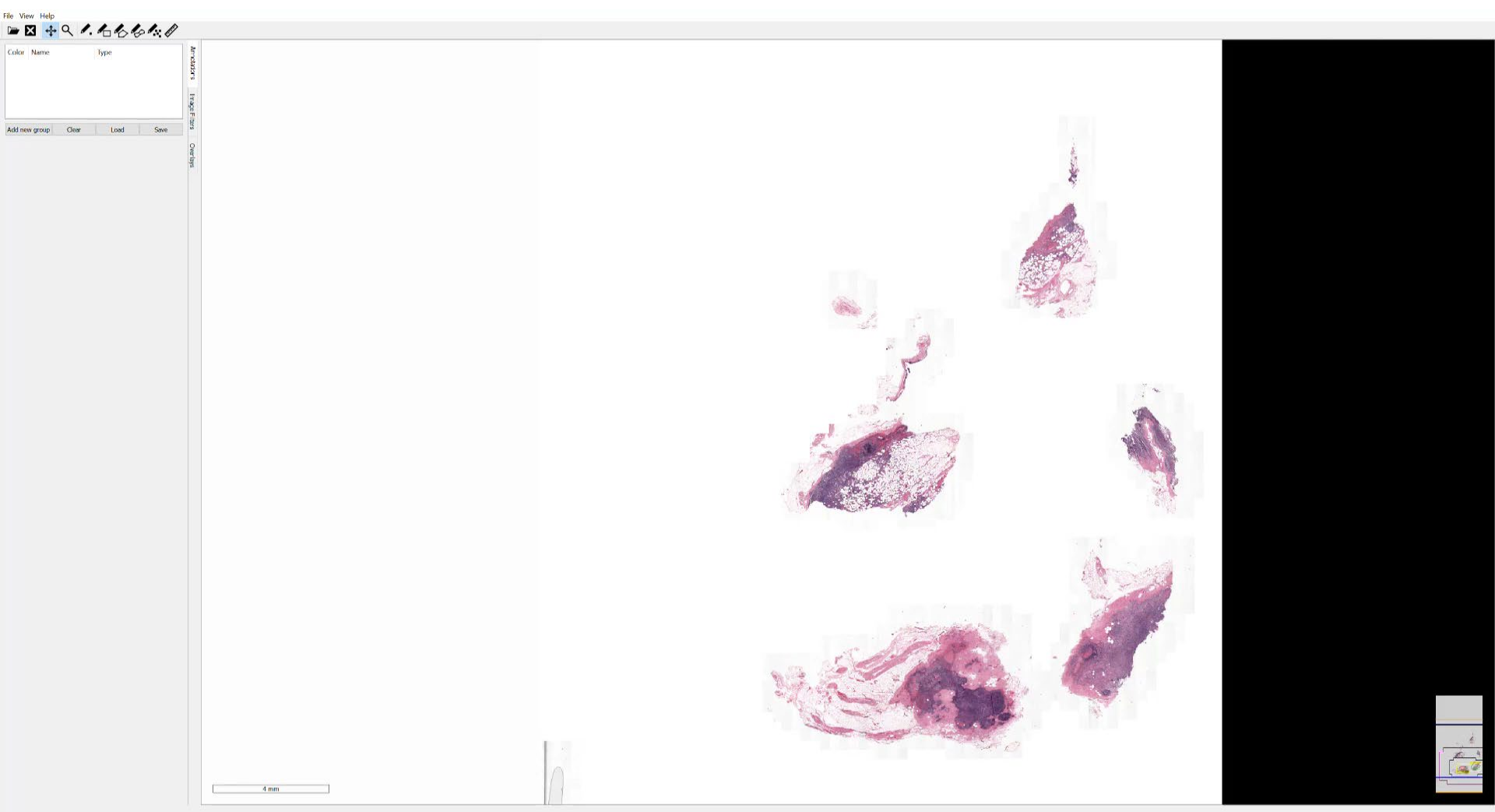
Whole-slide imaging

Digitale opnames van glaasjes met weefsel

Whole-slide imaging






File
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Add new group
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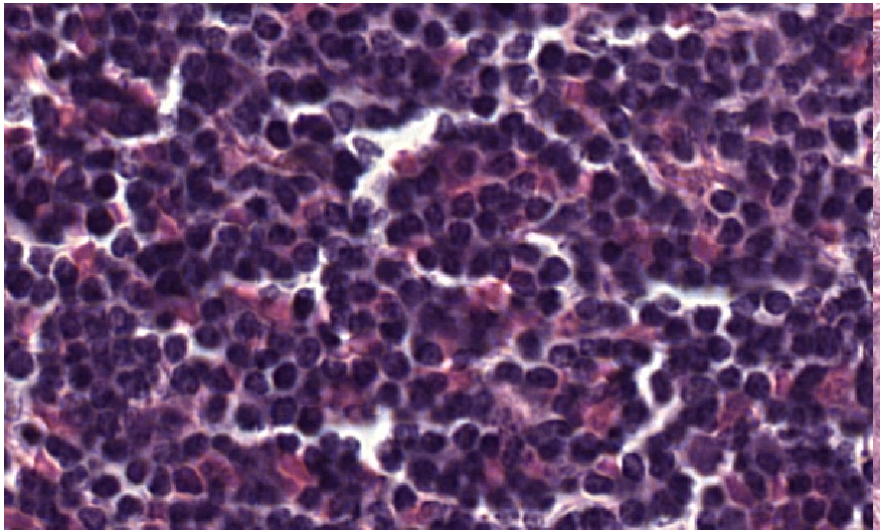
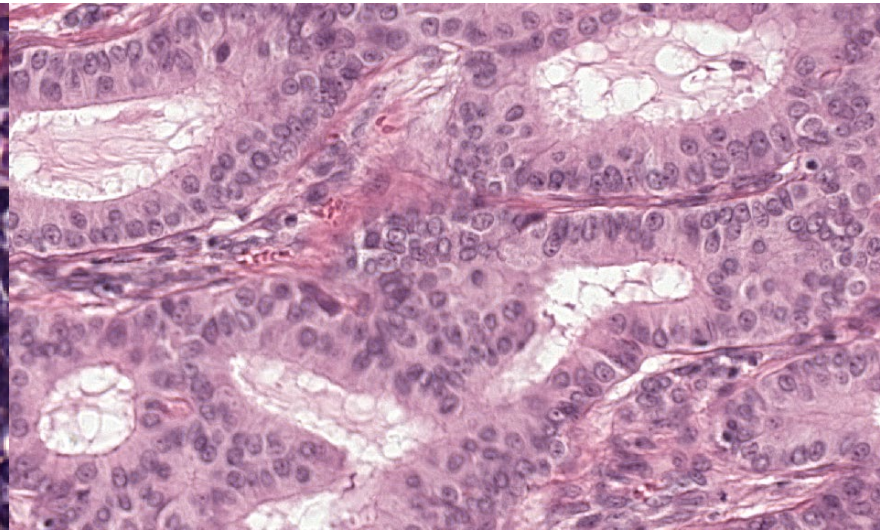
Kunstmatige intelligentie

Hoe maakte je zo’n systeem?



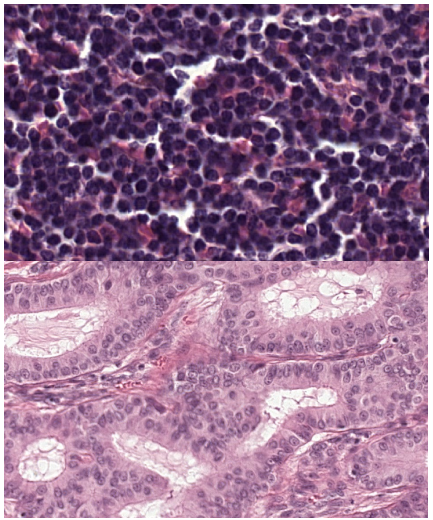
Normale cellen



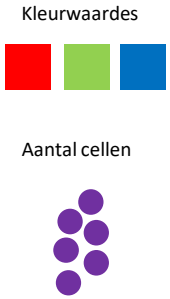
Borstkanker

Hoe maakte je zo'n systeem?

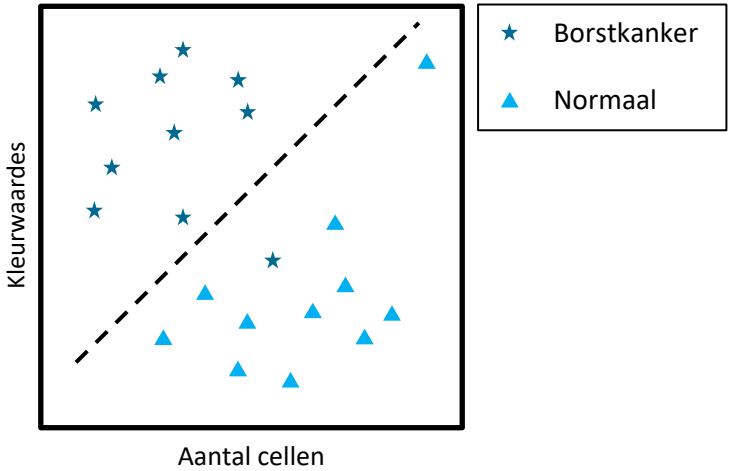
Voorbeelden



Kenmerken



Classificeren



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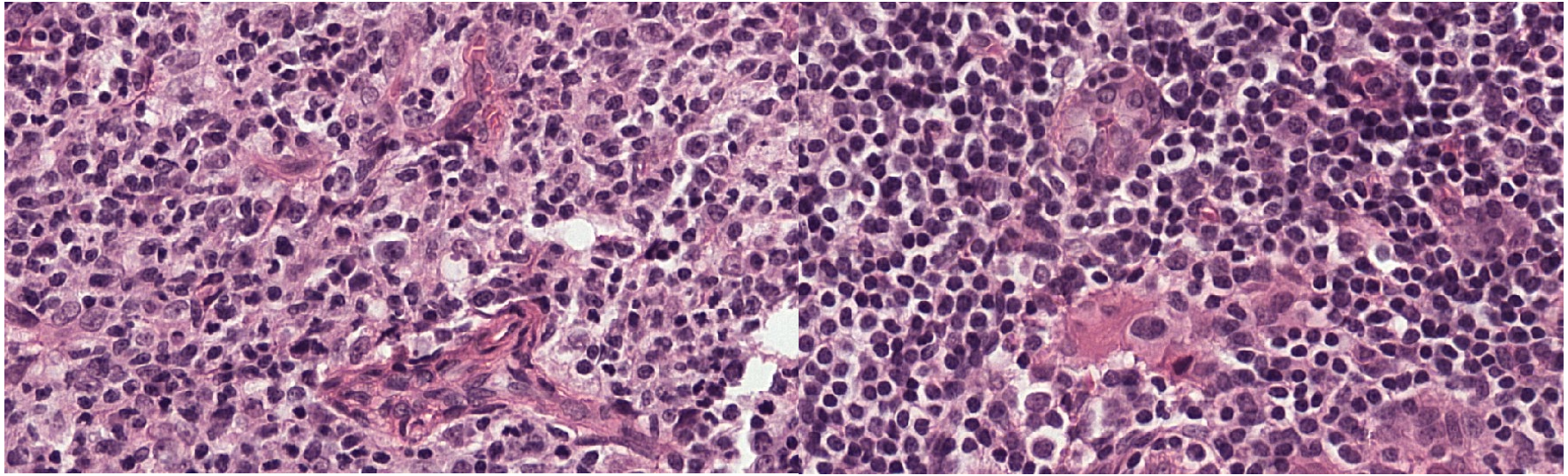


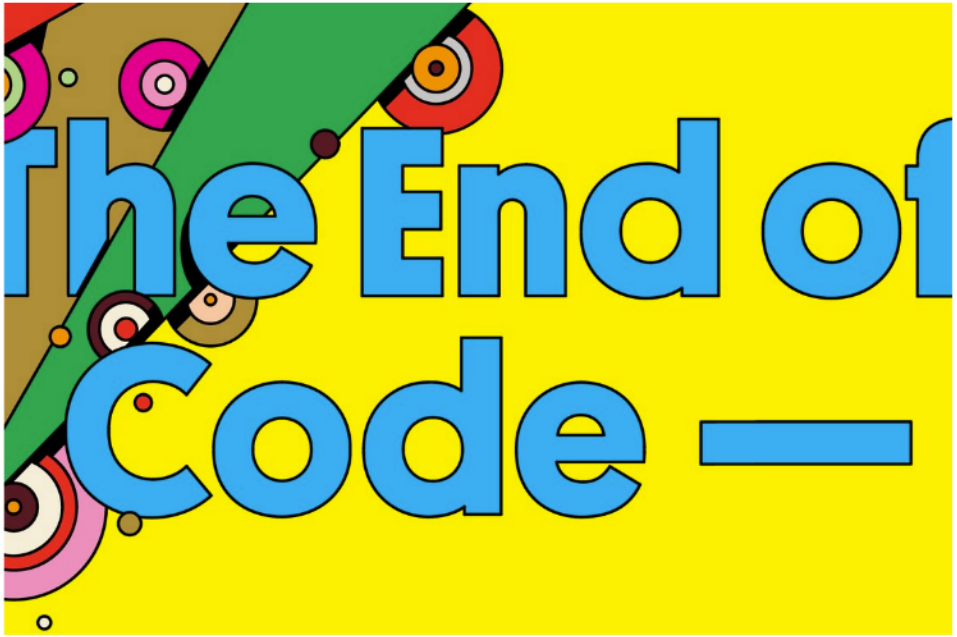
Normale cellen

Borstkanker

Hoe maak je nu een KI system?

JASON TANZ IDEAS 05.17.16 06:50 AM

SOON WE WON'T PROGRAM COMPUTERS. WE'LL TRAIN THEM LIKE DOGS



EDWARD C. MONAGHAN

BEFORE THE INVENTION of the computer, most experimental psychologists thought the brain was an unknowable black box. You could analyze a subject's behavior—*ring bell, dog salivates*—but thoughts, memories, emotions? That stuff was obscure and inscrutable, beyond the reach of science. So these behaviorists, as they called themselves, confined their work to the study of stimulus and response, feedback and reinforcement, bells and saliva. They gave up trying to

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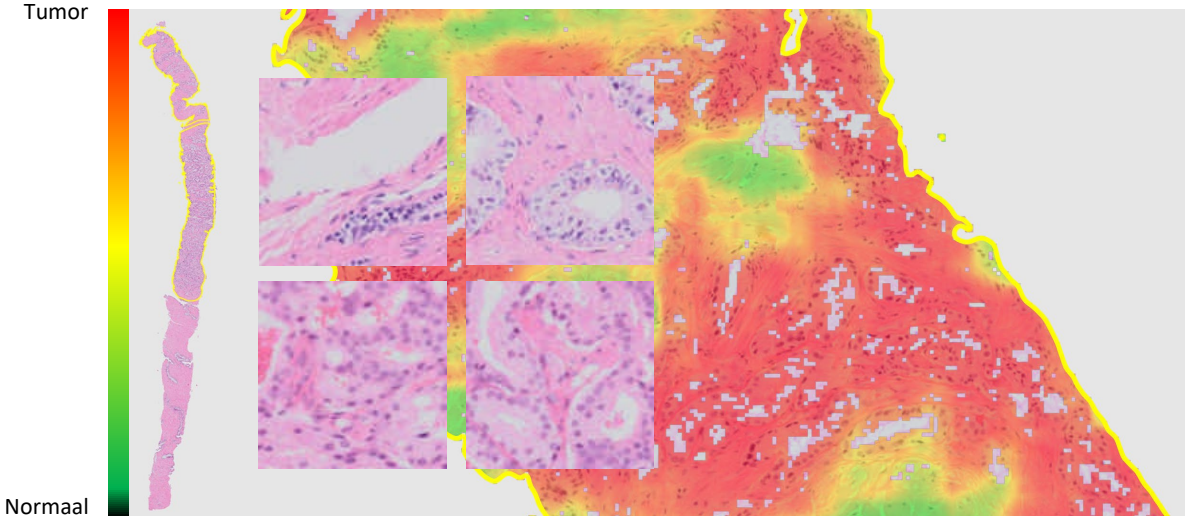
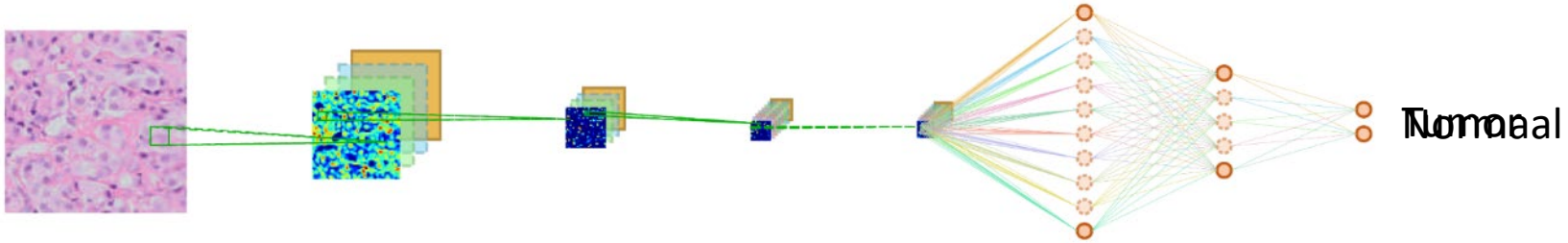
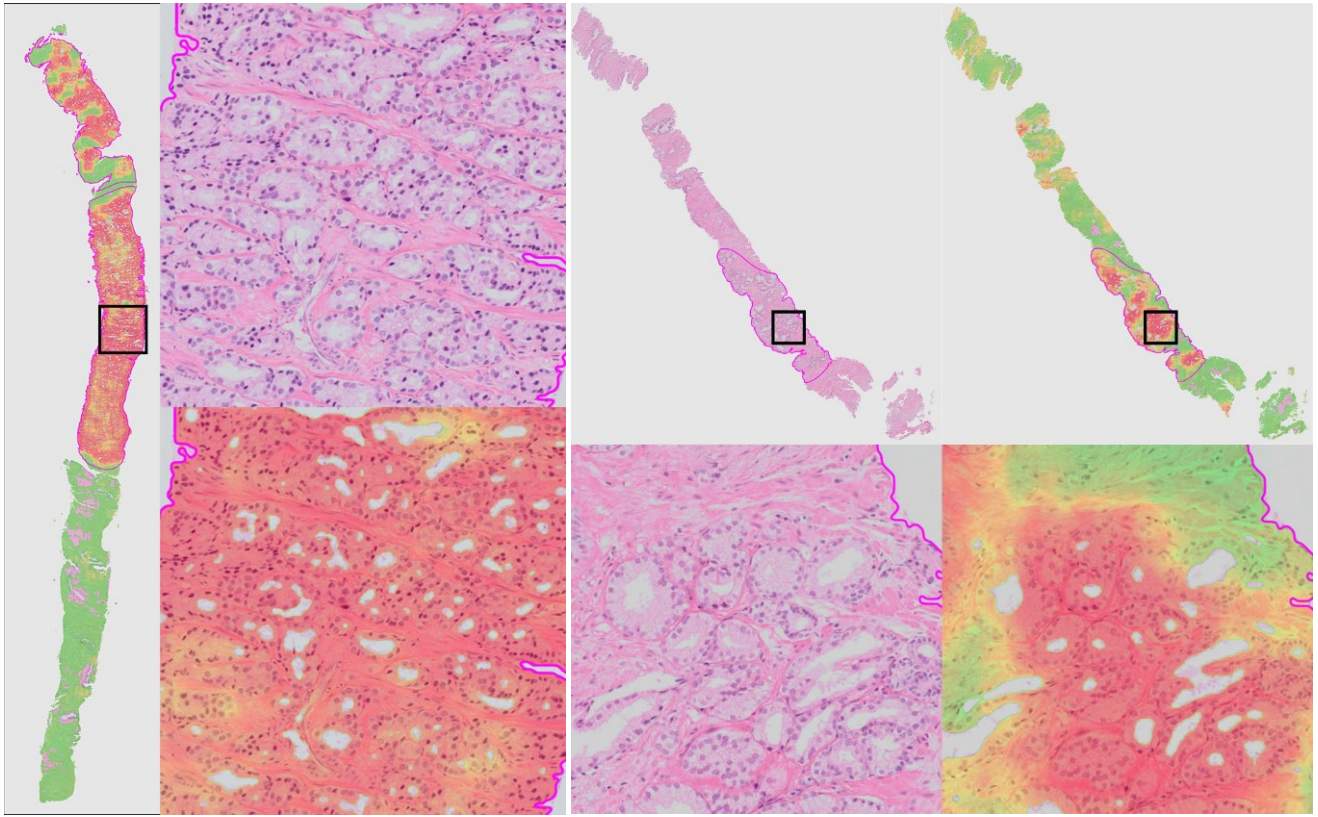




Litjens et al. *Sci Rep.* 2016

Radboudumc




Tumor

Kunnen we nu dan beter dan dit model?

Risico	Stadium	Prostaat specifiek antigeen (PSA) in bloed	Gleason score (patholoog)
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Bulten et al. *Lancet Oncology* (2020)

Kunnen we nu dan beter dan dit model?

Risico	Stadium	Prostaat specifiek antigeen (PSA) in bloed	Gleason score (patholoog + AI)	Computer score
Laag	T1c – T2a	< 10 ng/mL	< 7	< 0.25
Matig	T2b-c	10 – 20 ng/mL	7	0.25 – 0.75
Hoog	T3	>20 ng/mL	>7	>0.75

Kunnen we nu dan beter dan dit model?

Risico	Stadium	Prostaat specifiek antigeen (PSA) in bloed	Computer score
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Matig	T2b-c	10 – 20 ng/mL	0.25 – 0.75
Hoog	T3	>20 ng/mL	>0.75

The Group

Faculty

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Geert Litjens

Assistant professor

Francesco Ciompi

Assistant Professor

Scientific staff

Caner Mercan

Postdoctoral researcher

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PhD student

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Study manager

Hans Pinckaers

PhD student

Jasper Linmans

PhD student

John-Melle Bokhorst

PhD student

Mart van Rijthoven

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Pathology resident and PhD student

Meyke Hermsen

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Oscar Geessink

PhD student

Péter Bándi

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Postdoctoral researcher

Thomas de Bel

PhD student

Witali Aswolinskiy

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