Prague 12. ONCO ONCOLOGY COOPERATION VIRTUAL

Nové metody a technologie v zobrazení plicních nádorů

Zaostřeno na NM

VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE

1. LÉKAŘSKÁ FAKULTA Univerzita Karlova

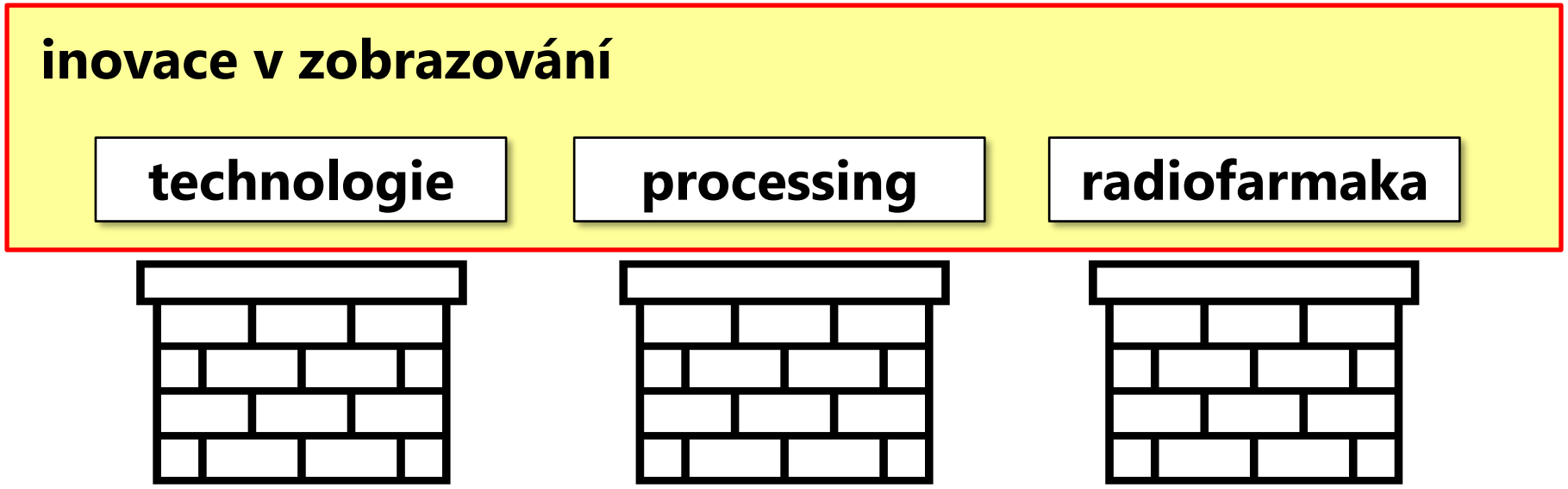
ČESKÁ SPOLEČNOST NUKLEÁRNÍ MEDICÍNY

D. Zogala

Ústav nukleární medicíny

1. LF UK a VFN Praha

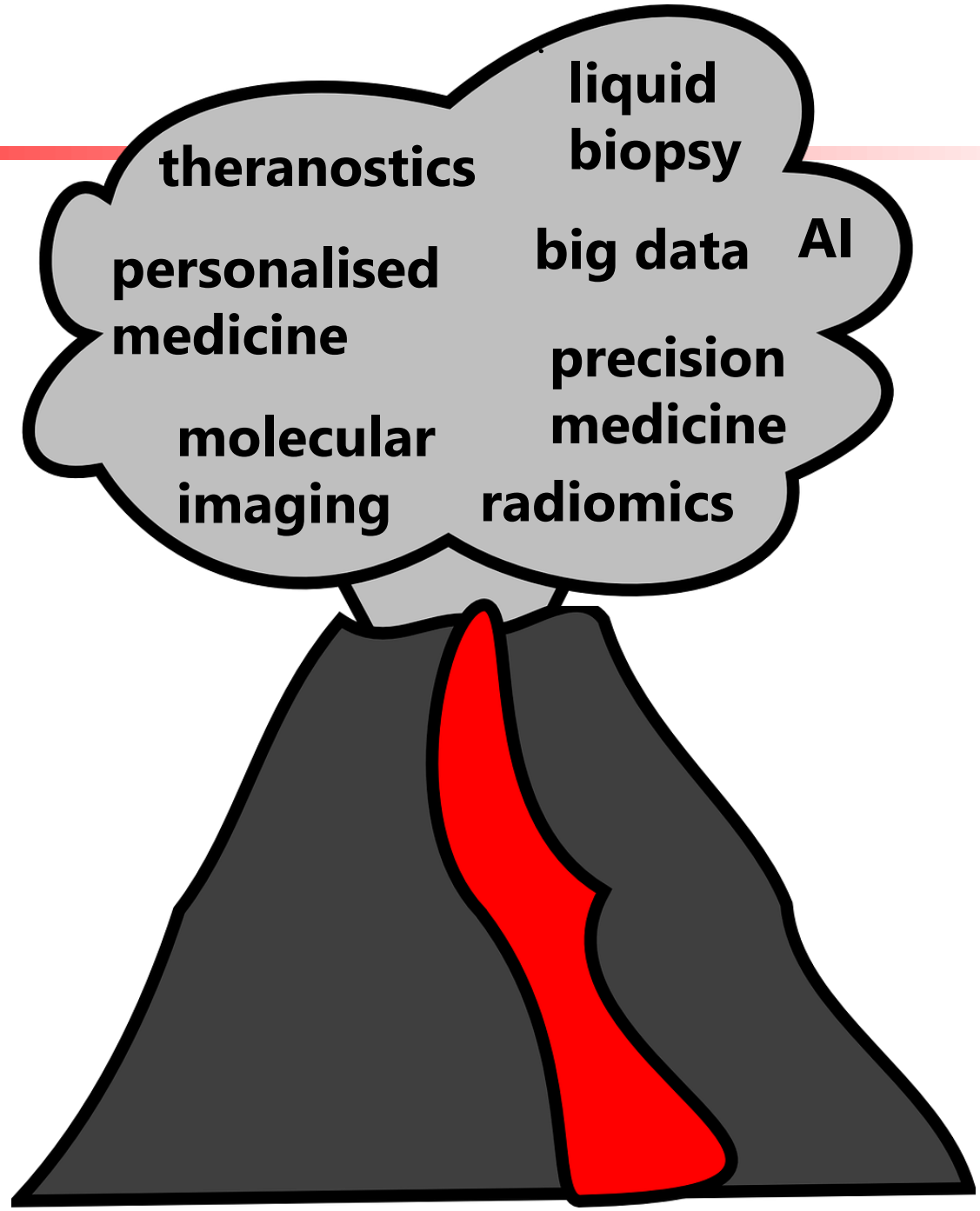
Úvod


inovace v zobrazování
technologie
processing
radiofarmaka

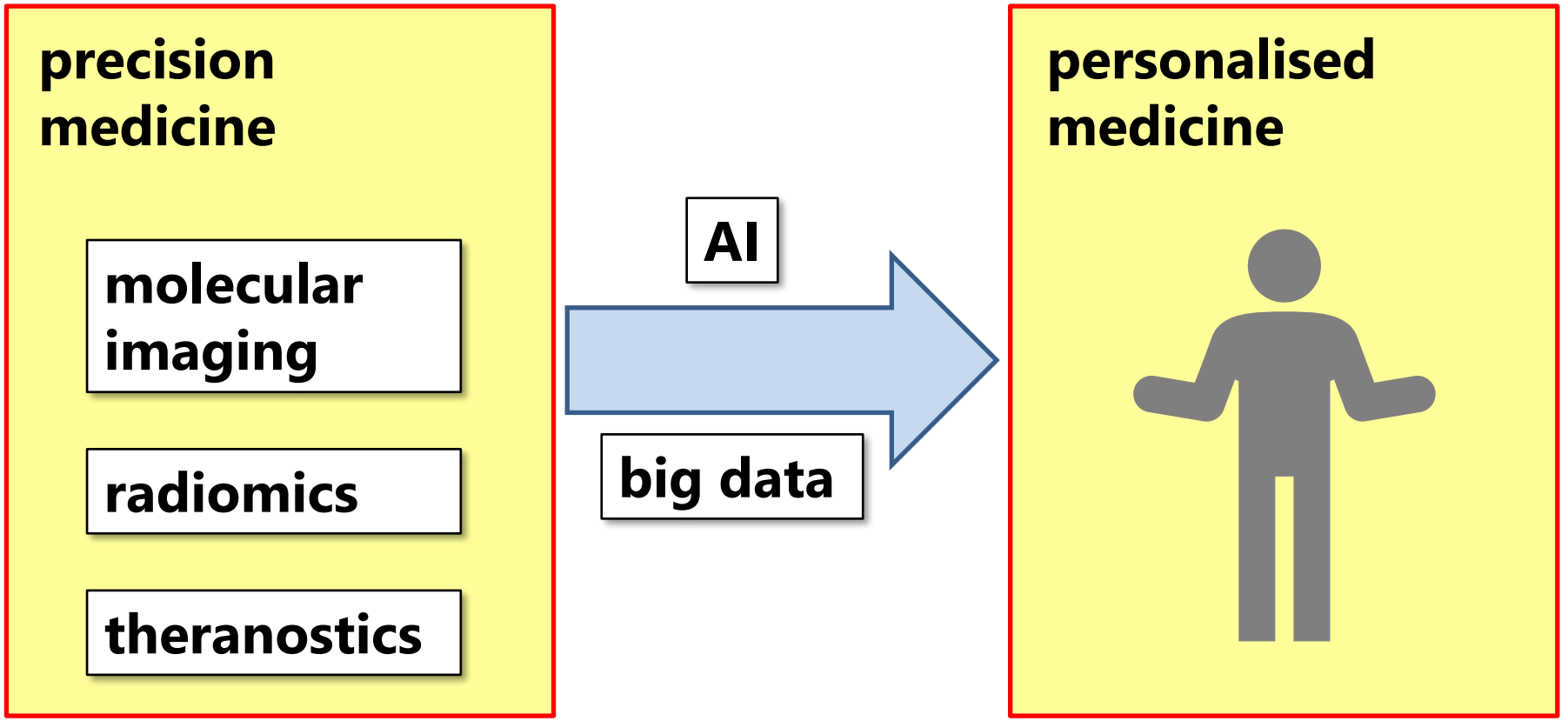
Introduction

buzzwords

hype?



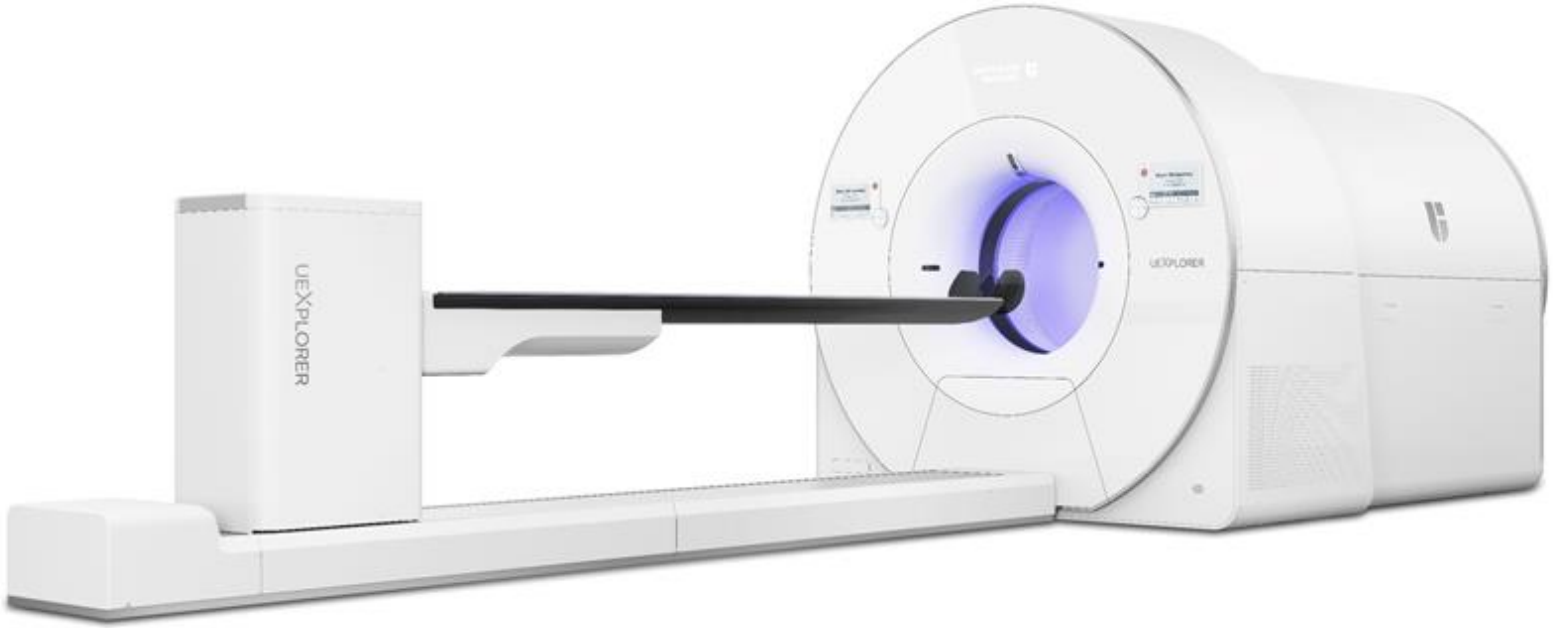
Introduction



Hot topics *technologie*

Total body PET

EXPLORER Total-body PET Scanner

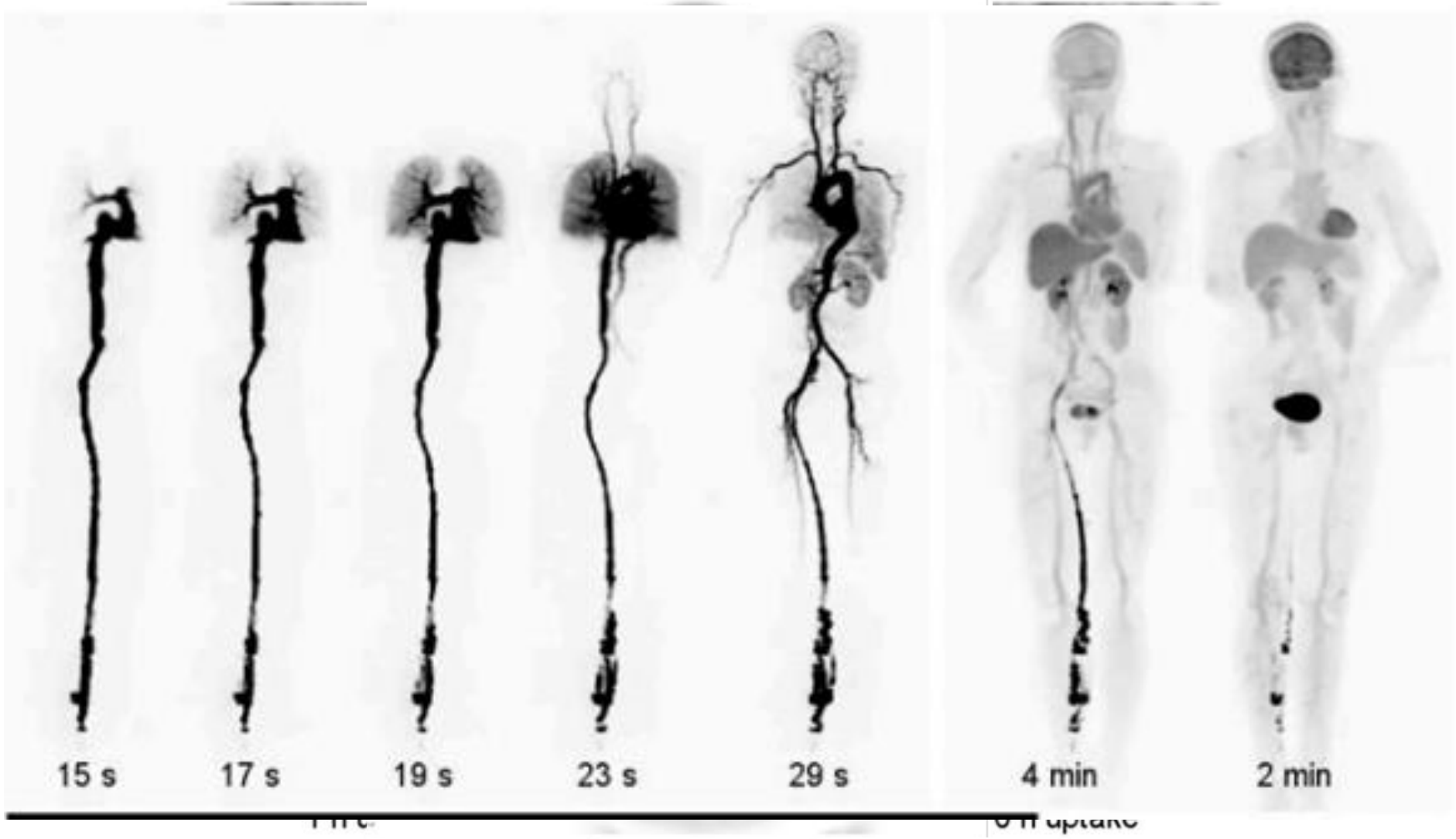


https://explorer.ucdavis.edu/

Total body PET

https://www.siemens-healthineers.com/molecular-imaging/pet-ct/biograph-vision-quadra

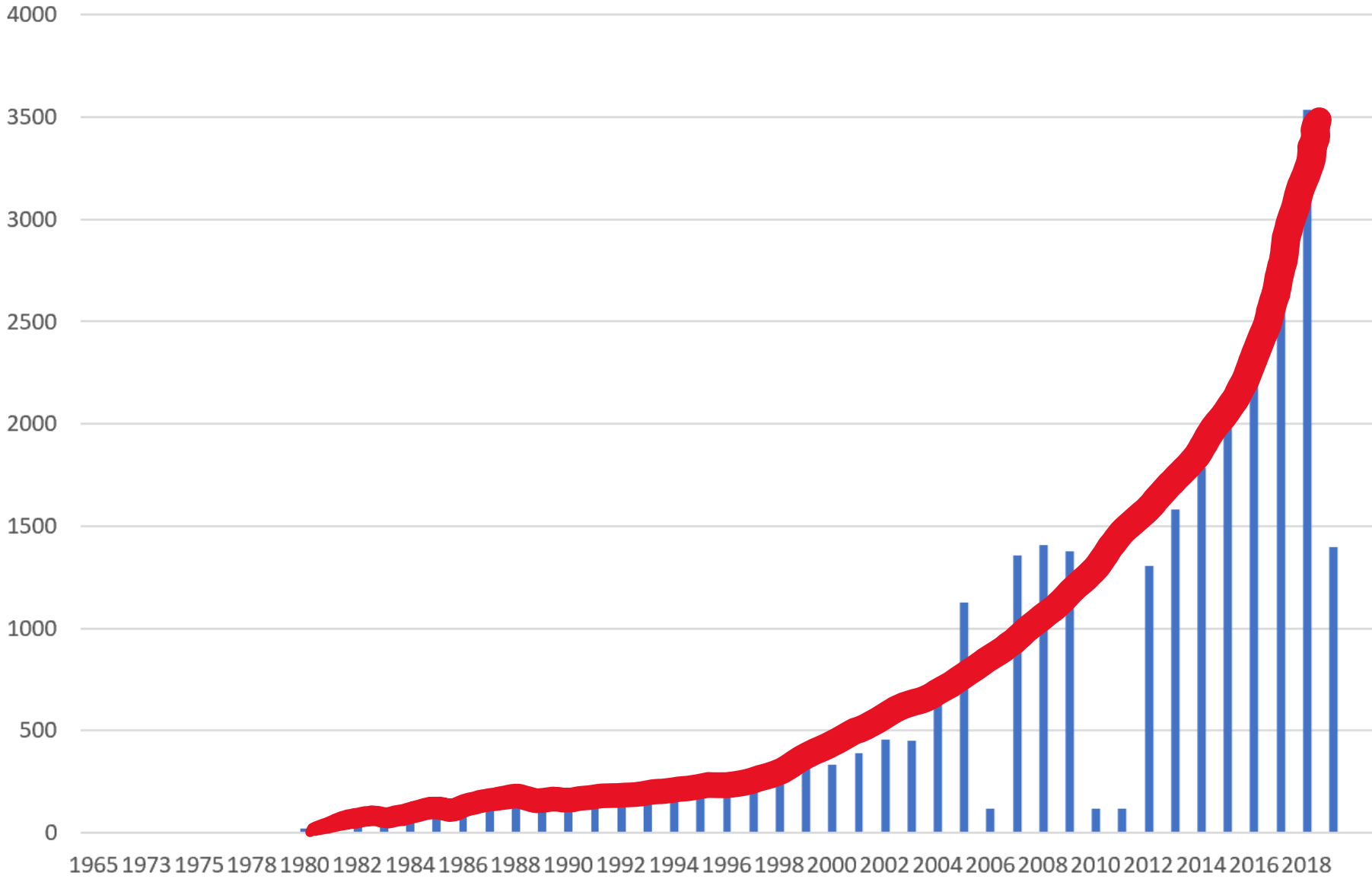
Total body PET



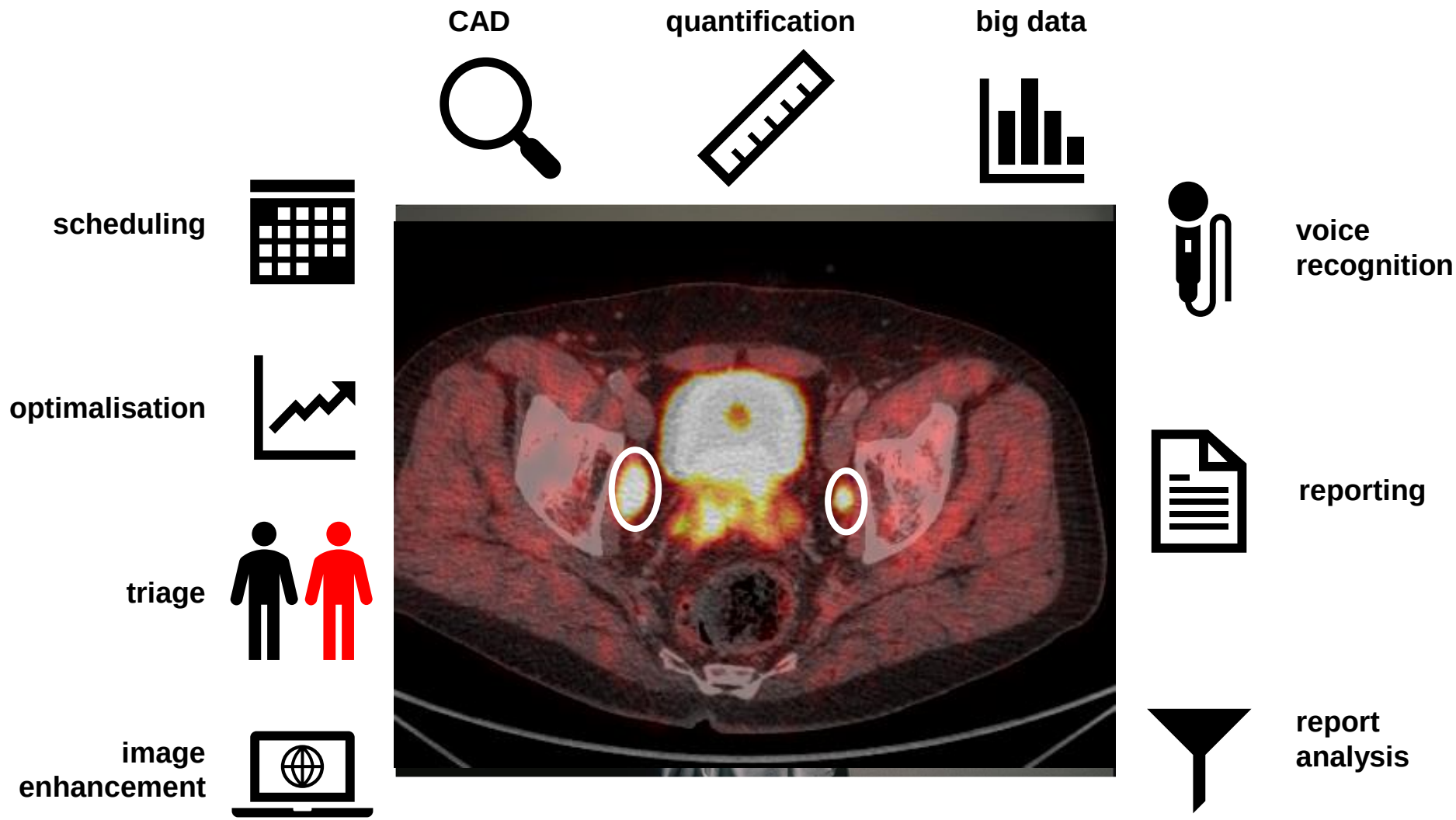
Badawi R. D. et al, JNM 2019

Hot topics *image processing*

AI


4000
3500
3000
2500
2000
1500
1000
500
0
1965 1973 1975 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018

AI



https://visualsonline.cancer.gov/details.cfm?imageid=4441

AI *bude třeba radiologů?*

- AI čl
- změ
- fore
  - d
  - p
- přen
- výpo
- akceptace ve společnosti

Geoffrey Hinton

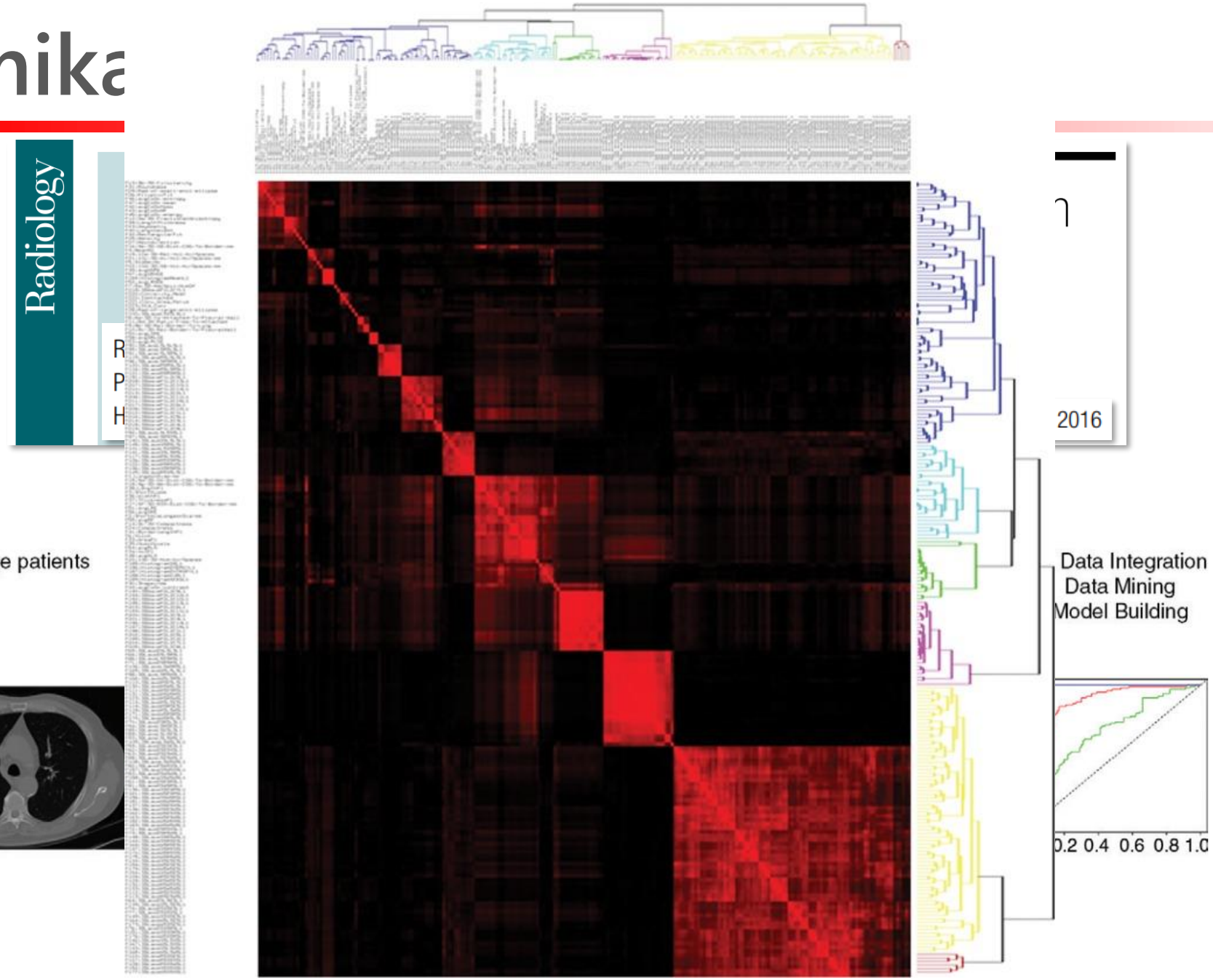
"I think that if you work as a radiologist, you are like Wile E. Coyote in the cartoon. You're already over the edge of the cliff, but you haven't yet looked down. There's no ground underneath. People should stop training radiologists now. It's just completely obvious that in five years deep learning is going to do better than radiologists."

Nov 24, 2016

AI

https://jamesbridle.com/works/autonomous-trap-001

Radiomika


Radiology
2016
I. Image patients
Data Integration
Data Mining
Model Building
0.2 0.4 0.6 0.8 1.0

Hot topics *radiofarmaka*

Hot topics *RF u plicních nádorů*

metabolism	aminokys.	proliferace	hypoxie	vlastnosti
▪ **FDG**	▪ FET ▪ FAMT ▪ ^{11}C-MET	▪ FLT	▪ FMISO ▪ FAZA	▪ SSR ▪ FAPI ▪ immunoPET ▪ integriny
LU vzd. meta SPN	ne rutinně meta mozku	ne rutinně monitorace RT	RT boost	charakteriz. tumorů predikce efektu terap.

Radiofarmaka *SSR PET*

Interactive CardioVascular and Thoracic Surgery 28 (2019) 957–960
doi:10.1093/icvts/ivz009 Advance Access publication 7 February 2019

BRIEF COMMUNICATION

Cite this article as: Lococo F, Rapicetta C, Mengoli MC, Filice A, Paci M, Di Stefano T *et al.* Diagnostic performances of ^{68}Ga-DOTATOC versus ^{18}Fluorodeoxyglucose positron emission tomography in pulmonary carcinoid tumours and interrelationship with histological features. Interact CardioVasc Thorac Surg 2019;28:957–60.

Diagnostic performances of ^{68}Ga-DOTATOC versus ^{18}Fluorodeoxyglucose positron emission tomography in pulmonary carcinoid tumours and interrelationship with histological features

Filippo Lococo[a,*], Cristian Rapicetta[a], Maria Cecilia Mengoli[b], Angelina Filice[b], Massimiliano Paci[a], Teresa Di Stefano[a], Chiara Coruzzi[c] and Annibale Versari[c]

Original article

Nuclear Medicine Communications

Does ^{68}Ga-DOTA-NOC-PET/CT impact staging and therapeutic decision making in pulmonary carcinoid tumors?

Nilendu C. Purandare[a], Ameya Puranik[a], Archi Agrawal[a], Sneha Shah[a], Rajiv Kumar[b], Sabita Jiwnani[c], George Karimundackal[c], C.S. Pramesh[c] and Venkatesh Rangarajan[a]

Rradiofarmaka *FMISO – radiotherapy boost?*

European Journal of Nuclear Medicine and Molecular Imaging (2019) 46:1448–1456
https://doi.org/10.1007/s00259-019-04285-9

ORIGINAL ARTICLE

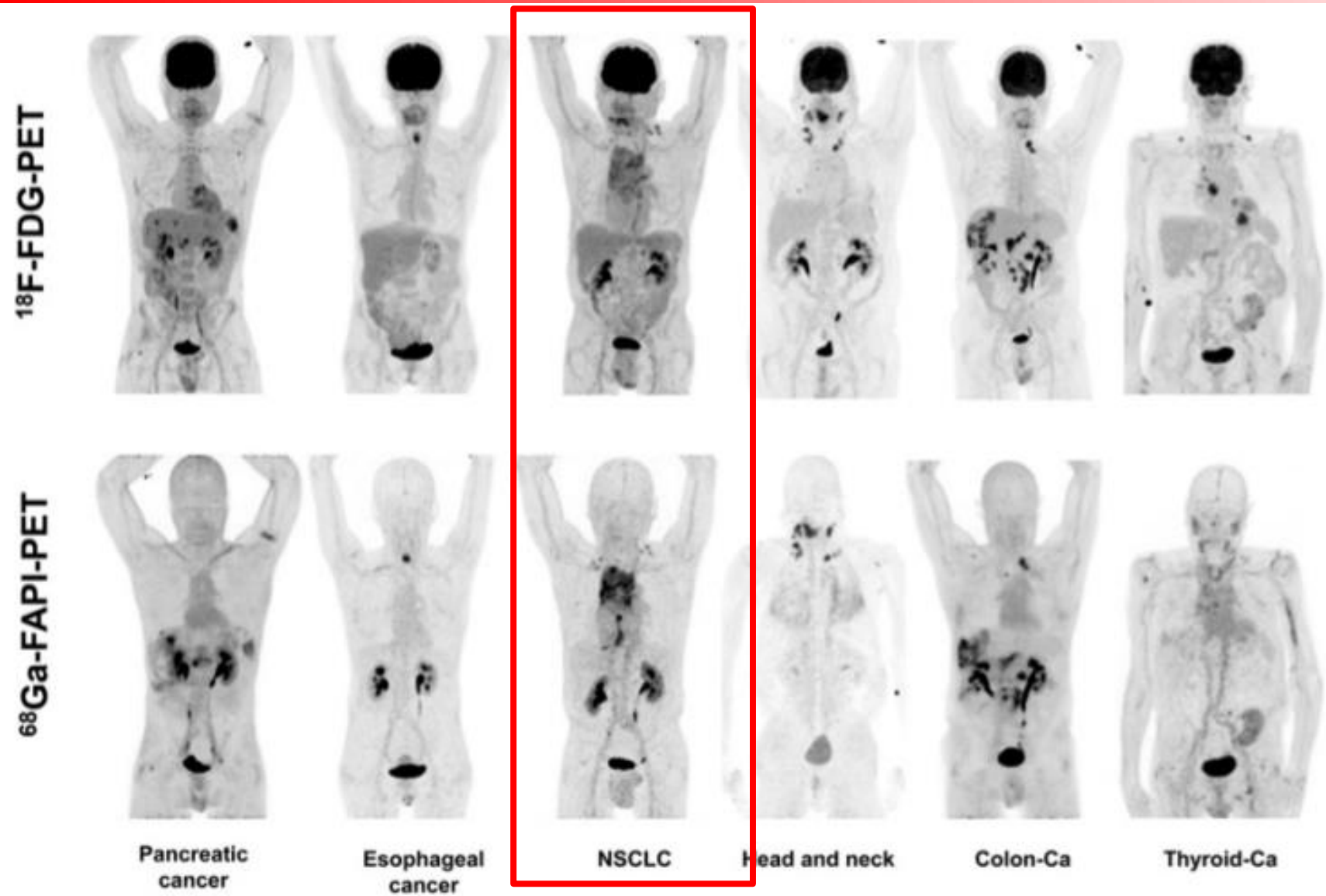
Check for updates

Radiotherapy boost in patients with hypoxic lesions identified by ^{18}F-FMISO PET/CT in non-small-cell lung carcinoma: can we expect a better survival outcome without toxicity? [RTEP5 long-term follow-up]

Pierre Vera[1] · Sorina-Dana Mihailescu[2] · Justine Lequesne[2] · Romain Modzelewski[1] · Pierre Bohn[1] · Sébastien Hapdey[1] · Louis-Ferdinand Pépin[2] · Bernard Dubray[3] · Philippe Chaumet-Riffaud[4] · Pierre Decazes[1] · Sébastien Thureau[1,3] · all investigators of RTEP5 study (list in annexe)

- 54 pac., 34 pac. „hypoxických“, 24 boost, 10 standard
- FMISO + horší OS a PFS
- pac. s boostem měli lepší OS, nesignifikantní
- 26,5 vs 15,3 měs. (p = 0,71)

Radiofarmaka *FAPI – musí být cíl nádor. buňka?*



Giesel F. L. et al, JNM 2019

Radiofarmaka *FAPI – musí být cíl nádor. buňka?*

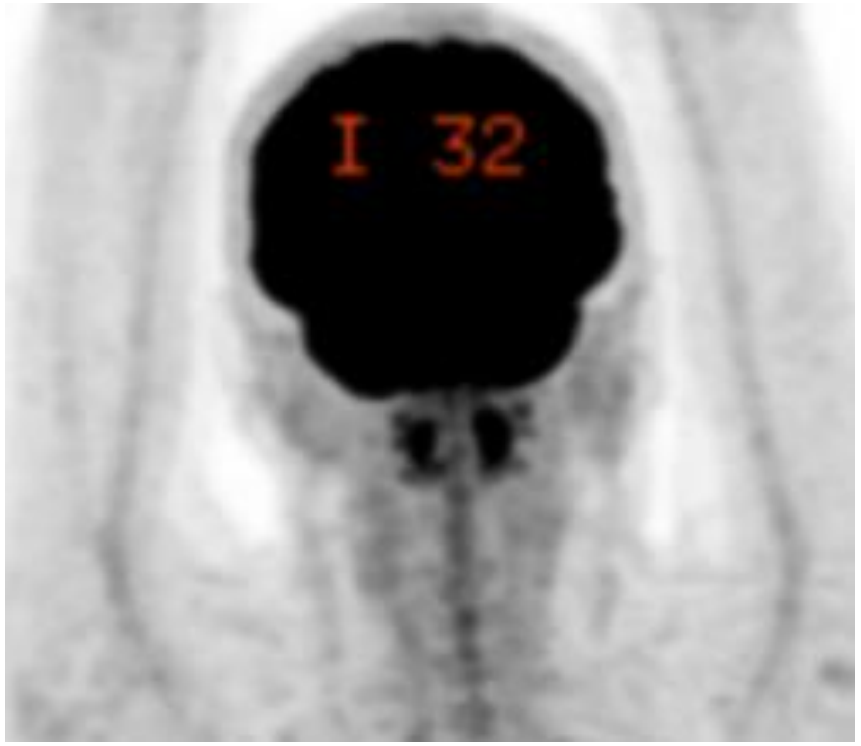
European Journal of Nuclear Medicine and Molecular Imaging (2019) 46:1754–1755
https://doi.org/10.1007/s00259-019-04346-z

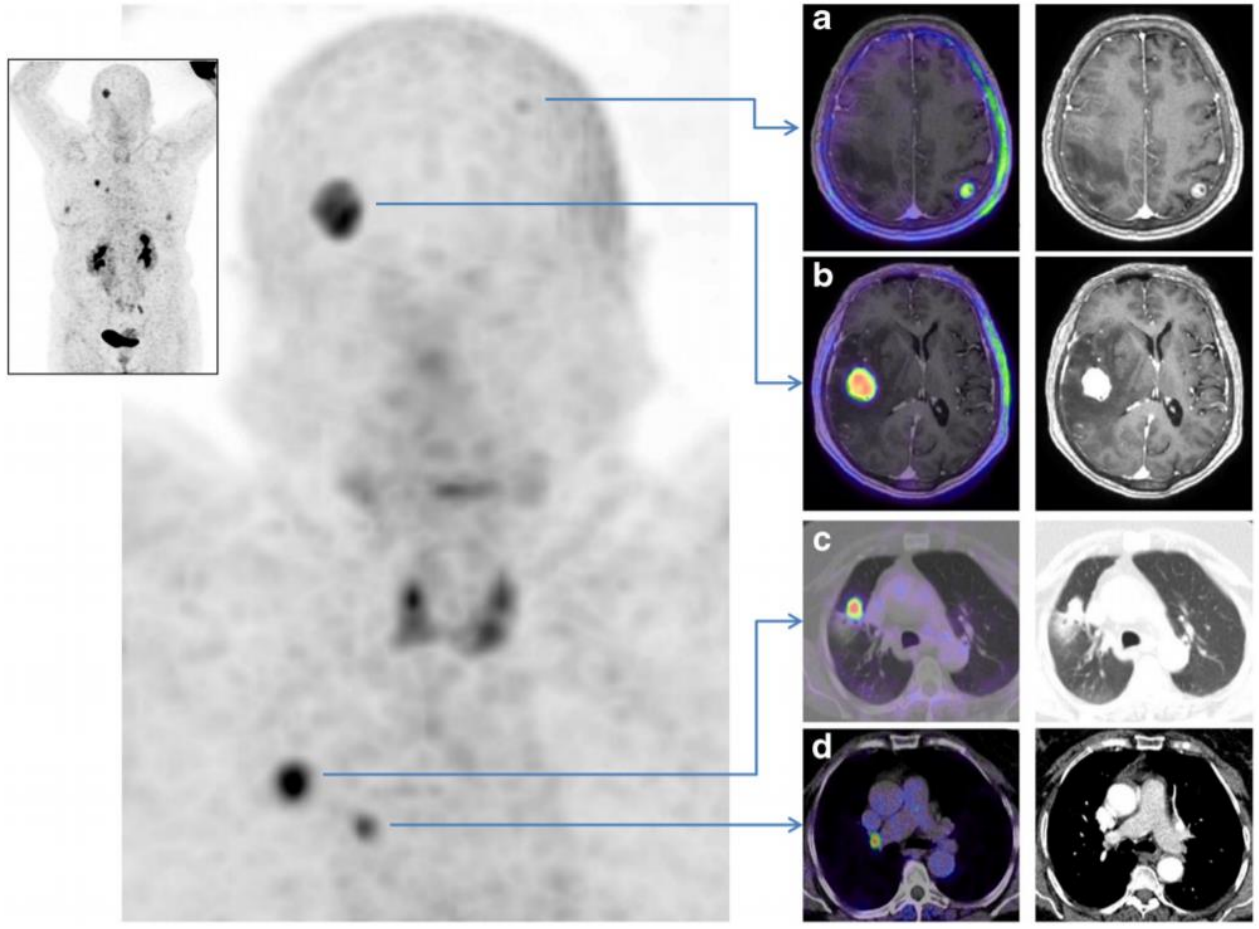
IMAGE OF THE MONTH

Check for updates

FAPI-PET/CT improves staging in a lung cancer patient with cerebral metastasis

Frederik L. Giesel[1] · Claus Peter Heussel[2,3,4] · Thomas Lindner[1] · Manuel Röhrich[1] · Hendrik Rathke[1] · Hans-Ulrich Kauczor[3,4] · Jürgen Debus[5] · Uwe Haberkorn[1,3,6] · Clemens Kratochwil[1]





Radiofarmaka *immunoPET*

Current Radiopharmaceuticals, 2020, *13*, 177-184

REVIEW ARTICLE

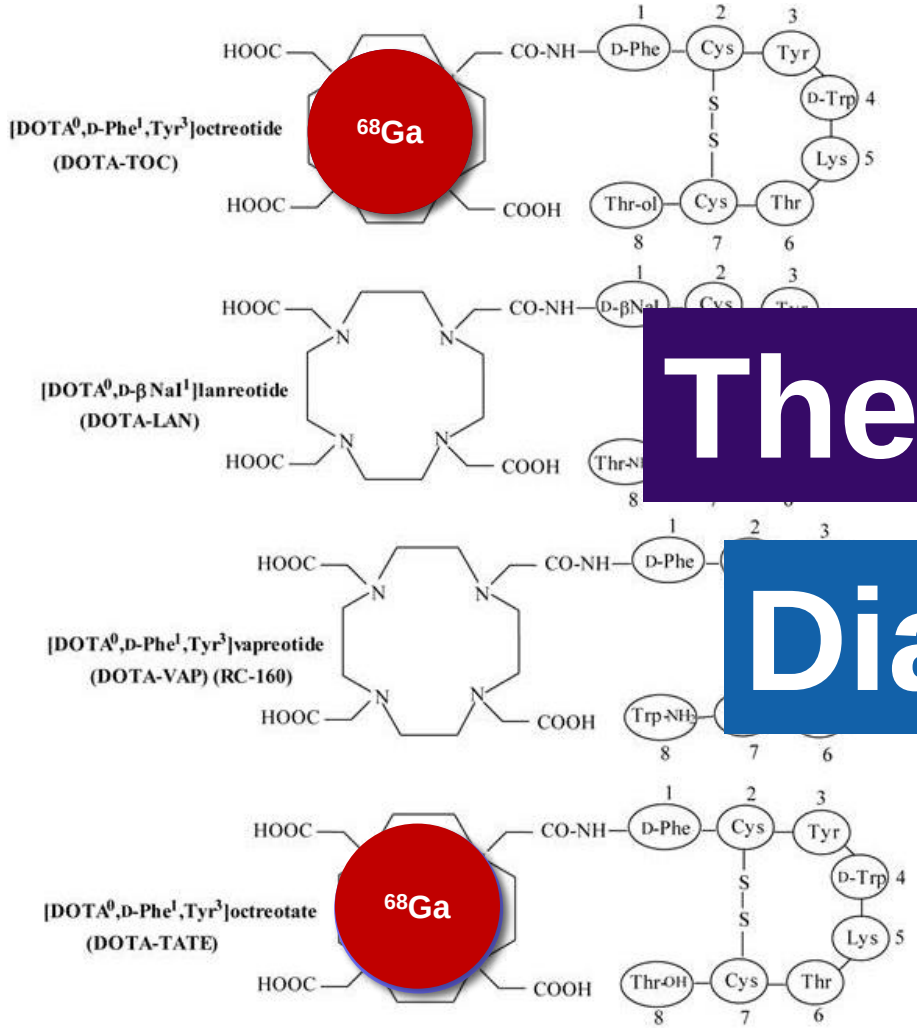
PET/CT and the Response to Immunotherapy in Lung Cancer

Laura Evangelista[1,*], Matteo Sepulcri[2] and Giulia Pasello[3]

Table 2. New radiopharmaceutical agents for immuno-PET.

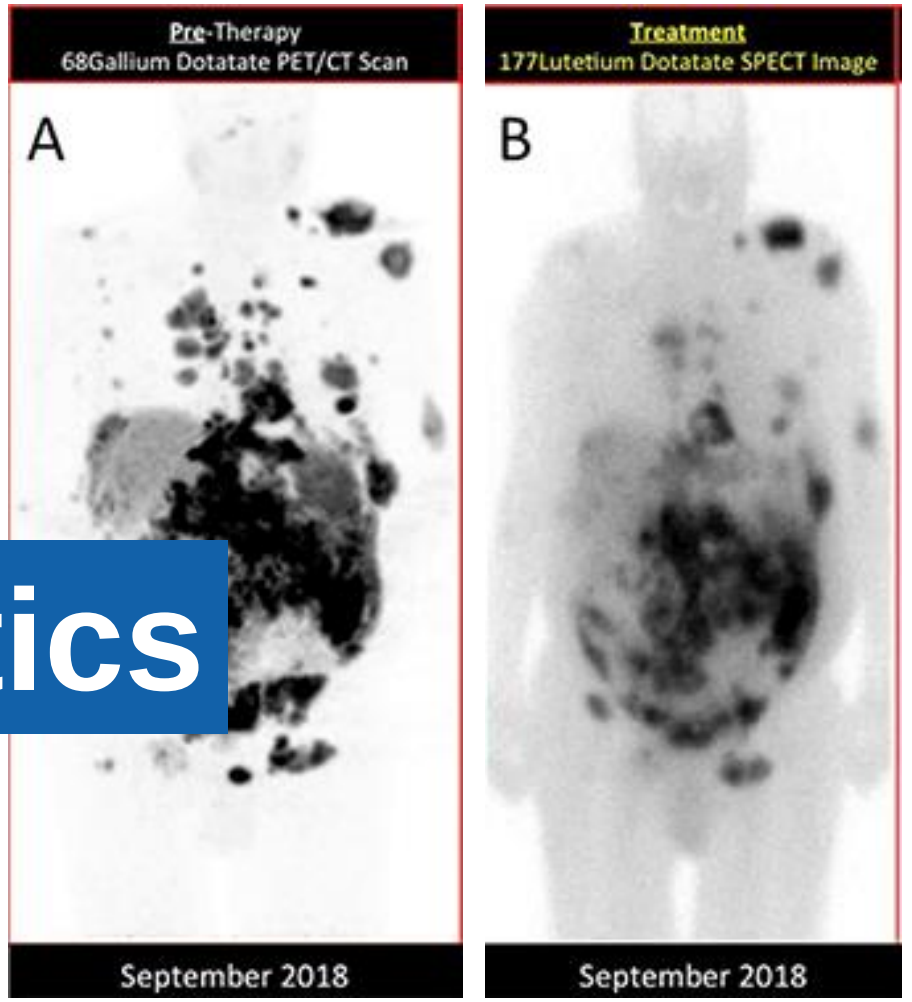
Authors (year), ref	Radiopharmaceutical	Target	Experimental phase
Pool *et al.* (2206), [42]	89Zr-imgratuzumab	EGFR	Preclinical
Sun *et al.* (2016), [47]	64Cu-anti CD 146	CD 146	Preclinical
Ehlerding *et al.* (2017), [43]	64Cu-DOTA-ipilimumab	Cytotoxic T lymphocyte associated protein (CTLA-4)	Preclinical
Cole *et al.* (2017), [44]	89Zr-nivolumab	PD-L1	Preclinical
Truillet *et al.* (2018), [46]	89Zr-C4	Human IgG1	Preclinical
England *et al.* (2018), [45]	89Zr-df-nivolumab	PD-L1	Preclinical

Teranostika



Therapy

Diagnostics



http://www.thno.org

Kasi P. M., Case Reports in Oncology 2019

Teran

Table 4: Prior studies of PRRT including patients with lung or bronchial NET*

Study	*n* (LNETs)	*n* (other NETs)	Isotope	Median OS	Median PFS	Median TTP	ORR
Mariniello A, 2016 [24]	114	-	^{90}Y v ^{177}Lu v ^{90}Y+ ^{177}Lu	58.8 m	28.0 m	-	Highest with ^{77}Lu at 38.1%
Brabander T, 2017 [31]	23	420	^{177}Lu	63 m	29 m	-	39%
Horsch D, 2016 [32] (German registry)	18	396	^{90}Y v ^{177}Lu v ^{90}Y+ ^{177}Lu	59 m	41 m	-	28%
Parghane RV, 2017 [21]	22	-	^{177}Lu	40 m		-	63% (3 scale criteria)
Demirci E, 2019 [33]	29	157	^{177}Lu	-	36.4 m	-	50%
van Essen M, 2007 [34]	9	7	^{177}Lu	-	-	31 m	50%
Sabet, 2017 [22]	22	-	^{177}Lu	42 m	27 m	-	27.3%
Imhof, 2011 [35]	84	1109	^{90}Y	-	-	-	29.7%
Villard, 2012 [36]	N/E	486	^{90}Y v ^{90}Y+ ^{177}Lu	47.5 v 66.1 m	-	-	-
Gabriel, 2019 [36]	4	34	^{90}Y	79 m	-	-	-
Garske-Roman, 2018 [37]	6	200	^{177}Lu	43 m	27 m	-	24%
Baum, 2018 [38]	75	1048	^{90}Y v ^{177}Lu v ^{90}Y+ ^{177}Lu	40 m (LNETs)	11 m (LNETs)	-	-
Sharma, 2017 [39]	18	135	^{90}Y ^{177}Lu	-	-	18.6 m (LNETs)	-
Koffas, 2016 [40] (abstract)	22	-	^{90}Y ^{177}Lu	26 m	-	14.1 m	-

- 48 pac
- med 4
- respon
- mírná

Teranostika *lung cancer*

P2RX7B is a new **theranostic** marker for **lung** adenocarcinoma patients.

Benzaquen J, Dit Hreich SJ, Heeke S, Juhel T, Lalvee S, Bauwens S, Saccani S, Lenormand P, Hofman V, Butori M, Leroy S, Berthet JP, Marquette CH, Hofman P, Vouret-Craviari V.

Theranostics. 2020 Aug 29;10(24):10849-10860. doi: 10.7150/thno.48229. eCollection 2020.

PMID: 33042257 **Free PMC article.**

Thymidylate synthase drives the phenotypes of epithelial-to-mesenchymal transition in non-small cell **lung cancer**.

Siddiqui MA, Gollavilli PN, Ramesh V, Parma B, Schwab A, Vazakidou ME, Natesan R, Saatci O, Rapa I, Bironzo P, Schuhwerk H, Asangani IA, Sahin O, Volante M, Ceppi P.

Br J Cancer. 2020 Oct 7. doi: 10.1038/s41416-020-01095-x. Online ahead of print.

PMID: 33024270

Targeted **theranostics** of **lung cancer**: PD-L1-guided delivery of gold nanoprisms with chlorin e6 for enhanced imaging and photothermal/photodynamic therapy.

Liu B, Qiao G, Han Y, Shen E, Alfranca G, Tan H, Wang L, Pan S, Ma L, Xiong W, Liu Y, Cui D.

Acta Biomater. 2020 Nov;117:361-373. doi: 10.1016/j.actbio.2020.09.040. Epub 2020 Sep 29.

PMID: 33007481

Závěr

- celotělové PET
- AI, radiomika
- specifická radiofarmaka
- teranostika
- personalizovaná precizní medicína

Děkuji za pozornost !