Molecular imaging as a tool to predict treatment outcomes

Martin Walter

MEDICIS-PROMED
Lemanic School
Tuesday, March 13th 2018

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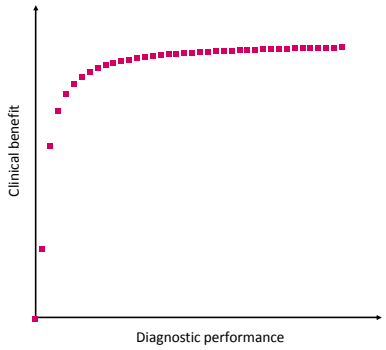
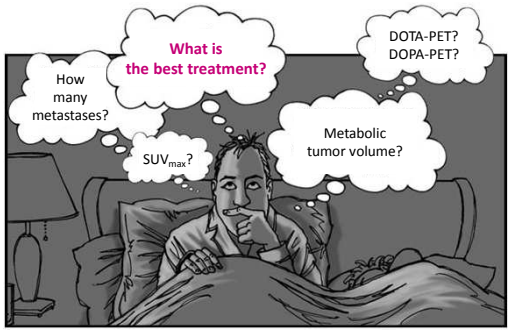
The clinical impact of imaging

Diagnosis
↓
Treatment Decision
↓
Treatment
↓
Clinical Benefit

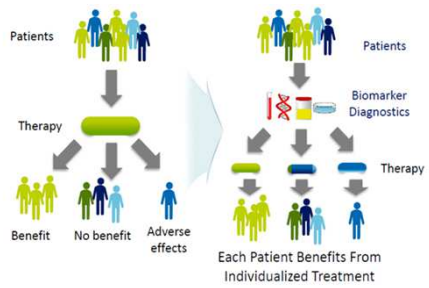
The impact of improved diagnostic performance



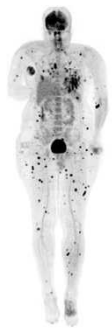
The clinical demand



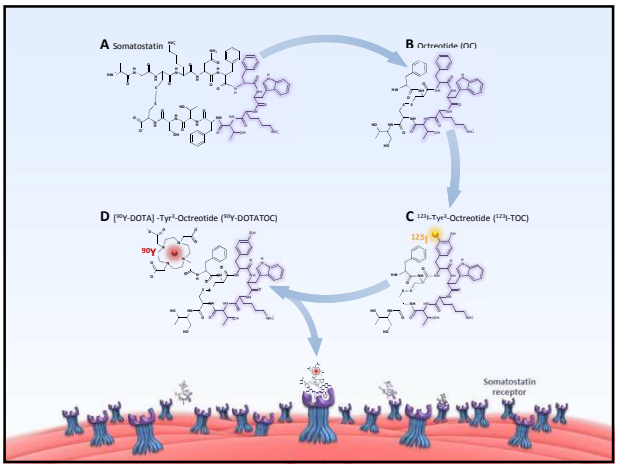
Companion Diagnostics



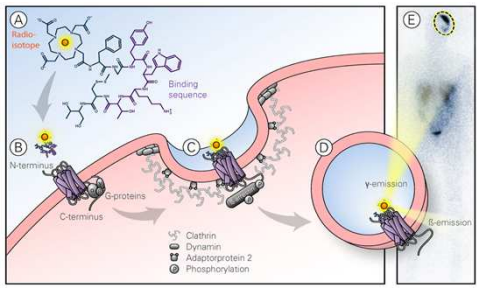
Diagnostics vs. Predictors



Diagnosis
↓
Treatment Decision ← Predictor
↓
Treatment
↓
Clinical Benefit



Somatostatin receptor targeting



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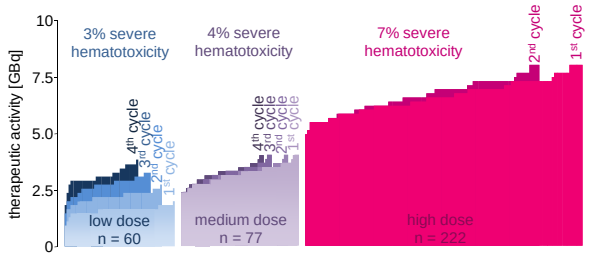
J Transl Med. 2013;11:17

Somatostatin-based radiotherapy with yttrium-90-DOTATOC in neuroendocrine tumors: long-term outcome of a phase I dose escalation study

Marincek N, Jörg AC, Brunner P, Schindler C, Koller MT, Rochlitz C, Müller-Brand J,Maecke HR, Briel M, **Walter MA**



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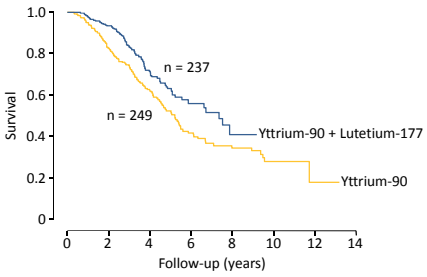
J Clin Oncol. 2012;30(10):1100-6

Cohort study of somatostatin-based radiopeptide therapy with [(90)Y-DOTA]-TOC versus [(90)Y-DOTA]-TOC plus [(177)Lu-DOTA]-TOC in neuroendocrine cancers

Villard L, Romer A, Marincek N, Brunner P, Koller MT, Schindler C, Ng QK, Mäcke HR, Müller-Brand J, Rochlitz C, Briel M, **Walter MA**



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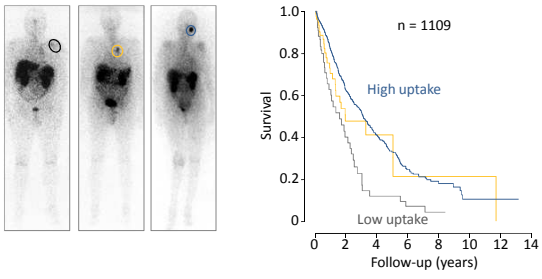
J Clin Oncol. 2011;29(17):2416-23

Response, survival, and long-term toxicity after therapy with the radiolabeled somatostatin analogue [90Y-DOTA]-TOC in metastasized neuroendocrine cancers

Imhof A, Brunner P, Marincek N, Briel M, Schindler C, Rasch H, Mäcke HR, Rochlitz C, Müller-Brand J, **Walter MA**



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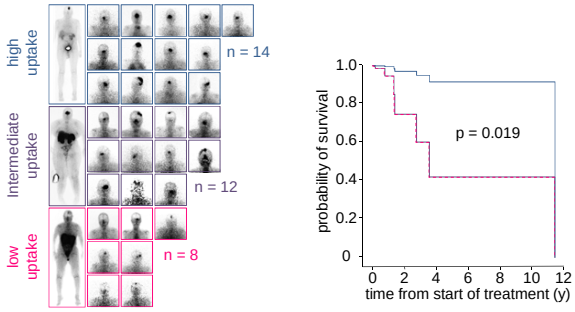
J Nucl Med. 2015;56(2):171-6

Somatostatin receptor-targeted radiopeptide therapy with 90Y-DOTATOC and 177Lu-DOTATOC in progressive meningioma: long-term results of a phase II clinical trial

Marincek N, Radojewski P, Dumont RA, Brunner P, Müller-Brand J, Maecke HR, Briel M, **Walter MA**



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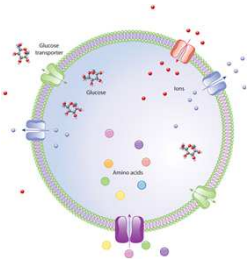
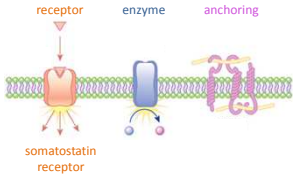
Molecular targets for predictive imaging





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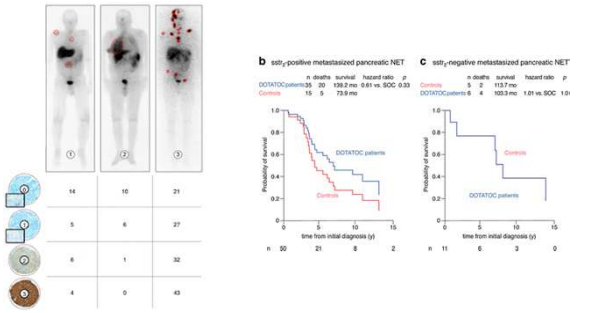
Eur J Nucl Med Mol Imaging. 2017;44(3):468-475

The prognostic and predictive value of $sstr_2$-immunohistochemistry and $sstr_2$-targeted imaging in neuroendocrine tumors

Brunner P, Jörg AC, Glatz K, Bubendorf L, Radojewski P, Umlauft M, Marincek N, Spanjol PM, Krause T, Dumont RA, Maecke HR, Müller-Brand J, Briel M, Schmitt A, Perren A, **Walter MA**



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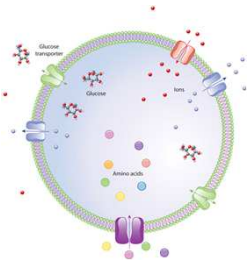

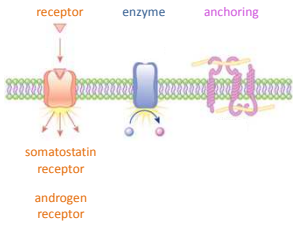

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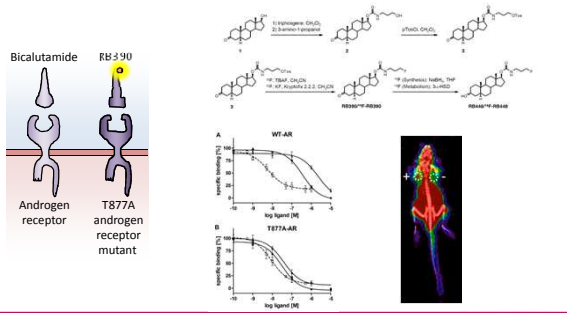
Prostate. 2015;75(4):348-59

^{18}F-RB390: innovative ligand for imaging the T877A androgen receptor mutant in prostate cancer via positron emission tomography (PET)

Bertolini R, Goepfert C, Andrieu T, Nichols S, **Walter MA**, Frey FJ, McCammon JA, Frey BM



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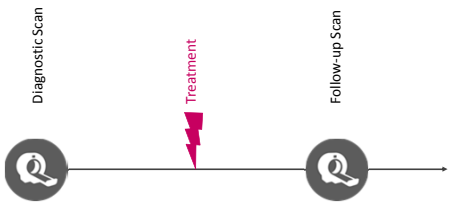
At present: diagnostic imaging



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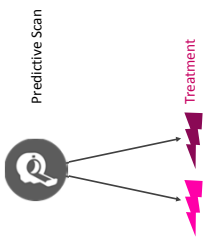
In the future: predictive imaging



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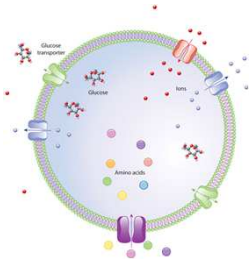
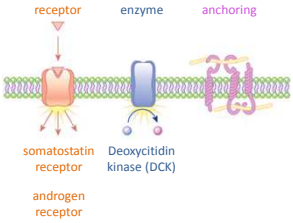
Molecular targets for predictive imaging





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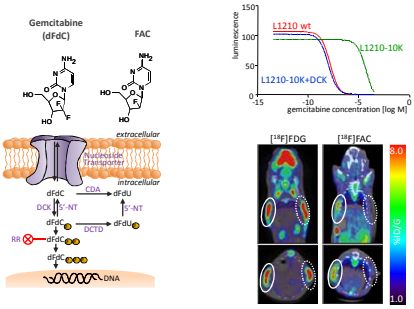
PNAS. 2009;106(8):2847-52

Noninvasive prediction of tumor responses to gemcitabine using positron emission tomography.

Laing RE, **Walter MA**, Campbell DO, Herschman HR, Satyamurthy N, Phelps ME, Czernin J, Witte ON, Radu CG



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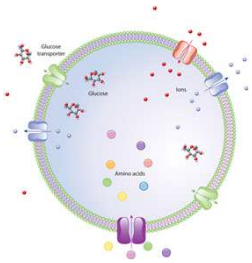

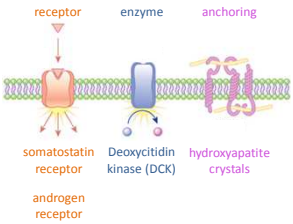

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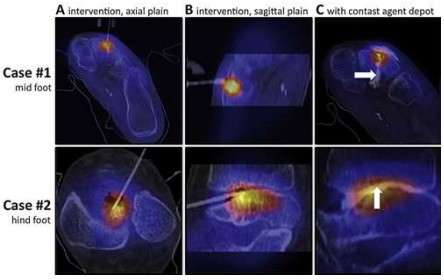
Eur J Radiol. 2011;80(3):e410-5

^{99m}Tc-DPD-SPECT/CT predicts the outcome of imaging-guided diagnostic anesthetic injections: a prospective cohort study.

Kretzschmar M, Wiewiorski M, Rasch H, Jacob AL, Bilecen D, **Walter MA**, Valderrabano V



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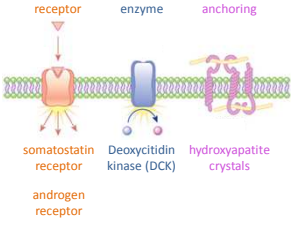
Conclusions

- Improvements in diagnosis are increasingly difficult to translate into a clinical benefit
- Predictive imaging will partly replace diagnostic imaging in the future
- Molecular imaging can generate a whole-body readout of predictive information
- Prerequisite is the development of predictive radiotratcers
- Predictive radiotracers can target receptors, enzymes, and extracellular structures



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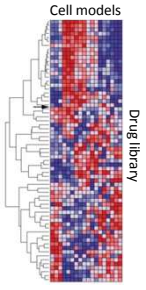
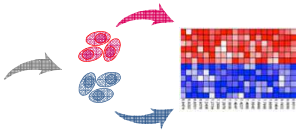
Outlook: Developing tracers for predictive imaging

Functional Screen

Cell models



Genomic Screen



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Basel Nuclear Medicine
Helmut Mäcke
Jan Müller-Brand
Helmut Rasch
Ann-Catherine Jörg
Anna Imhof
Anna Romer
Linda Villard
Elisabeth Oldani-Suter
UCLA Pharmacology
Johannes Czernin
Rebecca Dumont
Michael Phelps
UCLA Chemical Engineering
Tatiana Segura
McMaster Epidemiology
Gordon Guyatt
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Cedar Sinai Endocrinology
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