Erstellt am: 18.01.2022 (12:33:36 Uhr)

Klinik und Poliklinik für Nuklearmedizin

Leitung

Klinikdirektor
Prof. Dr. med. J. Kotzerke

Kontakt

E-Mail	nuklearmedizin@uniklinikum-dresden.de
WWW	https://www.uniklinikum-dresden.de/de/das-klinikum/kliniken-polikliniken-institute/nuk
Telefon	0351 458 4160

Lehre

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Publikationen

Summe der I-Faktoren (ungewichtet)	152.588
Summe der I-Faktoren	38.354
Summe der B-Faktoren	0.000
Summe der I- und B-Faktoren	38.354
Aufsätze	32
Bücher	0
Beiträge in Büchern	0
Habilitationen/Dissertationen	0/2
nicht-med. Diss./Dipl. u. Master	0/0
Patente (angem./ert.)	0/0
Preise und Ehrungen	0
Herausgabe einer Zeitschrift	0

Drittmittel

Intern bewirtschaftet	LOM-Kategorie A	0.0 T€
	LOM-Kategorie B	0.0 T€
	LOM-Kategorie C	0.0 T€
	LOM-Kategorie D	0.0 T€
	LOM-Kategorie E	0.0 T€
Gesamtsumme		0.0 T€
Gesamtsumme (bewertet)		0.0 T€

Leitbild

Die klinische Evaluierung neuer Untersuchungs- und Behandlungsmethoden steht im Vordergrund der Projekte der Klinik und Poliklinik für Nuklearmedizin. Untersuchungen an einem der modernsten kombinierten PET/MRT-Geräte sowie am PET/CT beide im PET-Zentrum Haus 44 sind besonders hervorzuheben.
Weitere klinische Forschungsarbeiten umfassen die Durchführung und Teilnahme an klinischen Studien gemeinsam mit Kliniken und Instituten des Universitätsklinikums und der Medizinischen Fakultät sowie anderen Einrichtungen.
In der interdisziplinären Arbeitsgruppe Radiobiologie untersuchen Mediziner, Biologen, Chemiker und Physiker gemeinsam strahlenbiologische Aspekte der Anwendung offener Radionuklide an Zellkulturen.
Weiterhin arbeiten wir an der Verbesserung der Bildgebung und der Quantifizierung der Daten. So soll die Validität der diagnostischen Aussagen und die Dosimetrie bei Radionuklidtherapien vorangetrieben werden.
Die Weiterentwicklung von Markierungstechniken für radioaktive Arzneimittel dient vorrangig der Erschließung neuer therapeutischer Ansätze.

Publikationen

Publikationen 2021

Aufsätze in wissenschaftlichen Zeitschriften (32)

Autoren, die zur eigenen Einrichtung gehören, sind mit * gekennzeichnet. Ist der Beitrag auf mehrere Einrichtungen verteilt, so ist der berücksichtigte Anteil in [] angegeben.

Radiotherapy enhances uptake and efficacy of (90)Y-cetuximab: A preclinical trial.

Dietrich, A. • Andreeff, M.* • Koi, L. • Bergmann, R. • Schubert, M. • Schreiner, L. • Löck, S. • Sihver, W. • Freudenberg, R.* • Hering, S. • Pietzsch, H.J. • Steinbach, J. • Kotzerke, J.* • Baumann, M. • Krause, M.
Erschienen 2021 in: RADIOTHER ONCOL 155, Seite 285 - 292
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 6.28 • (anteiliger) Autoren-Faktor: 0.069 • Bewerteter Impact-Faktor (1.0 · 6.28 · 0.069) = 0.435

Reduced diffusion in white matter after radiotherapy with photons and protons.

Dünger, L. • Seidlitz, A. • Jentsch, C. • Platzek, I. • Kotzerke, J.* • Beuthien-Baumann, B.* • Baumann, M. • Krause, M. • Troost, E.G.C. • Raschke, F.
Erschienen 2021 in: RADIOTHER ONCOL 164, Seite 66 - 72
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 6.28 • (anteiliger) Autoren-Faktor: 0.075 • Bewerteter Impact-Faktor (1.0 · 6.28 · 0.075) = 0.471

Spleno-aortic radiodensity ratio - A distinctive imaging feature to predict short-term outcome in critical care unit.

Fedders, D. • Hoxha, G. • Kaiser, D. • Hempel, S. • Hoberück, S.* • Michler, E.* • Cuberi, A. • Platzek, I. • Hoffmann, R.T. • Winzer, R.*
Erschienen 2021 in: EUR J RADIOL 143, Seite 109939 - 109945
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 3.528 • (anteiliger) Autoren-Faktor: 0.375 • Bewerteter Impact-Faktor (1.0 · 3.528 · 0.375) = 1.323

Technical Note: ADAM PETer - An anthropomorphic, deformable and multimodality pelvis phantom with positron emission tomography extension for radiotherapy.

Gillmann, C. • Homolka, N. • Johnen, W. • Runz, A. • Echner, G. • Pfaffenberger, A. • Mann, P. • Schneider, V. • Hoffmann, A.L. • Troost, E.G.C. • Koerber, S.A. • Kotzerke, J.* • Beuthien-Baumann, B.*
Erschienen 2021 in: MED PHYS 48, Seite 1624 - 1632
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 4.071 • (anteiliger) Autoren-Faktor: 0.327 • Bewerteter Impact-Faktor (1.0 · 4.071 · 0.327) = 1.332

Overestimation of grey matter atrophy in glioblastoma patients following radio(chemo)therapy.

Gommlich, A. • Raschke, F. • Petr, J. • Seidlitz, A. • Jentsch, C. • Platzek, I. • Van Den Hoff, J.*[50%] • Kotzerke, J.* • Beuthien-Baumann, B.* • Baumann, M. • Krause, M. • Troost, E.G.C.
Erschienen 2021 in: MAGN RESON MATER PHY, Seite 1 - 8
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 2.31 • (anteiliger) Autoren-Faktor: 0.075 • Bewerteter Impact-Faktor (1.0 · 2.31 · 0.075) = 0.173

Intraindividual comparison of [(68) Ga]-Ga-PSMA-11 and [(18)F]-F-PSMA-1007 in prostate cancer patients: a retrospective single-center analysis.

Hoberück, S.* • Löck, S. • Borkowetz, A. • Sommer, U. • Winzer, R. • Zöphel, K.* • Fedders, D. • Michler, E. • Kotzerke, J.* • Kopka, K. • Hölscher, T. • Braune, A.*
Erschienen 2021 in: EJNMMI RES 11, Seite 109
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 3.138 • (anteiliger) Autoren-Faktor: 0.760 • Bewerteter Impact-Faktor (1.0 · 3.138 · 0.760) = 2.385

Rapidly Evolving Diffuse Omental Carcinomatosis of Prostate Cancer in 68Ga-PSMA PET/CT.

Hoberück, S.* • Sommer, U. • Grey, A. • Hölscher, T. • Baretton, G.B. • Kotzerke, J.*
Erschienen 2021 in: CLIN NUCL MED 46, Seite e216 - e217
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 7.794 • (anteiliger) Autoren-Faktor: 0.700 • Bewerteter Impact-Faktor (1.0 · 7.794 · 0.700) = 5.456

Toxicity and Efficacy of Local Ablative, Image-guided Radiotherapy in Gallium-68 Prostate-specific Membrane Antigen Targeted Positron Emission Tomography-staged, Castration-sensitive Oligometastatic Prostate Cancer: The OLI-P Phase 2 Clinical Trial.

Hölscher, T. • Baumann, M. • Kotzerke, J.* • Zöphel, K.* • Paulsen, F. • Müller, A.C. • Zips, D. • Koi, L. • Thomas, C. • Löck, S. • Krause, M. • Wirth, M. • Lohaus, F.
Erschienen 2021 in: Eur Urol Oncol
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 7.479 • (anteiliger) Autoren-Faktor: 0.055 • Bewerteter Impact-Faktor (1.0 · 7.479 · 0.055) = 0.408

Management of Germ Cell Tumours of the Testes in Adult Patients: German Clinical Practice Guideline, PART II - Recommendations for the Treatment of Advanced, Recurrent, and Refractory Disease and Extragonadal and Sex Cord/Stromal Tumours and for the Management of Follow-Up, Toxicity, Quality of Life, Palliative Care, and Supportive Therapy.

Kliesch, S. • Schmidt, S. • Wilborn, D. • Aigner, C. • Albrecht, W. • Bedke, J. • Beintker, M. • Beyersdorff, D. • Bokemeyer, C. • Busch, J. • Classen, J. • De Wit, M. • Dieckmann, K.P. • Diemer, T. • Dieing, A. • Gockel, M. • Göckel-Beining, B. • Hakenberg, O.W. • Heidenreich, A. • Heinzelbecker, J. • Herkommer, K. • Hermanns, T. • Kaufmann, S. • Kornmann, M. • Kotzerke, J.* • Krege, S. • Kristiansen, G. • Lorch, A. • Müller, A.C. • Oechsle, K. • Ohloff, T. • Oing, C. • Otto, U. • Pfister, D. • Pichler, R. • Recken, H. • Rick, O. • Rudolph, Y. • Ruf, C. • Schirren, J. • Schmelz, H. • Schmidberger, H. • Schrader, M. • Schweyer, S. • Seeling, S. • Souchon, R. • Winter, C. • Wittekind, C. • Zengerling, F. • Zermann, D.H. • Zillmann, R. • Albers, P.

Erschienen 2021 in: UROL INT 105, Seite 181 - 191

Bewertung: Originalpublikation 1.0 • Impact-Faktor: 2.089 • (anteiliger) Autoren-Faktor: 0.006 • Bewerteter Impact-Faktor (1.0 · 2.089 · 0.006) = 0.013

Management of Germ Cell Tumours of the Testis in Adult Patients. German Clinical Practice Guideline Part I: Epidemiology, Classification, Diagnosis, Prognosis, Fertility Preservation, and Treatment Recommendations for Localized Stages.

Kliesch, S. • Schmidt, S. • Wilborn, D. • Aigner, C. • Albrecht, W. • Bedke, J. • Beintker, M. • Beyersdorff, D. • Bokemeyer, C. • Busch, J. • Classen, J. • De Wit, M. • Dieckmann, K.P. • Diemer, T. • Dieing, A. • Gockel, M. • Göckel-Beining, B. • Hakenberg, O.W. • Heidenreich, A. • Heinzelbecker, J. • Herkommer, K. • Hermanns, T. • Kaufmann, S. • Kornmann, M. • Kotzerke, J.* • Krege, S. • Kristiansen, G. • Lorch, A. • Müller, A.C. • Oechsle, K. • Ohloff, T. • Oing, C. • Otto, U. • Pfister, D. • Pichler, R. • Recken, H. • Rick, O. • Rudolph, Y. • Ruf, C. • Schirren, J. • Schmelz, H. • Schmidberger, H. • Schrader, M. • Schweyer, S. • Seeling, S. • Souchon, R. • Winter, C. • Wittekind, C. • Zengerling, F. • Zermann, D.H. • Zillmann, R. • Albers, P.

Erschienen 2021 in: UROL INT 105, Seite 169 - 180

Bewertung: Originalpublikation 1.0 • Impact-Faktor: 2.089 • (anteiliger) Autoren-Faktor: 0.006 • Bewerteter Impact-Faktor (1.0 · 2.089 · 0.006) = 0.013

Value of PET imaging for radiation therapy.

Lapa, C. • Nestle, U. • Albert, N.L. • Baues, C. • Beer, A. • Buck, A. • Budach, V. • Bütof, R. • Combs, S.E. • Derlin, T. • Eiber, M. • Fendler, W.P. • Furth, C. • Gani, C. • Gkika, E. • Grosu, A.L. • Henkenberens, C. • Ilhan, H. • Löck, S. • Marnitz-Schulze, S. • Miederer, M. • Mix, M. • Nicolay, N.H. • Niyazi, M. • Pöttgen, C. • Rödel, C.M. • Schatka, I. • Schwarzenboeck, S.M. • Todica, A.S. • Weber, W. • Wegen, S. • Wiegel, T. • Zamboglou, C. • Zips, D. • Zöphel, K.* • Zschaeck, S. • Thorwarth, D. • Troost, E.G.C.

Erschienen 2021 in: STRAHLENTHER ONKOL 197, Seite 1 - 23

Bewertung: Originalpublikation 1.0 • Impact-Faktor: 3.621 • (anteiliger) Autoren-Faktor: 0.008 • Bewerteter Impact-Faktor (1.0 · 3.621 · 0.008) = 0.030

Value of PET imaging for radiation therapy.

Lapa, C. • Nestle, U. • Albert, N.L. • Baues, C. • Beer, A. • Buck, A. • Budach, V. • Bütof, R. • Combs, S.E. • Derlin, T. • Eiber, M. • Fendler, W.P. • Furth, C. • Gani, C. • Gkika, E. • Grosu, A.L. • Henkenberens, C. • Ilhan, H. • Löck, S. • Marnitz-Schulze, S. • Miederer, M. • Mix, M. • Nicolay, N.H. • Niyazi, M. • Pöttgen, C. • Rödel, C.M. • Schatka, I. • Schwarzenboeck, S.M. • Todica, A.S. • Weber, W. • Wegen, S. • Wiegel, T. • Zamboglou, C. • Zips, D. • Zöphel, K.* • Zschaeck, S. • Thorwarth, D. • Troost, E.G.C.

Erschienen 2021 in: NUKLEARMED-NUCL MED 60, Seite 326 - 343

Bewertung: Originalpublikation 1.0 • Impact-Faktor: 1.379 • (anteiliger) Autoren-Faktor: 0.008 • Bewerteter Impact-Faktor (1.0 · 1.379 · 0.008) = 0.011

Comparison of 6-[(18)F]FDOPA PET with Nigrosome 1 detection in patients with parkinsonism.

Michler, E.* • Kaiser, D. • Eleftheriadou, K. • Falkenburger, B. • Kotzerke, J.* • Hoberück, S.*
Erschienen 2021 in: EJNMMI RES 11, Seite 16
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 3.138 • (anteiliger) Autoren-Faktor: 0.775 • Bewerteter Impact-Faktor (1.0 · 3.138 · 0.775) = 2.432

11C-Methionine Uptake in the Lactating Human Breast.

Michler, E.* • Hilliger, S.* • Kopka, K. • Kotzerke, J.*
Erschienen 2021 in: CLIN NUCL MED 47, Seite e66 - e67
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 7.794 • (anteiliger) Autoren-Faktor: 0.850 • Bewerteter Impact-Faktor (1.0 · 7.794 · 0.850) = 6.625

Radioembolization versus portal vein embolization for contralateral liver lobe hypertrophy: effect of cirrhosis.

Nebelung, H. • Wolf, T. • Bund, S. • Radosa, C.G. • Plodeck, V. • Grosche-Schlee, S.* • Riediger, C. • Hoffmann, R.T. • Kühn, J.P.
Erschienen 2021 in: Abdom Radiol (NY) 46, Seite 4046 - 4055
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 3.039 • (anteiliger) Autoren-Faktor: 0.043 • Bewerteter Impact-Faktor (1.0 · 3.039 · 0.043) = 0.130

A convolutional neural network for fully automated blood SUV determination to facilitate SUR computation in oncological FDG-PET.

Nikulin, P. • Hofheinz, F. • Maus, J. • Li, Y. • Bütof, R. • Lange, C. • Furth, C. • Zschaeck, S. • Kreissl, M.C. • Kotzerke, J.* • Van Den Hoff, J.*[50%]
Erschienen 2021 in: EUR J NUCL MED MOL I 48, Seite 995 - 1004
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 9.236 • (anteiliger) Autoren-Faktor: 0.183 • Bewerteter Impact-Faktor (1.0 · 9.236 · 0.183) = 1.693

Diagnostic performance of (18)F-fluorodeoxyglucose-PET/MRI versus MRI alone in the diagnosis of pelvic recurrence of rectal cancer.

Plodeck, V. • Platzek, I. • Streitzig, J. • Nebelung, H. • Blum, S. • Kühn, J.P. • Hoffmann, R.T. • Laniado, M. • Michler, E.* • Hoberück, S.* • Zöphel, K.* • Kotzerke, J.* • Fritzmann, J. • Weitz, J. • Radosa, C.G.
Erschienen 2021 in: Abdom Radiol (NY) 46, Seite 5086 - 5094
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 3.039 • (anteiliger) Autoren-Faktor: 0.092 • Bewerteter Impact-Faktor (1.0 · 3.039 · 0.092) = 0.281

KRAS mutation effects on the 2-[18F]FDG PET uptake of colorectal adenocarcinoma metastases in the liver.

Popovic, M. • Talarico, O. • Van Den Hoff, J.*[50%] • Kunin, H. • Zhang, Z. • Lafontaine, D. • Dogan, S. • Leung, J. • Kaye, E. • Czmielewski, C. • Mayerhoefer, M.E. • Zanzonico, P. • Yaeger, R. • Schöder, H. • Humm, J.L. • Solomon, S.B. • Sofocleous, C.T. • Kirov, A.S.
Erschienen 2020 in: EJNMMI RES 10, Seite 142
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 3.138 • (anteiliger) Autoren-Faktor: 0.009 • Bewerteter Impact-Faktor (1.0 · 3.138 · 0.009) = 0.029

GMP-compliant production of [(68)Ga]Ga-NeoB for positron emission tomography imaging of patients with gastrointestinal stromal tumor.

Pretze, M.* • Reffert, L. • Diehl, S. • Schönberg, S.O. • Wängler, C. • Hohenberger, P. • Wängler, B.

Erschienen 2021 in: EJNMMI Radiopharm Chem 6, Seite 22 - 35
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 2.64 • (anteiliger) Autoren-Faktor: 0.400 • Bewerteter Impact-Faktor (1.0 · 2.64 · 0.400) = 1.056

Ac-EAZY! Towards GMP-Compliant Module Syntheses of (225)Ac-Labeled Peptides for Clinical Application.

Pretze, M.* • Kunkel, F. • Runge, R.* • Freudenberg, R.* • Braune, A.* • Hartmann, H.* • Schwarz, U. • Brogsitter, C.* • Kotzerke, J.*
Erschienen 2021 in: Pharmaceuticals (Basel) 14, Seite 652 - 662
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 5.863 • (anteiliger) Autoren-Faktor: 0.914 • Bewerteter Impact-Faktor (1.0 · 5.863 · 0.914) = 5.360

α(v)β(3)-Specific Gold Nanoparticles for Fluorescence Imaging of Tumor Angiogenesis.

Pretze, M.* • Von Kiedrowski, V. • Runge, R.* • Freudenberg, R.* • Hübner, R. • Davarci, G. • Schirrmacher, R. • Wängler, C. • Wängler, B.
Erschienen 2021 in: Nanomaterials (Basel) 11, Seite 138 - 168
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 5.076 • (anteiliger) Autoren-Faktor: 0.486 • Bewerteter Impact-Faktor (1.0 · 5.076 · 0.486) = 2.465

PET/CT imaging of head-and-neck and pancreatic cancer in humans by targeting the "Cancer Integrin" αvβ6 with Ga-68-Trivehexin.

Quigley, N.G. • Steiger, K. • Hoberück, S.* • Czech, N. • Zierke, M.A. • Kossatz, S. • Pretze, M.* • Richter, F. • Weichert, W. • Pox, C. • Kotzerke, J.* • Notni, J.
Erschienen 2021 in: EUR J NUCL MED MOL I, Seite 1 - 12
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 9.236 • (anteiliger) Autoren-Faktor: 0.090 • Bewerteter Impact-Faktor (1.0 · 9.236 · 0.090) = 0.831

Molecular Response to Combined Molecular- and External Radiotherapy in Head and Neck Squamous Cell Carcinoma (HNSCC).

Rassamegevanon, T. • Feindt, L. • Koi, L. • Müller, J. • Freudenberg, R.* • Löck, S. • Sihver, W. • Çevik, E. • Kühn, A.C. • Von Neubeck, C. • Linge, A. • Pietzsch, H.J. • Kotzerke, J.* • Baumann, M. • Krause, M. • Dietrich, A.
Erschienen 2021 in: Cancers (Basel) 13, Seite 5595 - 5611
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 6.639 • (anteiliger) Autoren-Faktor: 0.043 • Bewerteter Impact-Faktor (1.0 · 6.639 · 0.043) = 0.285

Interim PET Evaluation in Diffuse Large B-Cell Lymphoma Using Published Recommendations: Comparison of the Deauville 5-Point Scale and the ΔSUV(max) Method.

Rekowski, J. • Hüttmann, A. • Schmitz, C. • Müller, S.P. • Kurch, L. • Kotzerke, J.* • Franzius, C. • Weckesser, M. • Bengel, F.M. • Freesmeyer, M. • Hertel, A. • Krohn, T. • Holzinger, J. • Brink, I. • Haberkorn, U. • Nyuyki, F. • Van Assema, D.M.E. • Geworski, L. • Hasenclever, D. • Jöckel, K.H. • Dührsen, U.
Erschienen 2021 in: J NUCL MED 62, Seite 37 - 42
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 10.057 • (anteiliger) Autoren-Faktor: 0.016 • Bewerteter Impact-Faktor (1.0 · 10.057 · 0.016) = 0.159

Third generation radioimmunoassay (RIA) for TSH receptor autoantibodies (TRAb) - one step less, similar results?

Roggenbuck, J.J.* • Zarske, G. • Schierack, P. • Wunderlich, G.* • Conrad, K. • Kotzerke, J.* • Roggenbuck, D. • Zöphel, K.*
Erschienen 2021 in: NUKLEARMED-NUCL MED 60, Seite 38 - 46
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 1.379 • (anteiliger) Autoren-Faktor: 0.800 • Bewerteter Impact-Faktor (1.0 · 1.379 · 0.800) = 1.103

Comparative effects of neurally adjusted ventilatory assist and variable pressure support on lung and diaphragmatic function in a model of acute respiratory distress syndrome: A randomised animal study.

Scharffenberg, M. • Moraes, L. • Güldner, A. • Huhle, R. • Braune, A.* • Zeidler-Rentzsch, I. • Kasper, M. • Kunert-Keil, C. • Koch, T. • Pelosi, P. • Rocco, P.R.M. • Gama De Abreu, M. • Kiss, T.
Erschienen 2021 in: EUR J ANAESTH 38, Seite 32 - 40
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 4.33 • (anteiliger) Autoren-Faktor: 0.027 • Bewerteter Impact-Faktor (1.0 · 4.33 · 0.027) = 0.118

Final Results of the Prospective Biomarker Trial PETra: [(11)C]-MET-Accumulation in Postoperative PET/MRI Predicts Outcome after Radiochemotherapy in Glioblastoma.

Seidlitz, A. • Beuthien-Baumann, B.* • Löck, S. • Jentsch, C. • Platzek, I. • Zöphel, K.* • Linge, A. • Kotzerke, J.* • Petr, J. • Van Den Hoff, J.*[50%] • Steinbach, J. • Krex, D. • Schmitz-Schackert, G. • Falk, M. • Baumann, M. • Krause, M.
Erschienen 2021 in: CLIN CANCER RES 27, Seite 1351 - 1360
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 12.531 • (anteiliger) Autoren-Faktor: 0.075 • Bewerteter Impact-Faktor (1.0 · 12.531 · 0.075) = 0.940

[Influence of therapeutic temperature management on the clinical course in patients after in-hospital cardiac arrest : A retrospective analysis].

Wanek, F. • Meißner, S. • Nuding, S. • Hoberück, S.* • Werdan, K. • Noutsias, M. • Ebelt, H.
Erschienen 2021 in: MED KLIN-INTENSIVMED
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 0.85 • (anteiliger) Autoren-Faktor: 0.060 • Bewerteter Impact-Faktor (1.0 · 0.85 · 0.060) = 0.051

Bilateral adrenal enhancement revised-adrenal-to-spleen ratio as an appropriate mortality predictor.

Winzer, R.* • Martin, R. • Kaiser, D. • Baldus, J.C. • Hoberück, S.* • Hoffmann, R.T. • Fedders, D.
Erschienen 2021 in: Abdom Radiol (NY) 46, Seite 2107 - 2114
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 3.039 • (anteiliger) Autoren-Faktor: 0.460 • Bewerteter Impact-Faktor (1.0 · 3.039 · 0.460) = 1.398

Adrenal glands enhancement in computed tomography as predictor of short-and intermediate term mortality in critically ill patients.

Winzer, R.* • Martin, R. • Kühn, J.P. • Baldus, J.C. • Seppelt, D. • Heidrich, F.M. • Hoberück, S.* • Hoffmann, R.T. • Fedders, D.
Erschienen 2021 in: CLIN IMAG 70, Seite 56 - 60
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 1.605 • (anteiliger) Autoren-Faktor: 0.443 • Bewerteter Impact-Faktor (1.0 · 1.605 · 0.443) = 0.711

Evaluation of response using FDG-PET/CT and diffusion weighted MRI after radiochemotherapy of pancreatic cancer: a non-randomized, monocentric phase II clinical trial-PaCa-DD-041 (Eudra-CT 2009-011968-11).

Zimmermann, C. • Distler, M. • Jentsch, C. • Blum, S. • Folprecht, G. • Zöphel, K.* • Polster, H. • Troost, E.G.C. • Abolmaali, N. • Weitz, J. • Baumann, M. • Saeger, H.D. • Grützmann, R.
Erschienen 2021 in: STRAHLENTHER ONKOL 197, Seite 19 - 26
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 3.621 • (anteiliger) Autoren-Faktor: 0.027 • Bewerteter Impact-Faktor (1.0 · 3.621 · 0.027) = 0.099

Generation of biological hypotheses by functional imaging links tumor hypoxia to radiation induced tissue inflammation/glucose uptake in head and neck cancer.

Zschaeck, S. • Zöphel, K.* • Seidlitz, A. • Zips, D. • Kotzerke, J.* • Baumann, M. • Troost, E.G.C. • Löck, S. • Krause, M.
Erschienen 2021 in: RADIOTHER ONCOL 155, Seite 204 - 211
Bewertung: Originalpublikation 1.0 • Impact-Faktor: 6.28 • (anteiliger) Autoren-Faktor: 0.086 • Bewerteter Impact-Faktor (1.0 · 6.28 · 0.086) = 0.538

Dissertationen (2)

Mersch, S.
Bedeutung seriell erhobener PET-Parameter für das Therapieoutcome von Patienten mit NSCLC und kurativer Radiochemotherapie unter Einschluss des mitbestrahlten Normalgewebes.
Technische Universität Dresden, 2021
Erstgutachter/Betreuer: Prof. Dr. med. K. Zöphel

Rosenberg, T.
Untersuchung zur Wirkung von Psoralen in Kombination mit UV Licht und ^{188}Re am pUC19-Plasmid und an FaDu-Zellen.
Technische Universität Dresden, 2021
Erstgutachter/Betreuer: PD Dr. med. C. Brogsitter

Kooperationen

Nationale Kooperationen

Entwicklung eines Prozesses zur Herstellung von Ac-225-DOTA-TATE und Ac-225-DOTA-PSMA unter Einsatz des ETD-Systems ML eazy
Bereich: Forschung
Kooperationspartner: Eckert & Ziegler (Berlin)
Vertragsbasis: Kooperationsvertrag
Finanzierung: Sonstige
Ansprechpartner an der Med. Fak.: Dr. rer. nat. Marc Pretze (marc.pretze@ukdd.de), Prof. Dr. med. Jörg Kotzerke (joerg.kotzerke@ukdd.de)

Radiotherapy and Oncology 155 (2021) 285–292

Contents lists available at ScienceDirect

Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com

Original Article

Radiotherapy enhances uptake and efficacy of ^{90}Y-cetuximab: A preclinical trial

Antje Dietrich [a,b,c,*], Michael Andreeff [d], Lydia Koi [c,e,f], Ralf Bergmann [g], Maik Schubert [g], Lena Schreiner [c], Steffen Löck [a,b,c,h], Wiebke Sihver [g], Robert Freudenberg [d], Sandra Hering [i], Hans-Jürgen Pietzsch [g], Jörg Steinbach [g,j], Jörg Kotzerke [d], Michael Baumann [b,c,e], Mechthild Krause [a,b,c,e,f,h]

[a] German Cancer Consortium (DKTK), Partner Site Dresden; [b] German Cancer Research Center (DKFZ), Heidelberg; [c] OncoRay - National Center for Radiation Research in Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, TU Dresden, Helmholtz-Zentrum Dresden – Rossendorf; [d] Department of Nuclear Medicine, Faculty of Medicine and University Hospital Carl Gustav Carus, TU; [e] Department of Radiotherapy and Radiation Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, TU; [f] Helmholtz-Zentrum Dresden - Rossendorf, Institute of Radiooncology – OncoRay; [g] Helmholtz-Zentrum Dresden - Rossendorf, Institute of Radiopharmaceutical Cancer Research; [h] National Center for Tumor Diseases (NCT), Partner Site Dresden, German Cancer Research Center (DKFZ), Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Germany, Helmholtz Association / Helmholtz-Zentrum Dresden - Rossendorf (HZDR), Dresden, Germany; [i] Institute for Legal Medicine, Faculty of Medicine Carl Gustav Carus; and [j] Department of Chemistry and Food Chemistry, TU Dresden, Germany

ARTICLE INFO

Article history:
Received 20 May 2020
Received in revised form 9 November 2020
Accepted 13 November 2020
Available online 21 November 2020

Keywords:
Molecular radiotherapy
Combination therapy
Cetuximab
Preclinical imaging
Radiation therapy
Radioimmunotherapy

ABSTRACT

Background and purpose: Systemic molecular radiotherapy utilizes internal irradiation by radionuclide-labeled tumor-targeting agents with the potential to destroy (micro-)metastases. However, doses that are applicable in solid tumors do not reach the levels nessecary for tumor control. Thus, the combination of molecular and external radiotherapy is a promising treatment strategy, as enhanced tumor doses can be delivered with and without minor overlapping toxicities. Here, we combined a ^{90}Y-labeled anti-EGFR antibody (Cetuximab) with clinically relevant fractionated radiotherapy in a preclinical trial using head and neck squamous cell carcinoma xenograft tumors.

Materials and methods: To model ^{90}Y-Cetuximab uptake for treatment schedule optimization, FaDu-bearing mice were injected with near-infrared-labeled-Cetuximab at different time points during radiotherapy with differing doses. Cetuximab uptake was longitudinally followed by in vivo-optical imaging. Tumor control probability experiments with fractionated radiotherapy (30 fx, 6 weeks, 8 dose groups/arm) in combination with ^{90}Y-Cetuximab were performed to test the curative potential.

Results: Imaging of near-infrared-labeled-Cetuximab uptake revealed that low to moderate external beam doses can enhance antibody uptake. Using the optimized schedule, combination of molecular and external radiotherapy using ^{90}Y-Cetuximab at a dose that did not result in permanent tumor inactivation in previous experiments, led to substantially increased tumor control compared to radiotherapy alone.

Conclusion: Our results indicate that combination of radiolabeled therapeutics with clinically relevant fractionated radiotherapy has a remarkable potential to improve curative treatment outcome. Application of some radiation dose prior to injection may improve drug uptake and enable patient stratification and treatment personalization via a corresponding PET-tracer during therapy.

Labeling of molecular targeted drugs with toxic effectors is long discussed in the literature as a potential method to treat solid tumors [1]. If radionuclides are used, the approach is referred to as molecular radiotherapy [2,3]. Molecular radiotherapy has the potential to destroy localized tumors and even metastases [4,5]. However, the agents show classical limitations of molecular therapeutics, especially the barriers for drug delivery [6–8], limiting the therapeutic doses that can be delivered to solid tumors. Maximum tolerated activities applied in clinical trials did not exceed tumor doses of 33 Gy [5,9], which corresponds to a palliative dose in most solid tumor entities.

External beam radiotherapy (RT) can precisely target solid tumors and is used to treat cancer patients with individualized treatment planning and curative intention [10]. A combination of molecular and external radiotherapy is a promising treatment strategy as it may combine advantages of both modalities [3,9,11]. Local tumor RT doses would be enhanced by molecular

* Corresponding author at: OncoRay - National Center for Radiation Research in Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Fetscherstr. 74, PF 41, 01307 Dresden, Germany.
E-mail address: antje.dietrich@uniklinikum-dresden.de (A. Dietrich).

https://doi.org/10.1016/j.radonc.2020.11.013
0167-8140/

Radiotherapy and Oncology 164 (2021) 66–72

Contents lists available at ScienceDirect

Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com

Original Article

Reduced diffusion in white matter after radiotherapy with photons and protons

L. Dünger [a,b], A. Seidlitz [b,c], C. Jentsch [b,c], I. Platzek [d], J. Kotzerke [e], B. Beuthien-Baumann [f], M. Baumann [b,g,h], M. Krause [b,c,i,j,k], E.G.C. Troost [b,c,i,j,k], F. Raschke [b,c,*]

[a] ABX-CRO Advanced Pharmaceutical Services Forschungsgesellschaft mbH; [b] OncoRay - National Center for Radiation Research in Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Helmholtz-Zentrum Dresden-Rossendorf; [c] Department of Radiotherapy and Radiation Oncology; [d] Department of Diagnostic and Interventional Radiology; [e] Department of Nuclear Medicine, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden; [f] Radiology; [g] German Cancer Research Center (DKFZ), Heidelberg; [h] National Center for Tumor Diseases (NCT), Partner Site Heidelberg, Germany; [i] Helmholtz-Zentrum Dresden-Rossendorf, Institute of Radiooncology – OncoRay, Dresden, Germany; [j] German Cancer Consortium (DKTK), Partner Site Dresden, and German Cancer Research Center (DKFZ), Heidelberg; and [k] National Center for Tumor Diseases (NCT), Partner Site Dresden, Germany: German Cancer Research Center (DKFZ), Heidelberg, Germany; Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany, and; Helmholtz Association / Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Dresden, Germany

ARTICLE INFO

Article history:
Received 23 February 2021
Received in revised form 30 August 2021
Accepted 10 September 2021
Available online 17 September 2021

Keywords:
Diffusion imaging
White matter
Radiotherapy
Proton therapy
Photon therapy

ABSTRACT

Background and purpose: Radio(chemo)therapy is standard in the adjuvant treatment of glioblastoma. Inevitably, brain tissue surrounding the target volume is also irradiated, potentially causing acute and late side-effects. Diffusion imaging has been shown to be a sensitive method to detect early changes in the cerebral white matter (WM) after radiation. The aim of this work was to assess possible changes in the mean diffusivity (MD) of WM after radio(chemo)therapy using Diffusion-weighted imaging (DWI) and to compare these effects between patients treated with proton and photon irradiation.

Materials and methods: 70 patients with glioblastoma underwent adjuvant radio(chemo)therapy with protons (n = 20) or photons (n = 50) at the University Hospital Dresden. MRI follow-ups were performed at three-monthly intervals and in this study were evaluated until 33 months after the end of therapy. Relative white matter MD changes between baseline and all follow-up visits were calculated in different dose regions.

Results: We observed a significant decrease of MD ($p < 0.05$) in WM regions receiving more than 20 Gy. MD reduction was progressive with dose and time after radio(chemo)therapy (maximum: $-7.9 \pm 1.2\%$ after 24 months, $\geq$50 Gy). In patients treated with photons, significant reductions of MD in the entire WM ($p < 0.05$) were seen at all time points. Conversely, in proton patients, whole brain MD did not change significantly.

Conclusions: Irradiation leads to measurable MD reduction in white matter, progressing with both increasing dose and time. Treatment with protons reduces this effect most likely due to a lower total dose in the surrounding white matter. Further investigations are needed to assess whether those MD changes correlate with known radiation induced side-effects.

Radiotherapy (RT) is standard of care for patients with high grade gliomas [1]. However, irradiation of surrounding healthy brain parenchyma is inevitable due to added CTV and PTV margins and limitations of RT techniques themselves. This can lead to side effects such as neurocognitive decline and memory loss which may occur several months or years after RT [2,3]. Radiation with protons instead of photons reduces the radiation dose distal of the tumour in the surrounding brain tissue due to the physical properties of protons. Irradiation with protons spares healthy brain parenchyma and could thus prevent or reduce possible delayed side effects, which may result in a better quality of life for the patient after therapy [4].

The underlying cause of RT induced side effects is not yet fully understood, but they are potentially associated with white matter (WM) damage that is not visible on conventional T1-weighted (T1w) or T2-weighted (T2w) magnetic resonance imaging (MRI) [2,5,6]. One way of assessing microstructural changes in white matter with MRI is diffusion weighted imaging (DWI). DWI measures diffusion of water on a microscopic level along three

* Corresponding author at: Department of Radiotherapy and Radiation Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus of Technische Universität Dresden, Fetscherstrasse 74, 01307 Dresden, Germany.
E-mail address: felix.raschke@oncoray.de (F. Raschk.

https://doi.org/10.1016/j.radonc.2021.09.007
0167-8140/

European Journal of Radiology 143 (2021) 109939

Contents lists available at ScienceDirect

European Journal of Radiology

journal homepage: www.elsevier.com/locate/ejrad

Spleno-aortic radiodensity ratio – A distinctive imaging feature to predict short-term outcome in critical care unit

Dieter Fedders [a], Genta Hoxha [a], Daniel Kaiser [b], Sebastian Hempel [c], Sebastian Hoberück [d], Enrico Michler [d], Ani Cuberi [a], Ivan Platzek [a], Ralf-Thorsten Hoffmann [a], Robert Winzer [a,*]

[a] Dresden University Hospital, Department of Radiology, Fetscherstr. 74, 01307 Dresden, Germany
[b] Dresden University Hospital, Department of Neuroradiology, Fetscherstr. 74, 01307 Dresden, Germany
[c] Dresden University Hospital, Department of Visceral, Thoracic and Vascular Surgery, Fetscherstr. 74, 01307 Dresden, Germany
[d] Dresden University Hospital, Department of Nuclear Medicine, Fetscherstr. 74, 01307 Dresden, Germany

ARTICLE INFO

Keywords:
Prognostic criteria
Spleen
Aorta
Critical care unit
Hospital mortality

ABSTRACT

Introduction: To investigate the value of contrast-enhanced CT findings - splenic and aortic radiodensities and their ratios (spleno-aortic ratio) - in predicting the prognosis of critical care unit patients (CCU).

Methods: One hundred thirteen continuous CCU patients with an acute deterioration (Group A: 37 women, age: 67.2 ± 14.0 years) were included in the retrospective study. Radiodensities of the spleen and aorta were evaluated by two radiologists separately. The spleno-aortic ratio was calculated. Matthews correlation coefficient (MCC) was used in conjunction with receiver operating characteristic analysis (ROC) to assess if and which parameter was most suitable for short-term mortality prediction. The intra-class correlation coefficient assessed consensus across readers. To validate the results for the best predictor, a second cohort was evaluated (Group B: 354 CT scans).

Results: The portal venous spleno-aortic ratio was best suited to predict 72-hour mortality (AUC = 0.91). A threshold ratio ≤0.53 predicted short-term mortality with a high sensitivity (80.95%) and specificity (96.74%, MCC = 0.79). The post-test probability was 85%, assuming a pre-test probability of 18.6% (72-hour mortality rate). ICCs of HU measurements in the aorta, spleen, and its ratios showed high interrater agreement (ICC: 0.92–0.99). In a control cohort, a threshold ratio ≤0.53 predicted CCU patientś outcome satisfactorily (SENS = 83.93%, SPEC = 97.65%, PPV = 87.00%, NPV = 97.00%).

Conclusions: The portal venous spleno-aortic ratio serves as a distinctive imaging feature to predict short-term mortality. For CCU patients with a cut-off portal venous spleno-aortic ratio ≤0.53, the risk of dying within three days after CT scan is approximately twenty times higher.

1. Introduction

The spleen is one of the most perfused abdominal organs. In the early contrast-enhanced CT phase, the spleen attenuation is much higher than in other abdominal organs, e.g., liver [1]. However, in critically ill patients, a reduced splenic enhancement is visible without any vascular or parenchymal injury [2–5]. One possible explanation focuses on the role of the sympathetic nervous system. Its activation and the associated release of catecholamines may lead to decreased arterial inflow and increased venous outflow [4], resulting in extensive splenic hypoenhancement. Other causes of hypodense areas must be considered, especially vascular rupture or splenic infarction. Signs for these are focal splenic wedges, hematoma, rim enhancement, or vascular occlusion [1].

There are few reports of a possible correlation between splenic hypoperfusion and its prognostic value. In arterial phase CT scan, a decreased splenic enhancement may indicate a poor outcome in traumatic patients with hypovolemic shock [6,7].

In routine clinical practice, the portal venous CT phase is commonly performed in critically ill patients. Thus, we hypothesized that portal venous phase data could also predict mortality in critical care unit patients without trauma. Furthermore, we wanted to investigate whether splenic density values or the spleno-aortic ratio, which also reflects possible changes in aortic perfusion, are better suited for prognostic statements. If a predictor proves to be favorable, results should be

* Corresponding author.
E-mail address: robert.winzer@uniklinikum-dresden.de (R. Winzer).

https://doi.org/10.1016/j.ejrad.2021.109939
Received 11 May 2021; Received in revised form 1 August 2021; Accepted 24 August 2021
Available online 28 August 2021

Technical Note: ADAM PETer – An anthropomorphic, deformable and multimodality pelvis phantom with positron emission tomography extension for radiotherapy

Clarissa Gillmann[a)*]
German Cancer Research Center (DKFZ), Department of Medical Physics in Radiation Oncology, Heidelberg, Germany
Heidelberg Institute for Radiation Oncology (HIRO), National Center for Radiation Research in Oncology (NCRO), Heidelberg, Germany

Noa Homolka[*]
German Cancer Research Center (DKFZ), Department of Medical Physics in Radiation Oncology, Heidelberg, Germany
Heidelberg Institute for Radiation Oncology (HIRO), National Center for Radiation Research in Oncology (NCRO), Heidelberg, Germany
Faculty for Physics and Astronomy, University of Heidelberg, Heidelberg, Germany

Wibke Johnen, Armin Runz, Gernot Echner, Asja Pfaffenberger and Philipp Mann
German Cancer Research Center (DKFZ), Department of Medical Physics in Radiation Oncology, Heidelberg, Germany
Heidelberg Institute for Radiation Oncology (HIRO), National Center for Radiation Research in Oncology (NCRO), Heidelberg, Germany

Verena Schneider
Department of Radiology, German Cancer Research Center (DKFZ), Heidelberg, Germany

Aswin L. Hoffmann
OncoRay – National Center for Radiation Research in Oncology, University Hospital Carl Gustav Carus Dresden, Dresden, Germany
Department for Radiotherapy and Radiation Oncology, Faculty of Medicine, University Hospital Carl Gustav Carus Dresden, Dresden, Germany
Helmholtz-Zentrum Dresden – Rossendorf, Institute of Radiooncology – OncoRay, Dresden, Germany

Esther G. C. Troost
OncoRay – National Center for Radiation Research in Oncology, University Hospital Carl Gustav Carus Dresden, Dresden, Germany
Department for Radiotherapy and Radiation Oncology, Faculty of Medicine, University Hospital Carl Gustav Carus Dresden, Dresden, Germany
Helmholtz-Zentrum Dresden – Rossendorf, Institute of Radiooncology – OncoRay, Dresden, Germany
German Cancer Consortium (DKTK), Partner Site Dresden, Dresden, Germany
National Center for Tumor Diseases (NCT), Partner Site Dresden,Germany

Stefan A. Koerber
Heidelberg Institute for Radiation Oncology (HIRO), National Center for Radiation Research in Oncology (NCRO), Heidelberg, Germany
National Center for Tumor Diseases (NCT), Partner Site, Heidelberg, Germany
Department of Radiation Oncology, University Hospital Heidelberg, Heidelberg, Germany

Jörg Kotzerke
Department for Radiotherapy and Radiation Oncology, Faculty of Medicine, University Hospital Carl Gustav Carus Dresden, Dresden, Germany
Department for Nuclear Medicine, University Hospital Carl Gustav Carus, Dresden, Germany

Bettina Beuthien-Baumann
Department of Radiology, German Cancer Research Center (DKFZ), Heidelberg, Germany
National Center for Tumor Diseases (NCT), Partner Site, Heidelberg, Germany

(Received 24 June 2020; revised 10 September 2020; accepted for publication 29 October 2020; published 14 December 2020)

Objective: To develop an anthropomorphic, deformable and multimodal pelvis phantom with positron emission tomography extension for radiotherapy (ADAM PETer).
Methods: The design of ADAM PETer was based on our previous pelvis phantom (ADAM) and extended for compatibility with PET and use in 3T magnetic resonance imaging (MRI). The formerly manually manufactured silicon organ surrogates were replaced by three-dimensional (3D) printed organ shells. Two intraprostatic lesions, four iliac lymph node metastases and two pelvic bone metastases were added to simulate prostate cancer as multifocal and metastatic disease. Radiological properties [computed tomography (CT) and 3T MRI] of cortical bone, bone marrow and adipose tissue were simulated by heavy gypsum, a mixture of Vaseline and K_2HPO_4 and peanut oil, respectively. For soft tissues,

Magnetic Resonance Materials in Physics, Biology and Medicine
https://doi.org/10.1007/s10334-021-00922-3

RESEARCH ARTICLE

Overestimation of grey matter atrophy in glioblastoma patients following radio(chemo)therapy

A. Gommlich[1,2,3] · F. Raschke[2,3] · J. Petr[4] · A. Seidlitz[3,5] · C. Jentsch[3,5] · I. Platzek[6] · J. van den Hoff[4] · J. Kotzerke[7] · B. Beuthien-Baumann[8] · M. Baumann[3,9,10] · M. Krause[2,3,5,11,12] · E. G. C. Troost[2,3,5,11,12]

Received: 12 November 2020 / Revised: 11 March 2021 / Accepted: 16 March 2021

Abstract

Objective Brain atrophy has the potential to become a biomarker for severity of radiation-induced side-effects. Particularly brain tumour patients can show great MRI signal changes over time caused by e.g. oedema, tumour progress or necrosis. The goal of this study was to investigate if such changes affect the segmentation accuracy of normal appearing brain and thus influence longitudinal volumetric measurements.

Materials and methods T1-weighted MR images of 52 glioblastoma patients with unilateral tumours acquired before and three months after the end of radio(chemo)therapy were analysed. GM and WM volumes in the contralateral hemisphere were compared between segmenting the whole brain (full) and the contralateral hemisphere only (cl) with SPM and FSL. Relative GM and WM volumes were compared using paired t tests and correlated with the corresponding mean dose in GM and WM, respectively.

Results Mean GM atrophy was significantly higher for full segmentation compared to cl segmentation when using SPM (mean ± std: $\Delta V_{GM,full} = -3.1\% \pm 3.7\%$, $\Delta V_{GM,cl} = -1.6\% \pm 2.7\%$; $p < 0.001$, $d = 0.62$). GM atrophy was significantly correlated with the mean GM dose with the SPM cl segmentation ($r = -0.4$, $p = 0.004$), FSL full segmentation ($r = -0.4$, $p = 0.004$) and FSL cl segmentation (r = -0.35, p = 0.012) but not with the SPM full segmentation ($r = -0.23$, $p = 0.1$).

Conclusions For accurate normal tissue volume measurements in brain tumour patients using SPM, abnormal tissue needs to be masked prior to segmentation, however, this is not necessary when using FSL.

Keywords Radiotherapy · Tissue segmentation · SPM · Atrophy · Glioblastoma · Proton

A. Gommlich, F. Raschke, and J. Petr shared first authors

✉ F. Raschke
felix.raschke@oncoray.de

[1] Siemens Energy Austria GmbH, Vienna, Austria

[2] Helmholtz-Zentrum Dresden-Rossendorf, Institute of Radiooncology – OncoRay, Dresden, Germany

[3] OncoRay - National Center for Radiation Research in Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany

[4] Helmholtz-Zentrum Dresden-Rossendorf, Institute of Radiopharmaceutical Cancer Research, Dresden, Germany

[5] Department of Radiotherapy and Radiation Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany

[6] Faculty of Medicine and University Hospital Carl Gustav Carus, Department of Diagnostic and Interventional Radiology, Technische Universität Dresden, Dresden, Germany

[7] Faculty of Medicine and University Hospital Carl Gustav Carus, Department of Nuclear Medicine, Technische Universität Dresden, Dresden, Germany

[8] Department of Radiology, German Cancer Research Center (DKFZ), Heidelberg, Germany

[9] German Cancer Research Center (DKFZ), Heidelberg, Germany

[10] National Center for Tumor Diseases (NCT), Partner Site Heidelberg, Germany

[11] German Cancer Consortium (DKTK), Partner Site Dresden, and German Cancer Research Center (DKFZ), Heidelberg, Germany

[12] National Center for Tumor Diseases (NCT), Partner Site Dresden, Germany: German Cancer Research Center (DKFZ), Heidelberg, Germany; Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany, and; Helmholtz Association / Helmholtz-Zentrum Dresden-Rossendorf (HZDR),, Dresden, Germany

Published online: 31 March 2021

Rapidly Evolving Diffuse Omental Carcinomatosis of Prostate Cancer in ^{68}Ga-PSMA PET/CT

Sebastian Hoberück, MD, Ulrich Sommer, MD,† Arne Grey, MD,‡ Tobias Hölscher, MD,§|| Gustavo Bruno Baretton, MD,† and Jörg Kotzerke, MD**

Abstract: An 81-year-old man received androgen deprivation therapy for a locally advanced prostate cancer and, 6 months later, a curative radiation therapy. Half a year later, the patient presented with a steeply increased PSA value (32 ng/mL) and a suppressed testosterone level (0.48 nmol/L). The consecutively performed ^{68}Ga-PSMA PET/CT revealed, besides local tumor remains and several PSMA-positive lymph node and soft tissue metastases, an extensive, diffuse PSMA ligand accumulation in the omentum, which was immunohistochemically proven to be a carcinomatosis of prostate cancer. None of the extraprostatic lesions were present in the pretherapeutic PSMA PET 1 year ago.

Key Words: PSMA, PET, peritoneal carcinomatosis, omental carcinomatosis

(*Clin Nucl Med* 2021;46: e216–e217)

Received for publication July 6, 2020; revision accepted October 6, 2020.

From the Departments of *Nuclear Medicine, †Pathology, ‡Radiology, and §Radiotherapy and Radiation Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden; and ||OncoRay–National Center for Radiation Research in Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany.

Conflicts of interest and sources of funding: none declared.

Correspondence to: Sebastian Hoberück, MD, Department of Nuclear Medicine, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Fetscherstr. 74, 01307 Dresden, Germany. E-mail: Sebastian.Hoberueck@uniklinikum-dresden.de.

ISSN: 0363-9762/21/4604–e216
DOI: 10.1097/RLU.0000000000003414

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EJNMMI Research

ORIGINAL RESEARCH

Open Access

Intraindividual comparison of [68 Ga]-Ga-PSMA-11 and [18F]-F-PSMA-1007 in prostate cancer patients: a retrospective single-center analysis

Sebastian Hoberück[1,2*], Steffen Löck[3], Angelika Borkowetz[4], Ulrich Sommer[5], Robert Winzer[6], Klaus Zöphel[1,7], Dieter Fedders[6], Enrico Michler[1], Jörg Kotzerke[1], Klaus Kopka[8,9], Tobias Hölscher[3,10] and Anja Braune[1]

Abstract

Background: The analysis aimed to compare the radiotracers [68Ga]-Ga-PSMA-11 and [18F]-F-PSMA-1007 intraindividually in terms of malignant lesions, mi(molecular-imaging)TNM staging and presumable unspecific lesions retrospectively as used in routine clinical practice.

Methods: A retrospective analysis of 46 prostate cancer patients (median age: 71 years) who underwent consecutive [68Ga]-Ga-PSMA-11- and [18F]-F-PSMA-1007-PET/CT or PET/MRI within a mean of 12 ± 8.0 days was performed. MiTNM staging was performed in both studies by two nuclear medicine physicians who were blinded to the results of the other tracer. After intradisciplinary and interdisciplinary consensus with two radiologists was reached, differences in both malignant and presumable nonspecific tracer accumulation were analyzed.

Results: Differences in terms of miTNM stages in both studies occurred in nine of the 46 patients (19.6%). The miT stages differed in five patients (10.9%), the miN stages differed in three patients (6.5%), and different miM stages occurred only in one patient who was upstaged in [18F]-F-PSMA-1007 PET. Concordant miTNM stages were obtained in 37 patients (80.4%). There was no significant difference between [18F]-F-PSMA-1007 and [68Ga]-Ga-PSMA-11 in the SUV_{max} locally (31.5 vs. 32.7; $p = 0.658$), in lymph node metastases (28.9 vs. 24.9; $p = 0.30$) or in bone metastases (22.9 vs. 27.6; $p = 0.286$). In [18F]-F-PSMA-1007 PET, more patients featured presumable unspecific uptake in the lymph nodes (52.2% vs. 28.3%; $p: < 0.001$), bones (71.7% vs. 23.9%; $p < 0.001$) and ganglia (71.7% vs. 43.5%; $p < 0.001$). Probable unspecific, exclusively [18F]-F-PSMA-1007-positive lesions mainly occurred in the ribs (58.7%), axillary lymph nodes (39.1%) and cervical ganglia (28.3%).

Conclusion: In terms of miTNM staging, both tracers appeared widely exchangeable, as no tracer relevantly outperformed the other. The differences between the two tracers were far more common in presumable unspecific lesions than in malignant spots. A routinely performed two-tracer study could not be shown to be superior. Since it seems at least challenging for most nuclear medicine departments to provide both [18F]-F-PSMA-1007 and [68Ga]-Ga-PSMA-11, it appears reasonable to choose the PSMA radiotracer depending on local availability with attention to the greater occurrence of nonspecific bone findings with [18F]-F-PSMA-1007.

*Correspondence: Sebastian.Hoberueck@uniklinikum-dresden.de
[1] Department of Nuclear Medicine, Faculty of Medicine and University Hospital Carl Gustav Carus, TU Dresden, Fetscherstr. 74, 01307 Dresden, Germany
Full list of author information is available at the end of the article

EUROPEAN UROLOGY ONCOLOGY xxx (2021) xxx

available at www.sciencedirect.com
journal homepage: euoncology.europeanurology.com

European Association of Urology

Toxicity and Efficacy of Local Ablative, Image-guided Radiotherapy in Gallium-68 Prostate-specific Membrane Antigen Targeted Positron Emission Tomography–staged, Castration-sensitive Oligometastatic Prostate Cancer: The OLI-P Phase 2 Clinical Trial

Tobias Hölscher [a,b,c,d,*], *Michael Baumann* [c,e], *Jörg Kotzerke* [b,c,d,f], *Klaus Zöphel* [f,g], *Frank Paulsen* [h], *Arndt-Christian Müller* [h,i], *Daniel Zips* [h,c,j], *Lydia Koi* [a,k], *Christian Thomas* [b,c,d,l], *Steffen Löck* [a,e,c,m], *Mechthild Krause* [a,b,c,d,e,k,m], *Manfred Wirth* [l], *Fabian Lohaus* [a,b,c,d,m]

[a] *Department of Radiotherapy and Radiation Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany;* [b] *National Center for Tumor Diseases (NCT), Partner Site Dresden, Dresden, Germany;* [c] *German Cancer Research Center (DKFZ), Heidelberg, Germany;* [d] *Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany;* [e] *OncoRay – National Center for Radiation Research in Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Helmholtz-Zentrum Dresden - Rossendorf, Dresden, Germany;* [f] *Department of Nuclear Medicine, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany;* [g] *Department of Nuclear Medicine, Klinikum Chemnitz gGmbH, Campus Chemnitz der TU Dresden, Chemnitz, Germany;* [h] *Department of Radiation Oncology, Medical Faculty and University Hospital Tübingen, Tübingen, Germany;* [i] *Department of Radiation Oncology, RKH-Kliniken Ludwigsburg, Academic Hospital of University Heidelberg, Ludwigsburg, Germany;* [j] *German Cancer Consortium (DKTK), Partner Site Tübingen, Tübingen, Germany;* [k] *Helmholtz-Zentrum Dresden - Rossendorf, Institute of Radiation Oncology, Dresden, Germany;* [l] *Department of Urology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany;* [m] *German Cancer Consortium (DKTK), Partner Site Dresden, Dresden, Germany*

Article info

Article history:
Accepted October 5, 2021

Associate Editor:
Gianluca Giannarini

Keywords:
Prostatic neoplasms
Prospective studies
Radiotherapy
Image guided, Radiosurgery
Positron emission tomography
Prostate-specific antigen
Neoplasm metastasis
Adult
Male

Abstract

Background: Local ablative radiotherapy (aRT) of oligometastatic prostate cancer (PCa) is very promising and has become a focus of current clinical research.
Objective: We hypothesize that aRT is safe and effective in gallium-68 prostate-specific membrane antigen targeted positron emission tomography (PSMA-PET)-staged oligometastatic PCa patients.
Design, setting, and participants: A nonrandomized, prospective, investigator-initiated phase 2 trial recruited patients with oligometastatic PCa (five or fewer lymph node or osseous metastases) after local curative therapy, without significant comorbidity and androgen deprivation therapy (ADT), at two German centers from 2014 to 2018.
Intervention: All PSMA-PET–positive metastases were treated with aRT. No systemic therapy was initiated.
Outcome measurements and statistical analysis: The primary endpoint was treatment-related toxicity (grade $\geq$2) 24 mo after aRT. A one-sided single-sample test of proportions was planned to test whether the endpoint occurs in <15% of the patients. Key secondary endpoints were time to progression of prostate-specific antigen (PSA) and time to ADT, which were associated with potential prognostic factors by Cox regression.

* Corresponding author. Department of Radiotherapy and Radiation Oncology, University Hospital Carl Gustav Carus, Fetscherstr 74, 01307 Dresden, Germany. Tel. +49 351 458 2095; Fax: +49351 458-5716.
E-mail address: tobias.hoelscher@ukdd.de (T. Hölscher).

https://doi.org/10.1016/j.euo.2021.10.002

Please cite this article as: T. Hölscher, M. Baumann. J. Kotzerke et al., Toxicity and Efficacy of Local Ablative, Image-guided Radiotherapy in Gallium-68 Prostate-specific Membrane Antigen Targeted Positron Emission Tomography–staged, Castration-sensitive Oligometastatic Prostate Cancer: The OLI-P Phase 2 Clinical Trial, Eur Urol Oncol (2021), https://doi.org/10.1016/j.euo.2021.10.002

Urologia Internationalis

Review

Urol Int 2021;105:169–180
DOI: 10.1159/000510407

Received: June 12, 2020
Accepted: June 23, 2020
Published online: January 7, 2021

Management of Germ Cell Tumours of the Testis in Adult Patients. German Clinical Practice Guideline Part I: Epidemiology, Classification, Diagnosis, Prognosis, Fertility Preservation, and Treatment Recommendations for Localized Stages

Sabine Kliesch[a] Stefanie Schmidt[b] Doris Wilborn[b] Clemens Aigner[c] Walter Albrecht[d] Jens Bedke[e] Matthias Beintker[f] Dirk Beyersdorff[g] Carsten Bokemeyer[h] Jonas Busch[i] Johannes Classen[j] Maike de Wit[k] Klaus-Peter Dieckmann[l] Thorsten Diemer[m] Anette Dieing[n] Matthias Gockel[o] Bernt Göckel-Beining[p] Oliver W. Hakenberg[q] Axel Heidenreich[r] Julia Heinzelbecker[s] Kathleen Herkommer[t] Thomas Hermanns[u] Sascha Kaufmann[v] Marko Kornmann[w] Jörg Kotzerke[x] Susanne Krege[y] Glen Kristiansen[z] Anja Lorch[A] Arndt-Christian Müller[v] Karin Oechsle[h] Timur Ohloff[B] Christoph Oing[h] Ulrich Otto[C] David Pfister[r] Renate Pichler[D] Heinrich Recken[E] Oliver Rick[F] Yvonne Rudolph[G] Christian Ruf[H] Joachim Schirren[I] Hans Schmelz[J] Heinz Schmidberger[K] Mark Schrader[L] Stefan Schweyer[M] Stefanie Seeling[N] Rainer Souchon[v] Christian Winter[O] Christian Wittekind[P] Friedemann Zengerling[Q] Dirk-Henrik Zermann[R] Roger Zillmann[S] Peter Albers[A]

[a]Centre of Reproductive Medicine and Andrology, Department of Clinical and Surgical Andrology, University Hospital Münster, Münster, Germany; [b]UroEvidence@Deutsche Gesellschaft für Urologie, Berlin, Germany; [c]Ruhrlandklinik at University Hospital Essen, Essen, Germany; [d]Department of Urology, Landesklinikum Mistelbach-Gänserndorf, Mistelbach, Austria; [e]Department of Urology, University Hospital Tübingen, Tübingen, Germany; [f]Südharz Hospital Nordhausen gGmbH, Nordhausen, Germany; [g]Clinic and Polyclinic for Diagnostic and Interventional Radiology and Nuclear Medicine, University Hospital Hamburg-Eppendorf, Hamburg, Germany; [h]II. Medical Clinic and Polyclinic, University Hospital Hamburg-Eppendorf, Hamburg, Germany; [i]Department of Urology, Charité University Hospital, Berlin, Germany; [j]Department of Radiotherapy, Radiological Oncology and Palliative Medicine, St. Vincentius-Kliniken, Karlsruhe, Germany; [k]Clinic for Internal Medicine – Hematology, Oncology and Palliative Medicine, Vivantes Clinic Neukölln, Berlin, Germany; [l]Department of Urology, Asklepios Klinik Altona, Hamburg, Germany; [m]Clinic and Polyclinic for Urology, Pediatric Urology and Andrology, University Hospital Gießen, Gießen, Germany; [n]Clinic for Internal Medicine – Hematology and Oncology, Vivantes Clinics Am Urban, Berlin, Germany; [o]HELIOS Clinics Berlin-Buch, Berlin, Germany; [p]Urologist, Horn-Bad Meinberg, Germany; [q]Urological Clinic and Polyclinic, University Hospital Rostock, Rostock, Germany; [r]Department of Urology, University Hospital Cologne, Cologne, Germany; [s]Department of Urology, University Hospital Saarland, Saarbrücken, Germany; [t]Urological Clinic and Polyclinic of the Technical University of Munich, Munich, Germany; [u]Department of Urology, University Hospital Zurich, University of Zurich, Zurich, Switzerland; [v]Department for Radiooncology, University Hospital Tübingen, Tübingen, Germany; [w]Clinic for General and Visceral Surgery, University Hospital Ulm, Ulm, Germany; [x]Klinik und Poliklinik für Nuklearmedizin, University Hospital Dresden, Dresden, Germany; [y]KEM, Protestant Hospital Essen-Mitte, Clinic for Urology, Pediatric Urology and Urological Oncology, Essen, Germany; [z]Institute of Pathology, University Hospital Bonn, Bonn, Germany;

S. Kliesch and S. Schmidt contributed equally to this study and should be considered co-first authors.

karger@karger.com
www.karger.com/uin

Sabine Kliesch
Centrum für Reproduktionsmedizin und Andrologie, Abteilung für Klinische und Operative Andrologie, Universitätsklinikum Münster
Albert-Schweitzer-Straße 33, DE–48149 Münster (Germany)
kliesch@ukmuenster.de

Urologia Internationalis

Review

Urol Int 2021;105:181–191
DOI: 10.1159/000511245

Received: July 23, 2020
Accepted: August 20, 2020
Published online: January 22, 2021

Management of Germ Cell Tumours of the Testes in Adult Patients: German Clinical Practice Guideline, PART II – Recommendations for the Treatment of Advanced, Recurrent, and Refractory Disease and Extragonadal and Sex Cord/Stromal Tumours and for the Management of Follow-Up, Toxicity, Quality of Life, Palliative Care, and Supportive Therapy

Sabine Kliesch[a] Stefanie Schmidt[b] Doris Wilborn[b] Clemens Aigner[c] Walter Albrecht[d] Jens Bedke[e] Matthias Beintker[f] Dirk Beyersdorff[g] Carsten Bokemeyer[h] Jonas Busch[i] Johannes Classen[j] Maike de Wit[k] Klaus-Peter Dieckmann[l] Thorsten Diemer[m] Anette Dieing[n] Matthias Gockel[o] Bernt Göckel-Beining[p] Oliver W. Hakenberg[q] Axel Heidenreich[r] Julia Heinzelbecker[s] Kathleen Herkommer[t] Thomas Hermanns[u] Sascha Kaufmann[v] Marko Kornmann[w] Jörg Kotzerke[x] Susanne Krege[y] Glen Kristiansen[z] Anja Lorch[A] Arndt-Christian Müller[v] Karin Oechsle[h] Timur Ohloff[B] Christoph Oing[h] Ulrich Otto[C] David Pfister[r] Renate Pichler[D] Heinrich Recken[E] Oliver Rick[F] Yvonne Rudolph[G] Christian Ruf[H] Joachim Schirren[I] Hans Schmelz[J] Heinz Schmidberger[K] Mark Schrader[L] Stefan Schweyer[M] Stefanie Seeling[N] Rainer Souchon[v] Christian Winter[O] Christian Wittekind[P] Friedemann Zengerling[Q] D.H. Zermann[R] Roger Zillmann[S] Peter Albers[A]

[a]Centre of Reproductive Medicine and Andrology, Department of Clinical and Surgical Andrology, University Hospital Münster, Münster, Germany; [b]UroEvidence, Deutsche Gesellschaft für Urologie, Berlin, Germany; [c]Ruhrlandklinik, University Hospital Essen, Essen, Germany; [d]Department of Urology, Landesklinikum Mistelbach-Gänserndorf, Mistelbach, Austria; [e]Department of Urology, University Hospital Tübingen, Tübingen, Germany; [f]Südharz Hospital Nordhausen gGmbH, Nordhausen, Germany; [g]Clinic and Polyclinic for Diagnostic and Interventional Radiology and Nuclear Medicine, University Hospital Hamburg-Eppendorf, Hamburg, Germany; [h]II. Medical Clinic and Polyclinic, University Hospital Hamburg-Eppendorf, Hamburg, Germany; [i]Department of Urology, Charité University Hospital, Berlin, Germany; [j]Department of Radiotherapy, Radiological Oncology, and Palliative Medicine, St. Vincentius-Kliniken, Karlsruhe, Germany; [k]Clinic for Internal Medicine – Hematology, Oncology, and Palliative Medicine, Vivantes Clinic Neukölln, Berlin, Germany; [l]Department of Urology, Asklepios Klinik Altona, Hamburg, Germany; [m]Clinic and Polyclinic for Urology, Pediatric Urology, and Andrology, University Hospital Gießen, Gießen, Germany; [n]Clinic for Internal Medicine – Hematology and Oncology, Vivantes Clinics Am Urban, Berlin, Germany; [o]HELIOS Clinics Berlin-Buch, Berlin, Germany; [p]Urologist, Horn-Bad Meinberg, Germany; [q]Urological Clinic and Polyclinic, University Hospital Rostock, Rostock, Germany; [r]Department of Urology, University Hospital Cologne, Cologne, Germany; [s]Department of Urology, University Hospital Saarland, Saarbrücken, Germany;

S. Kliesch and S. Schmidt contributed equally to this study and should be considered co-first authors.

karger@karger.com
www.karger.com/uin

Peter Albers
Universitätsklinikum Düsseldorf
Gebäude 13.71/72, Moorenstraße 5
DE–40225 Düsseldorf (Germany)
p.albers@dkfz-heidelberg.de

Published online: 2021-07-14

Value of PET imaging for radiation therapy*

Wertigkeit der PET-Bildgebung für die Radioonkologie

Authors

Constantin Lapa[1], Ursula Nestle[2, 3, 4], Nathalie L. Albert[5], Christian Baues[6], Ambros Beer[7], Andreas Buck[8], Volker Budach[9], Rebecca Bütof[10, 11], Stephanie E. Combs[12, 13, 14], Thorsten Derlin[15], Matthias Eiber[16], Wolfgang P. Fendler[17], Christian Furth[18], Cihan Gani[19, 20], Eleni Gkika[2], Anca L. Grosu[2, 3], Christoph Henkenberens[21], Harun Ilhan[5], Steffen Löck[10, 11], Simone Marnitz-Schulze[6], Matthias Miederer[22], Michael Mix[23], Nils H. Nicolay[2, 3], Maximilian Niyazi[5, 12], Christoph Pöttgen[24], Claus M. Rödel[25, 26], Imke Schatka[18], Sarah M. Schwarzenboeck[27], Andrei S. Todica[5], Wolfgang Weber[16], Simone Wegen[6], Thomas Wiegel[28], Constantinos Zamboglou[2, 3], Daniel Zips[19, 20], Klaus Zöphel[11, 29, 30, 31, 32], Sebastian Zschaeck[33], Daniela Thorwarth[19, 34], Esther G. C. Troost[10, 11, 29, 30, 35], on behalf of "Arbeitsgemeinschaft Nuklearmedizin und Strahlentherapie der DEGRO und DGN"

Affiliations

1 Nuclear Medicine, Medical Faculty, University of Augsburg, Augsburg, Germany
2 Department of Radiation Oncology, Faculty of Medicine, University Medical Center Freiburg, Freiburg, Germany
3 German Cancer Consortium (DKTK), Partner Site Freiburg, Freiburg, Germany
4 Department of Radiation Oncology, Kliniken Maria Hilf, Mönchengladbach, Germany
5 Department of Nuclear Medicine, University Hospital, LMU Munich, Munich, Germany
6 Department of Radiation Oncology, Cyberknife and Radiotherapy, Medical Faculty, University Hospital Cologne, Cologne, Germany
7 Department of Nuclear Medicine, Ulm University Hospital, Ulm, Germany
8 Department of Nuclear Medicine, University Hospital Würzburg, Würzburg, Germany
9 Department of Radiation Oncology, Charité-Universitätsmedizin Berlin, Campus Virchow-Klinikum, Berlin, Germany
10 Department of Radiotherapy and Radiation Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany
11 OncoRay – National Center for Radiation Research in Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany
12 German Cancer Consortium (DKTK), Partner Site Munich, Munich, Germany
13 Department of Radiation Oncology, Technical University of Munich (TUM), Klinikum rechts der Isar, Munich, Germany
14 Department of Radiation Sciences (DRS), Institute of Radiation Medicine (IRM), Neuherberg, Germany
15 Department of Nuclear Medicine, Hannover Medical School, Germany
16 Department of Nuclear Medicine, Technical University of Munich (TUM), Klinikum rechts der Isar, Munich, Germany
17 Department of Nuclear Medicine, University of Duisburg-Essen and German Cancer Consortium (DKTK)-University Hospital Essen, Essen, Germany
18 Department of Nuclear Medicine, Charité-Universitätsmedizin Berlin, Freie Universität Berlin, Humboldt-Universität zu Berlin, Berlin Institute of Health, Berlin, Germany
19 German Cancer Consortium (DKTK), Partner Site Tübingen, and German Cancer Research Center (DKFZ), Heidelberg, Germany
20 Department of Radiation Oncology, University of Tübingen, Tübingen, Germany
21 Department of Radiotherapy and Special Oncology, Medical School Hannover, Germany
22 Department of Nuclear Medicine, University Hospital Mainz, Mainz, Germany
23 Department of Nuclear Medicine, Faculty of Medicine, Medical Center, University of Freiburg, Freiburg, Germany
24 Department of Radiation Oncology, West German Cancer Centre, University of Duisburg-Essen, Essen, Germany
25 German Cancer Consortium (DKTK), Partner Site Frankfurt, and German Cancer Research Center (DKFZ), Heidelberg, Germany
26 Department of Radiotherapy and Oncology, Goethe University Frankfurt, Frankfurt, Germany
27 Department of Nuclear Medicine, Rostock University Medical Centre, Rostock, Germany
28 Department of Radiation Oncology, Ulm University Hospital, Ulm, Germany
29 National Center for Tumor Diseases (NCT), Partner Site Dresden, Germany: German Cancer Research Center (DKFZ), Heidelberg, Germany; Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany; Helmholtz Association/Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Dresden, Germany

* This article is co-published in the journals Strahlentherapie und Onkologie and Nuklearmedizin – Nuclear Medicine Molecular Imaging and Therapy. https://doi.org/10.1007/s00066-021-01812-2 or https://doi.org/10.1055/a-1525-7029.

Strahlenther Onkol (2021) 197:757–779
https://doi.org/10.1007/s00066-021-01812-2

REVIEW ARTICLE

Value of PET imaging for radiation therapy

Constantin Lapa[1] · Ursula Nestle[2,3,4] · Nathalie L. Albert[5] · Christian Baues[6] · Ambros Beer[7] · Andreas Buck[8] · Volker Budach[9] · Rebecca Bütof[10,11] · Stephanie E. Combs[12,13,14] · Thorsten Derlin[15] · Matthias Eiber[16] · Wolfgang P. Fendler[17] · Christian Furth[18] · Cihan Gani[19,20] · Eleni Gkika[2] · Anca-L. Grosu[2,3] · Christoph Henkenberens[21] · Harun Ilhan[5] · Steffen Löck[10,11] · Simone Marnitz-Schulze[6] · Matthias Miederer[22] · Michael Mix[23] · Nils H. Nicolay[2,3] · Maximilian Niyazi[5,12] · Christoph Pöttgen[24] · Claus M. Rödel[25,26] · Imke Schatka[18] · Sarah M. Schwarzenboeck[27] · Andrei S. Todica[5] · Wolfgang Weber[16] · Simone Wegen[6] · Thomas Wiegel[28] · Constantinos Zamboglou[2,3] · Daniel Zips[19,20] · Klaus Zöphel[11,29,30,31,32] · Sebastian Zschaeck[33] · Daniela Thorwarth[19,34] · Esther G. C. Troost[10,11,29,30,35] · Arbeitsgemeinschaft Nuklearmedizin und Strahlentherapie der DEGRO und DGN

Received: 1 June 2021 / Accepted: 9 June 2021 / Published online: 14 July 2021

Abstract
This comprehensive review written by experts in their field gives an overview on the current status of incorporating positron emission tomography (PET) into radiation treatment planning. Moreover, it highlights ongoing studies for treatment individualisation and per-treatment tumour response monitoring for various primary tumours. Novel tracers and image analysis methods are discussed. The authors believe this contribution to be of crucial value for experts in the field as well as for policy makers deciding on the reimbursement of this powerful imaging modality.

Keywords PET · Radiation oncology · Functional imaging · Radiomics

Introduction

Positron emission tomography (PET) has found its way into primary disease staging of numerous solid tumours and of lymphomas. This has mainly been the contribution of 2-[^{18}F]fluorodeoxyglucose-([^{18}F]FDG), a glucose analogue which depicts the altered metabolism of malignant tumours as well as the physiological metabolism of organs and inflammatory processes. Functional PET with [^{18}F]FDG as radiopharmaceutical (FDG-PET) combined with anatomical imaging modalities, such as computed tomography (CT) and magnetic resonance imaging (MRI), has also altered radiation treatment planning and response assessment, in particular in lung cancer, prostate cancer and lymphoma. Moreover, local radiation dose-escalation, termed dose-painting, based on increased metabolism has been applied both in theoretical treatment planning studies as well as in the context of prospective clinical trials. Finally, tracers depicting additional tumour characteristics beyond glucose metabolism have become available and their value is being assessed. For many years, the incremental value of a close interaction between radiation oncologists and nuclear medicine physicians has been highlighted by interdisciplinary studies in various tumour entities. Whereas this review is primarily aimed to provide a concise overview over the current value of PET in radiation oncology, it might also serve as a stimulus for future collaboration in both daily practice and scientific trials to further enhance patient care.

Primary brain tumours

Different from peripheral oncological diseases, which are predominantly imaged with FDG-PET, non-glucose tracers have shown clear superiority in the workup of tumour lesions in the brain. This is due to their high physiological glucose consumption, leading to a low tumour-to-back-

This article is co-published in the journals *Strahlentherapie und Onkologie* and *Nuklearmedizin—NuclearMedicine Molecular Imaging and Therapy*, https://doi.org/10.1007/s00066-021-01812-2 or https://doi.org/10.1055/a-1525-7029.

✉ Esther G. C. Troost, MD PhD
esther.troost@uniklinikum-dresden.de

Extended author information available on the last page of the article

^{11}C-Methionine Uptake in the Lactating Human Breast

Enrico Michler, MD, Stephan Hilliger, MD,* Klaus Kopka, PhD,† and Jörg Kotzerke, MD**

Abstract: A 33-year-old nursing mother who underwent resection of a glioblastoma of the right hemisphere was referred for a ^{11}C-methionine PET/MR scan to exclude cancer recurrence. In whole-body PET imaging, a slight radiotracer uptake could be observed in the mammary glands, reflecting lactation status. In this case report, we initially describe ^{11}C-methionine uptake in the human breast and discuss any consequences arising from this special situation.

Key Words: ^{11}C-methionine, lactating breast, PET

(*Clin Nucl Med* 2022;47: e66–e67)

Received for publication March 26, 2021; revision accepted June 3, 2021.

From the *Department of Nuclear Medicine, Faculty of Medicine and University Hospital Carl Gustav Carus, TU Dresden; and †Helmholtz-Zentrum Dresden-Rossendorf, PET Center, Institute of Radiopharmaceutical Cancer Research, Dresden, Germany.

Conflicts of interest and sources of funding: none declared.

Ethics approval and consent to participate: Informed written consent was obtained from the patient before imaging, data collection, and publication.

Consent for publication: The patient gave her written consent for publication.

Availability of data and material: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Correspondence to: Enrico Michler, MD, Department of Nuclear Medicine, Faculty of Medicine and University Hospital Carl Gustav Carus, TU Dresden, Fetscherstr. 74, 01307 Dresden, Germany. E-mail: Enrico.Michler@uniklinikum-dresden.de.

ISSN: 0363-9762/22/4701–0e66
DOI: 10.1097/RLU.0000000000003836

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EJNMMI Research

ORIGINAL RESEARCH Open Access

Comparison of 6-[^{18}F]FDOPA PET with Nigrosome 1 detection in patients with parkinsonism

Enrico Michler[1*], Daniel Kaiser[2], Kiriaki Eleftheriadou[3], Björn Falkenburger[3,4], Jörg Kotzerke[1] and Sebastian Hoberück[1]

Abstract

Background: The functional 6-[^{18}F]FDOPA positron emission tomography (PET) can be a helpful tool in differentiating parkinsonism with dopaminergic deficiency from clinically similar differential diagnoses. Furthermore, in T2*/susceptibility-weighted imaging (SWI) magnetic resonance imaging (MRI) sequences the structural integrity of the Nigrosome 1 (N1) can be assessed by checking the presence of the swallow tail sign (STS). We therefore retrospectively compared the performance of the 6-[^{18}F]FDOPA PET with the N1 detection in patients suspected with parkinsonian diseases. Forty-three consecutive patients (m: 23, f: 20, mean age: 63 ± 12 years) were included in the study. They underwent clinically indicated 6-[^{18}F]FDOPA PET/MRI scans as part of their neurological evaluation of uncertain parkinsonian syndromes. Visual and semi-quantitative PET imaging results were statistically compared with visual N1 assessment on 3 T SWI. As the gold standard, we defined the clinical diagnosis at the last follow-up, which included idiopathic Parkinson syndrome (IPS; $n = 18$), atypical parkinsonian syndromes (APS; $n = 9$) and other neurological diseases without dopaminergic deficit ($n = 16$).

Results: Thirty-five of 43 patients (81%, Kappa 0.611) had corresponding results in 6-[^{18}F]FDOPA PET and SWI. Seven of the remaining 8 patients were correctly diagnosed by 6-[^{18}F]FDOPA PET alone. Sensitivity, specificity and accuracy for 6-[^{18}F]FDOPA and N1 imaging were 93%, 94%, 93% and 82%, 75%, 79%, respectively.

Conclusions: 6-[^{18}F]FDOPA PET and Nigrosome 1 evaluation had an overall good intermodality agreement. Diagnostic agreement was very good in cases of clinically suspected idiopathic Parkinson syndrome and fair in atypical parkinsonian syndromes, but poor in patients with non-parkinsonian disorders. 6-[^{18}F]FDOPA PET showed higher sensitivity, specificity and accuracy in discriminating parkinsonian syndromes from non-parkinsonian disorders than the N1 evaluation. In summary, the additional benefit of N1 assessment in patients with APS or parkinsonism without dopaminergic deficit needs to be proven by prospective studies.

Keywords: Nigrosome 1, 6-[^{18}F]FDOPA, PET, Parkinson's disease, Parkinsonism

Background

Idiopathic Parkinson syndrome (IPS) is a sporadic neurodegenerative disease, in which pathological intracellular deposition of a-synuclein leads to diminishing motor and non-motor functions [1]. After onset in the brain stem, the disease progresses into midbrain's substantia nigra, resulting in dopaminergic cell death [2]. Besides IPS, further neurodegenerative disorders show a dopaminergic deficit. These are called atypical parkinsonian syndromes

*Correspondence: Enrico.Michler@uniklinikum-dresden.de
[1] Department of Nuclear Medicine, Faculty of Medicine and University Hospital Carl Gustav Carus, TU Dresden, Dresden, Germany
Full list of author information is available at the end of the article

Abdominal Radiology (2021) 46:4046–4055
https://doi.org/10.1007/s00261-021-03048-1

INTERVENTIONAL RADIOLOGY

Radioembolization versus portal vein embolization for contralateral liver lobe hypertrophy: effect of cirrhosis

Heiner Nebelung[1] · Thomas Wolf[1] · Sebastian Bund[1] · Christoph Georg Radosa[1] · Verena Plodeck[1] · Sabine Grosche-Schlee[2] · Carina Riediger[3] · Ralf-Thorsten Hoffmann[1] · Jens-Peter Kühn[1]

Received: 30 January 2021 / Revised: 3 March 2021 / Accepted: 9 March 2021 / Published online: 29 March 2021

Abstract

Purpose Preoperative hypertrophy induction of future liver remnant (FLR) reduces the risk of postoperative liver insufficiency after partial hepatectomy. One of the most commonly used methods to induce hypertrophy of FLR is portal vein embolization (PVE). Recent studies have shown that transarterial radioembolization (TARE) also induces hypertrophy of the contralateral liver lobe. The aim of our study was to evaluate contralateral hypertrophy after TARE versus after PVE taking into account the effect of cirrhosis.

Methods Forty-nine patients undergoing PVE before hemihepatectomy and 24 patients with TARE as palliative treatment for liver malignancy were retrospectively included. Semi-automated volumetry of the FLR/contralateral liver lobe before and after intervention (20 to 65 days) was performed on CT or MRI, and the relative increase in volume was calculated. Cirrhosis was evaluated independently by two radiologists on CT/MRI, and interrater reliability was calculated.

Results Hypertrophy after PVE was significantly more pronounced than after TARE (25.3% vs. 7.4%; $p<0.001$). In the subgroup of patients without cirrhosis, the difference was also statistically significant (25.9% vs. 8.6%; $p=0.002$), whereas in patients with cirrhosis, the difference was not statistically significant (18.2% vs. 7.4%; $p=0.212$). After PVE, hypertrophy in patients without cirrhosis was more pronounced than in patients with cirrhosis (25.9% vs. 18.2%; $p=0.203$), while after TARE, hypertrophy was comparable in patients with and without cirrhosis (7.4% vs. 8.6%; $p=0.928$).

Conclusion TARE induces less pronounced hypertrophy of the FLR compared to PVE. Cirrhosis seems to be less of a limiting factor for hypertrophy after TARE, compared to PVE.

✉ Heiner Nebelung
heiner.nebelung@uniklinikum-dresden.de

[1] Department of Radiology, Dresden University Hospital, Fetscherstr. 74, 01307 Dresden, Germany

[2] Department of Nuclear Medicine, Dresden University Hospital, Fetscherstr. 74, 01307 Dresden, Germany

[3] Department of Visceral, Thoracic and Vascular Surgery, Dresden University Hospital, Fetscherstr. 74, 01307 Dresden, Germany

European Journal of Nuclear Medicine and Molecular Imaging (2021) 48:995–1004
https://doi.org/10.1007/s00259-020-04991-9

ORIGINAL ARTICLE

A convolutional neural network for fully automated blood SUV determination to facilitate SUR computation in oncological FDG-PET

Pavel Nikulin[1] · Frank Hofheinz[1] · Jens Maus[1] · Yimin Li[2] · Rebecca Bütof[3,4,5] · Catharina Lange[6] · Christian Furth[6] · Sebastian Zschaeck[7,8] · Michael C. Kreissl[9] · Jörg Kotzerke[10] · Jörg van den Hoff[1,10]

Received: 22 May 2020 / Accepted: 5 August 2020 / Published online: 1 October 2020

Abstract

Purpose The standardized uptake value (SUV) is widely used for quantitative evaluation in oncological FDG-PET but has well-known shortcomings as a measure of the tumor's glucose consumption. The standard uptake ratio (SUR) of tumor SUV and arterial blood SUV (BSUV) possesses an increased prognostic value but requires image-based BSUV determination, typically in the aortic lumen. However, accurate manual ROI delineation requires care and imposes an additional workload, which makes the SUR approach less attractive for clinical routine. The goal of the present work was the development of a fully automated method for BSUV determination in whole-body PET/CT.

Methods Automatic delineation of the aortic lumen was performed with a convolutional neural network (CNN), using the U-Net architecture. A total of 946 FDG PET/CT scans from several sites were used for network training ($N = 366$) and testing ($N = 580$). For all scans, the aortic lumen was manually delineated, avoiding areas affected by motion-induced attenuation artifacts or potential spillover from adjacent FDG-avid regions. Performance of the network was assessed using the fractional deviations of automatically and manually derived BSUVs in the test data.

Results The trained U-Net yields BSUVs in close agreement with those obtained from manual delineation. Comparison of manually and automatically derived BSUVs shows excellent concordance: the mean relative BSUV difference was (mean $\pm$ SD) = (-0.5 ± 2.2)% with a 95% confidence interval of [−5.1, 3.8]% and a total range of [−10.0, 12.0]%. For four test cases, the derived ROIs were unusable (<1 ml).

Conclusion CNNs are capable of performing robust automatic image-based BSUV determination. Integrating automatic BSUV derivation into PET data processing workflows will significantly facilitate SUR computation without increasing the workload in the clinical setting.

Keywords FDG-PET · Standardized uptake value · SUV · Standardized uptake ratio · SUR · Convolutional neural network

Introduction

The standardized uptake value (SUV) is currently still the de facto standard for quantitative evaluation in clinical oncological FDG-PET and assumed to be a reasonable surrogate for the metabolic rate of FDG and, ultimately, for tumor glucose consumption. However, the SUV falls short of closely reflecting the latter quantities due to a number of well-known shortcomings. Among these are a notable uptake time dependence, interstudy variability of the arterial input function, and susceptibility to scanner calibration errors [1–3]. Recently, it was shown that the uptake time normalized tumor to blood SUV ratio (standardized uptake ratio, SUR) essentially removes most of these shortcomings which leads to a distinctly improved correlation of this modified uptake measure with the metabolic uptake rate [4–6]. This in turn leads to improved test-retest stability [7] and significantly better prognostic value compared with tumor SUV [8–11].

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s00259-020-04991-9) contains supplementary material, which is available to authorized users.

This article is part of the Topical Collection on Advanced Image Analyses (Radiomics and Artificial Intelligence)

✉ Pavel Nikulin
p.nikulin@hzdr.de

Extended author information available on the last page of the article.

Abdominal Radiology (2021) 46:5086–5094
https://doi.org/10.1007/s00261-021-03224-3

PELVIS

Diagnostic performance of ^{18}F-fluorodeoxyglucose-PET/MRI versus MRI alone in the diagnosis of pelvic recurrence of rectal cancer

Verena Plodeck[1] · Ivan Platzek[1] · Johannes Streitzig[1] · Heiner Nebelung[1] · Sophia Blum[1] · Jens-Peter Kühn[1] · Ralf-Thorsten Hoffmann[1] · Michael Laniado[1] · Enrico Michler[2] · Sebastian Hoberück[3] · Klaus Zöphel[4] · Jörg Kotzerke[2] · Johannes Fritzmann[5] · Jürgen Weitz[5] · Christoph G. Radosa[1]

Received: 17 June 2021 / Revised: 16 July 2021 / Accepted: 19 July 2021 / Published online: 17 August 2021

Abstract

Purpose To compare the diagnostic performance of ^{18}F-fluorodeoxyglucose-PET/MRI and MRI in the diagnosis of pelvic recurrence of rectal cancer.

Methods All PET/MRIs of patients in the follow-up of rectal cancer performed between 2011 and 2018 at our institution were retrospectively reviewed. Recurrence was confirmed/excluded either by histopathology or imaging follow-up (> 4 months). Four groups of readers (groups 1/2: one radiologist each, groups 3/4: one radiologist/one nuclear medicine physician) independently interpreted MRI and PET/MRI. The likelihood of recurrence was scored on a 5-point-scale. Inter-reader agreement, sensitivity, specificity, PPV/NPV and accuracy were assessed. ROC curve analyses were performed.

Results Fourty-one PET/MRIs of 40 patients (mean 61 years ± 10.9; 11 women, 29 men) were included. Sensitivity of PET/MRI in detecting recurrence was 94%, specificity 88%, PPV/NPV 97% and 78%, accuracy 93%. Sensitivity of MRI was 88%, specificity 75%, PPV/NPV 94% and 60%, accuracy 85%. ROC curve analyses showed an AUC of 0.97 for PET/MRI and 0.92 for MRI, but the difference was not statistically significant ($p = 0.116$). On MRI more cases were scored as equivocal (12% versus 5%). Inter-reader agreement was substantial for PET/MRI and MRI (0.723 and 0.656, respectively).

Conclusion ^{18}F-FDG-PET/MRI and MRI are accurate in the diagnosis of locally recurrent rectal cancer. Sensitivity, specificity, PPV, NPV and accuracy are comparable for both modalities, but PET/MRI increases readers' confidence levels and reduces the number of equivocal cases.

✉ Verena Plodeck
verena.plodeck@uniklinikum-dresden.de

1 Department of Radiology, Dresden University Hospital, Fetscherstrasse 74, 01307 Dresden, Germany

2 Department of Nuclear Medicine, Dresden University Hospital, Fetscherstrasse 74, 01307 Dresden, Germany

3 Department of Nuclear Medicine, Helios Hospital Erfurt, Nordhäuser Strasse 74, 99089 Erfurt, Germany

4 Department of Nuclear Medicine, Chemnitz Hospital GmbH, Flemmingstrasse 2, 09116 Chemnitz, Germany

5 Department of General, Thoracic and Vascular Surgery, Dresden University Hospital, Fetscherstrasse 74, 01307 Dresden, Germany

EJNMMI Research

ORIGINAL RESEARCH

Open Access

KRAS mutation effects on the 2-[18F]FDG PET uptake of colorectal adenocarcinoma metastases in the liver

M. Popovic[1,2], O. Talarico[1,3,4], J. van den Hoff[5], H. Kunin[6], Z. Zhang[7], D. Lafontaine[1], S. Dogan[8], J. Leung[9], E. Kaye[1], C. Czmielewski[1], M. E. Mayerhoefer[6], P. Zanzonico[1], R. Yaeger[10], H. Schöder[6], J. L. Humm[1], S. B. Solomon[6], C. T. Sofocleous[6] and A. S. Kirov[1*]

Abstract

Background: Deriving individual tumor genomic characteristics from patient imaging analysis is desirable. We explore the predictive value of 2-[18F]FDG uptake with regard to the *KRAS* mutational status of colorectal adenocarcinoma liver metastases (CLM).

Methods: 2-[18F]FDG PET/CT images, surgical pathology and molecular diagnostic reports of 37 patients who underwent PET/CT-guided biopsy of CLM were reviewed under an IRB-approved retrospective research protocol. Sixty CLM in 39 interventional PET scans of the 37 patients were segmented using two different auto-segmentation tools implemented in different commercially available software packages. PET standard uptake values (SUV) were corrected for: (1) partial volume effect (PVE) using cold wall-corrected contrast recovery coefficients derived from phantom spheres with variable diameter and (2) variability of arterial tracer supply and variability of uptake time after injection until start of PET scan derived from the tumor-to-blood standard uptake ratio (SUR) approach. The correlations between the *KRAS* mutational status and the mean, peak and maximum SUV were investigated using Student's *t* test, Wilcoxon rank sum test with continuity correction, logistic regression and receiver operation characteristic (ROC) analysis.These correlation analyses were also performed for the ratios of the mean, peak and maximum tumor uptake to the mean blood activity concentration at the time of scan: SUR_{MEAN}, SUR_{PEAK} and SUR_{MAX}, respectively.

Results: Fifteen patients harbored *KRAS* missense mutations (*KRAS*+), while another 3 harbored *KRAS* gene amplification. For 31 lesions, the mutational status was derived from the PET/CT-guided biopsy. The Student's *t* test *p* values for separating *KRAS* mutant cases decreased after applying PVE correction to all uptake metrics of each lesion and when applying correction for uptake time variability to the SUR metrics. The observed correlations were strongest when both corrections were applied to SUR_{MAX} and when the patients harboring gene amplification were grouped with the wild type: $p \leq 0.001$; ROC area under the curve = 0.77 and 0.75 for the two different segmentations, respectively, with a mean specificity of 0.69 and sensitivity of 0.85.

Conclusion: The correlations observed after applying the described corrections show potential for assigning probabilities for the *KRAS* missense mutation status in CLM using 2-[18F]FDG PET images.

Keywords: PET, Colorectal adenocarcinoma, Liver metastases, *KRAS* mutations

Background

The value of functional images for personalized therapy is limited by cancer histological and genomic heterogeneity [1, 2]. Gathering information from medical images

*Correspondence: kirova@mskcc.org
[1] Memorial Sloan Kettering Cancer Center, 1275 York Avenue, New York, NY 10065, USA
Full list of author information is available at the end of the article

EJNMMI Radiopharmacy and Chemistry

RESEARCH ARTICLE Open Access

GMP-compliant production of [^{68}Ga]Ga-NeoB for positron emission tomography imaging of patients with gastrointestinal stromal tumor

Marc Pretze[1,2*], Laura Reffert[1], Steffen Diehl[3], Stefan O. Schönberg[3], Carmen Wängler[4], Peter Hohenberger[5] and Björn Wängler[2*]

* Correspondence: Marc.Pretze@uniklinikum-dresden.de; Bjoern.Waengler@medma.uni-heidelberg.de
[1]Department of Nuclear Medicine, University Hospital Carl Gustav Carus, TU Dresden, Fetscherstr. 74, 01307 Dresden, Germany
[2]Molecular Imaging and Radiochemistry, Department of Clinical Radiology and Nuclear Medicine, Medical Faculty Mannheim of Heidelberg University, Theodor-Kutzer-Ufer 1-3, 68167 Mannheim, Germany
Full list of author information is available at the end of the article

Abstract

Background: [^{68}Ga]Ga-NeoB is a novel DOTA-coupled Gastrin Releasing Peptide Receptor (GRPR) antagonist with high affinity for GRPR and good in vivo stability. This study aimed at (1) the translation of preclinical results to the clinics and establish the preparation of [^{68}Ga]Ga-NeoB using a GMP conform kit approach and a licensed ^{68}Ge/^{68}Ga generator and (2) to explore the application of [^{68}Ga]Ga-NeoB in patients with gastrointestinal stromal tumors (GIST) before and/or after interventional treatment (selective internal radiotherapy, irreversible electroporation, microwave ablation).

Results: Validation of the production and quality control of [^{68}Ga]Ga-NeoB for patient use had to be performed before starting the GMP production. Six independent batches of [^{68}Ga]Ga-NeoB were produced, all met the quality and sterility criteria and yielded 712 ± 73 MBq of the radiotracer in a radiochemical purity of > 95% and a molar activity of 14.2 ± 1.5 GBq/μmol within 20 min synthesis time and additional 20 min quality control. Three patients (2 females, 1 male, 51–77 yrs. of age) with progressive gastrointestinal stromal tumor metastases in the liver or peritoneum not responsive to standard tyrosine kinase inhibitor therapy underwent both [^{68}Ga]Ga-NeoB scans prior and after interventional therapy. Radiosynthesis of ^{68}Ga-NeoB was performed using a kit approach under GMP conditions. No specific patient preparation such as fasting or hydration was required for [^{68}Ga]Ga-NeoB PET/CT imaging. Contrast-enhanced PET/CT studies were performed. A delayed, second abdominal image after the administration of the of [^{68}Ga]Ga-NeoB was acquired at 120 min post injection.

Conclusions: A fully GMP compliant kit preparation of [^{68}Ga]Ga-NeoB enabling the routine production of the tracer under GMP conditions was established for clinical routine PET/CT imaging of patients with metastatic GIST and proved to adequately visualize tumor deposits in the abdomen expressing GRPR. Patients could benefit from additional information derived from [^{68}Ga]Ga-NeoB diagnosis to assess the presence of GRPR in the tumor tissue and monitor antitumor treatment.

Keywords: [^{68}Ga]Ga-NeoB, GRPR, GMP, PET/CT, Metastatic GIST

nanomaterials

MDPI

Article

$\alpha_v\beta_3$-Specific Gold Nanoparticles for Fluorescence Imaging of Tumor Angiogenesis

Marc Pretze [1,2,*], Valeska von Kiedrowski [2], Roswitha Runge [1], Robert Freudenberg [1], René Hübner [3], Güllü Davarci [2], Ralf Schirrmacher [4], Carmen Wängler [5] and Björn Wängler [2]

[1] Department of Nuclear Medicine, University Hospital Carl Gustav Carus, TU Dresden, 01307 Dresden, Germany; Roswitha.Runge@uniklinikum-dresden.de (R.R.); Robert.Freudenberg@uniklinikum-dresden.de (R.F.)
[2] Molecular Imaging and Radiochemistry, Department of Clinical Radiology and Nuclear Medicine, Medical Faculty Mannheim of Heidelberg University, 68167 Mannheim, Germany; Valeska.vonKiedrowski@medma.uni-heidelberg.de (V.v.K.); Guellue.Davarci@medma.uni-heidelberg.de (G.D.); Bjoern.Waengler@medma.uni-heidelberg.de (B.W.)
[3] Helmholtz-Zentrum Dresden-Rossendorf, Institute of Ion Beam Physics and Materials Research, 01328 Dresden, Germany; r.huebner@hzdr.de
[4] Department of Oncology, Division of Oncological Imaging, University of Alberta, Edmonton, AB T6G 2R3, Canada; schirrma@ualberta.ca
[5] Biomedical Chemistry, Department of Clinical Radiology and Nuclear Medicine, Medical Faculty Mannheim of Heidelberg University, 68167 Mannheim, Germany; Carmen.Waengler@medma.uni-heidelberg.de
* Correspondence: marc.pretze@ukdd.de; Tel.: +49-351-458-5417

Abstract: This paper reports on the development of tumor-specific gold nanoparticles (AuNPs) as theranostic tools intended for target accumulation and the detection of tumor angiogenesis via optical imaging (OI) before therapy is performed, being initiated via an external X-ray irradiation source. The AuNPs were decorated with a near-infrared dye, and RGD peptides as the tumor targeting vector for $\alpha_v\beta_3$-integrin, which is overexpressed in tissue with high tumor angiogenesis. The AuNPs were evaluated in an optical imaging setting in vitro and in vivo exhibiting favorable diagnostic properties with regards to tumor cell accumulation, biodistribution, and clearance. Furthermore, the therapeutic properties of the AuNPs were evaluated in vitro on pUC19 DNA and on A431 cells concerning acute and long-term toxicity, indicating that these AuNPs could be useful as radiosensitizers in therapeutic concepts in the future.

Keywords: gold nanoparticle; optical imaging; radiosensitizer; tumor angiogenesis; RGD peptide

Citation: Pretze, M.; von Kiedrowski, K.; Runge, R.; Freudenberg, R.; Hübner, R.; Davarci, G.; Schirrmacher, R.; Wängler, C.; Wängler, B. $\alpha_v\beta_3$-Specific Gold Nanoparticles for Fluorescence Imaging of Tumor Angiogenesis. *Nanomaterials* **2021**, *11*, 138. https://doi.org/10.3390/nano11010138

Received: 25 November 2020
Accepted: 30 December 2020
Published: 8 January 2021

1. Introduction

In recent years, gold nanoparticles (AuNPs) have gained serious attention since their first use as radioactive ^{198}Au-nanocolloid in the early 1950s for nanobrachytherapy [1–3]. Since then, the focus has shifted to the development of ultra-small target-specific AuNPs with a very narrow size distribution and, ultimately, tailored shapes for use in various imaging modalities such as CT [4], Raman [5], or photoacoustic imaging [6]. On the one hand AuNPs represent a perfect platform for multimerization of target-specific effectors on their surface and on the other hand they offer the possibility of detection using multimodal imaging techniques by surface modification [7], as well as for theranostic purposes [8–11]. Many approaches of AuNPs with a size of >10 nm are based on a phenomenon typically known as 'enhanced permeability and retention' (EPR) effect due to passive extravasation of nanoparticles across the perforated vasculature of tumors [12]. Rapid renal clearance is preferable for radioactive diagnostic nanoparticles to avoid a high radiation burden on healthy organs and tissues, which can be achieved for AuNPs smaller than 6

pharmaceuticals

MDPI

Article

Ac-EAZY! Towards GMP-Compliant Module Syntheses of ^{225}Ac-Labeled Peptides for Clinical Application

Marc Pretze [1,2,*], Falk Kunkel [3], Roswitha Runge [1], Robert Freudenberg [1], Anja Braune [1], Holger Hartmann [1], Uwe Schwarz [4], Claudia Brogsitter [1] and Jörg Kotzerke [1,*]

[1] Department of Nuclear Medicine, University Hospital Carl Gustav Carus, Technical University Dresden, 01307 Dresden, Germany; roswitha.runge@ukdd.de (R.R.); robert.freudenberg@ukdd.de (R.F.); anja.braune@ukdd.de (A.B.); holger.hartmann@ukdd.de (H.H.); claudia.brogsitter@ukdd.de (C.B.)
[2] Molecular Imaging and Radiochemistry, Department of Radiology and Nuclear Medicine, Medical Faculty Mannheim, Heidelberg University, 68167 Mannheim, Germany
[3] Eckert & Ziegler Eurotope, 13125 Berlin, Germany; Falk.Kunkel@ezag.de
[4] Eckert & Ziegler Radiopharma, 38110 Braunschweig, Germany; Uwe.Schwarz@ezag.de
* Correspondence: marc.pretze@ukdd.de (M.P.); Joerg.kotzerke@ukdd.de (J.K.); Tel.: +49-351-458-5417 (M.P.)

Abstract: The application of ^{225}Ac (half-life $T_{1/2}$ = 9.92 d) dramatically reduces the activity used for peptide receptor radionuclide therapy by a factor of 1000 in comparison to ^{90}Y, ^{177}Lu or ^{188}Re while maintaining the therapeutic outcome. Additionally, the range of alpha particles of ^{225}Ac and its daughter nuclides in tissue is much lower (47–85 µm for alpha energies E_α = 5.8–8.4 MeV), which results in a very precise dose deposition within the tumor. DOTA-conjugated commercially available peptides used for endoradiotherapy, which can readily be labeled with ^{177}Lu or ^{90}Y, can also accommodate ^{225}Ac. The benefits are lower doses in normal tissue for the patient, dose reduction of the employees and environment and less shielding material. The low availability of ^{225}Ac activity is preventing its application in clinical practice. Overcoming this barrier would open a broad field of ^{225}Ac therapy. Independent which production pathway of ^{225}Ac proves the most feasible, the use of automated synthesis and feasible and reproducible patient doses are needed. The Modular-Lab EAZY is one example of a GMP-compliant system, and the cassettes used for synthesis are small. Therefore, also the waste after the synthesis can be minimized. In this work, two different automated setups with different purification systems are presented. In its final configuration, three masterbatches were performed on the ML EAZY for DOTA-TATE and PSMA-I&T, respectively, fulfilling all quality criteria with final radiochemical yields of 80–90% for the ^{225}Ac-labeled peptides.

Keywords: actinium-225; TATE; PSMA; module synthesis; endoradiotherapy; GMP

Citation: Pretze, M.; Kunkel, F.; Runge, R.; Freudenberg, R.; Braune, A.; Hartmann, H.; Schwarz, U.; Brogsitter, C.; Kotzerke, J. Ac-EAZY! Towards GMP-Compliant Module Syntheses of ^{225}Ac-Labeled Peptides for Clinical Application. *Pharmaceuticals* **2021**, *14*, 652. https://doi.org/10.3390/ph14070652

Academic Editor: Gerald Reischl

Received: 27 May 2021
Accepted: 2 July 2021
Published: 6 July 2021

1. Introduction

Targeted alpha therapy (TAT) is a promising approach for the treatment of cancer [1]. The use of alpha emitters for cancer therapy has three distinct advantages over conventional therapies with beta emitters: The short range of alpha radiation in human tissue (less than 0.1 mm), corresponding to only a few cell diameters, allows the selective killing of targeted cancer cells while sparing surrounding healthy tissue. At the same time, the high energy (several MeV) of alpha particles and its associated high linear energy transfer leads to a high rate of cell deaths. Consequently, alpha radiation can destroy cells, which otherwise exhibit resistance to treatment with beta or gamma irradiation or chemotherapeutic drugs, and thus can offer a therapeutic option for tumors resistant to conventional therapies. The third is the radiation safety for personnel as ^{225}Ac-therapeutic doses are in the MBq range (~100 kB/kg) compared to several GBq used commonly for ^{90}Y- and ^{177}Lu-therapy. Recent results demonstrating the remarkable therapeutic efficacy of alpha emitters to treat various cancers have underlined the clinical potential of TAT. To date, the chelator DOTA is commonly used for ^{225}Ac-labeling of peptides, antibodies and

European Journal of Nuclear Medicine and Molecular Imaging
https://doi.org/10.1007/s00259-021-05559-x

ORIGINAL ARTICLE

PET/CT imaging of head-and-neck and pancreatic cancer in humans by targeting the "Cancer Integrin" αvβ6 with Ga-68-Trivehexin

Neil Gerard Quigley[1] · Katja Steiger[1] · Sebastian Hoberück[2] · Norbert Czech[3] · Maximilian Alexander Zierke[1] · Susanne Kossatz[4] · Marc Pretze[2] · Frauke Richter[1] · Wilko Weichert[1] · Christian Pox[5] · Jörg Kotzerke[2] · Johannes Notni[1,6]

Received: 14 July 2021 / Accepted: 5 September 2021

Abstract

Purpose To develop a new probe for the αvβ6-integrin and assess its potential for PET imaging of carcinomas.

Methods Ga-68-Trivehexin was synthesized by trimerization of the optimized αvβ6-integrin selective cyclic nonapeptide Tyr2 (sequence: c[YRGDLAYp(*N*Me)K]) on the TRAP chelator core, followed by automated labeling with Ga-68. The tracer was characterized by ELISA for activities towards integrin subtypes αvβ6, αvβ8, αvβ3, and α5β1, as well as by cell binding assays on H2009 (αvβ6-positive) and MDA-MB-231 (αvβ6-negative) cells. SCID-mice bearing subcutaneous xenografts of the same cell lines were used for dynamic (90 min) and static (75 min p.i.) μPET imaging, as well as for biodistribution (90 min p.i.). Structure–activity-relationships were established by comparison with the predecessor compound Ga-68-TRAP(AvB6)$_3$. Ga-68-Trivehexin was tested for in-human PET/CT imaging of HNSCC, parotideal adenocarcinoma, and metastatic PDAC.

Results Ga-68-Trivehexin showed a high αvβ6-integrin affinity (IC_{50} = 0.047 nM), selectivity over other subtypes (IC_{50}-based factors: αvβ8, 131; αvβ3, 57; α5β1, 468), blockable uptake in H2009 cells, and negligible uptake in MDA-MB-231 cells. Biodistribution and preclinical PET imaging confirmed a high target-specific uptake in tumor and a low non-specific uptake in other organs and tissues except the excretory organs (kidneys and urinary bladder). Preclinical PET corresponded well to in-human results, showing high and persistent uptake in metastatic PDAC and HNSCC (SUV_{max} = 10–13) as well as in kidneys/urine. Ga-68-Trivehexin enabled PET/CT imaging of small PDAC metastases and showed high uptake in HNSCC but not in tumor-associated inflammation.

Conclusions Ga-68-Trivehexin is a valuable probe for imaging of αvβ6-integrin expression in human cancers.

Keywords Positron emission tomography · Carcinoma · Integrins · Gallium-68

Neil Gerard Quigley and Katja Steiger contributed equally to this work.

This article is part of the Topical Collection on Translational research.

✉ Johannes Notni
johannes.notni@uk-essen.de

[1] Institute of Pathology, Technische Universität München, Munich, Germany

[2] Klinik und Poliklinik für Nuklearmedizin, Universitätsklinikum Carl Gustav Carus an der Technischen Universität Dresden, Dresden, Germany

[3] Center of Nuclear Medicine and PET/CT Bremen, Bremen, Germany

[4] Department of Nuclear Medicine, University Hospital Klinikum rechts der Isar, and Central Institute for Translational Cancer Research (TranslaTUM), Technical University of Munich, Munich, Germany

[5] Clinic of Internal Medicine, Hospital St. Joseph-Stift Bremen, Bremen, Germany

[6] Experimental Radiopharmacy, Clinic for Nuclear Medicine, University Hospital Essen, Hufelandstr. 55, 45147 Essen, Germany

Published online: 24 September 2021

cancers

MDPI

Article

Molecular Response to Combined Molecular- and External Radiotherapy in Head and Neck Squamous Cell Carcinoma (HNSCC)

Treewut Rassamegevanon [1,2,3,†], Louis Feindt [3,4,†], Lydia Koi [3,4,5], Johannes Müller [3,5], Robert Freudenberg [6], Steffen Löck [1,2,3,4], Wiebke Sihver [7], Enes Çevik [3,5,8], Ariane Christel Kühn [3,9], Cläre von Neubeck [1,2,3,10], Annett Linge [1,2,3,4,11], Hans-Jürgen Pietzsch [7], Jörg Kotzerke [6], Michael Baumann [2,3], Mechthild Krause [1,2,3,4,5,11] and Antje Dietrich [1,2,3,*]

1 German Cancer Consortium (DKTK), Partner Site Dresden, and German Cancer Research Center (DKFZ), 69192 Heidelberg, Germany; Treewut.Rassamegevanon@uniklinikum-dresden.de (T.R.); Steffen.Loeck@OncoRay.de (S.L.); Claere.VonNeubeck@uk-essen.de (C.v.N.); Annett.Linge@uniklinikum-dresden.de (A.L.); Mechthild.Krause@uniklinikum-dresden.de (M.K.)
2 German Cancer Research Center (DKFZ), 69192 Heidelberg, Germany; Michael.Baumann@dkfz.de
3 OncoRay—National Center for Radiation Research in Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Helmholtz-Zentrum Dresden-Rossendorf, 01307 Dresden, Germany; Louis.Feindt@uniklinikum-dresden.de (L.F.); Lydia.Koi@uniklinikum-dresden.de (L.K.); Johannes.Mueller@uniklinikum-dresden.de (J.M.); mcevik15@ku.edu.tr (E.Ç.); ariane_christel.kuehn@mailbox.tu-dresden.de (A.C.K.)
4 Department of Radiotherapy and Radiation Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, 01307 Dresden, Germany
5 Helmholtz-Zentrum Dresden-Rossendorf, Institute of Radiooncology—OncoRay, 01328 Dresden, Germany
6 Department of Nuclear Medicine, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, 01307 Dresden, Germany; Robert.Freudenberg@uniklinikum-dresden.de (R.F.); Joerg.Kotzerke@uniklinikum-dresden.de (J.K.)
7 Helmholtz-Zentrum Dresden-Rossendorf, Institute of Radiopharmaceutical Cancer Research, 01328 Dresden, Germany; w.sihver@hzdr.de (W.S.); h.j.pietzsch@hzdr.de (H.-J.P.)
8 School of Medicine, Koç University, Istanbul 34450, Turkey
9 B CUBE—Center for Molecular Bioengineering, Technische Universität Dresden, 01307 Dresden, Germany
10 Department of Particle Therapy, University Hospital Essen, University of Duisburg-Essen, 45147 Essen, Germany
11 National Center for Tumor Diseases (NCT), Partner Site Dresden, 01307 Dresden, Germany
* Correspondence: antje.dietrich@uniklinikum-dresden.de; Tel.: +49-351-458-7404
† These authors contributed equally to this work.

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Citation: Rassamegevanon, T.; Feindt, L.; Koi, L.; Müller, J.; Freudenberg, R.; Löck, S.; Sihver, W.; Çevik, E.; Kühn, A.C.; von Neubeck, C.; et al. Molecular Response to Combined Molecular- and External Radiotherapy in Head and Neck Squamous Cell Carcinoma (HNSCC). *Cancers* **2021**, *13*, 5595. https://doi.org/10.3390/cancers13225595

Academic Editors: Meritxell Arenas and Pierfrancesco Franco

Received: 23 October 2021
Accepted: 3 November 2021
Published: 9 November 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Simple Summary: Our previous preclinical trial in a head and neck squamous cell carcinoma (HNSCC) xenograft model showed a high potential for the improvement of curative treatment outcome upon the combination treatment of a radiolabeled (Yttrium-90) anti-EGFR antibody (Cetuximab) and external radiotherapy. We aim to elucidate the molecular response of HNSCC tumors upon this combination. Here, we show that the combination treatment leads to an increasing number and complexity of DNA double strand breaks. The upregulation of $p21^{cip1/waf1}$ expression and cleaved caspase-3 suggest a blockage of cell cycle transition and an induction of programmed cell death. Collectively, a complex interplay between molecular mechanisms involved in cell death induction, cell cycle arrest, and DNA double strand break repair accounts for the beneficial potential using Yttrium-90-Cetuximab in combination with external radiotherapy.

Abstract: Combination treatment of molecular targeted and external radiotherapy is a promising strategy and was shown to improve local tumor control in a HNSCC xenograft model. To enhance the therapeutic value of this approach, this study investigated the underlying molecular response. Subcutaneous HNSCC $FaDu_{DD}$ xenografts were treated with single or combination therapy (X-ray: 0, 2, 4 Gy; anti-EGFR antibody (Cetuximab) (un-)labeled with Yttrium-90 (^{90}Y)). Tumors were excised 24 h post respective treatment. Residual DNA double strand breaks (DSB), mRNA expression of DNA damage response related genes, immunoblotting, tumor histology, and immunohistological

Interim PET Evaluation in Diffuse Large B-Cell Lymphoma Using Published Recommendations: Comparison of the Deauville 5-Point Scale and the ΔSUV_{max} Method

Jan Rekowski[1], Andreas Hüttmann[2], Christine Schmitz[2], Stefan P. Müller[3], Lars Kurch[4], Jörg Kotzerke[5], Christiane Franzius[6], Matthias Weckesser[7], Frank M. Bengel[8], Martin Freesmeyer[9], Andreas Hertel[10], Thomas Krohn[11], Jens Holzinger[12], Ingo Brink[13], Uwe Haberkorn[14], Fonyuy Nyuyki[15], Daniëlle M.E. van Assema[16], Lilli Geworski[17], Dirk Hasenclever[18], Karl-Heinz Jöckel[1], and Ulrich Dührsen[2]

[1]Institut für Medizinische Informatik, Biometrie, und Epidemiologie, Universitätsklinikum, Essen, Germany; [2]Klinik für Hämatologie, Universitätsklinikum, Essen, Germany; [3]Klinik für Nuklearmedizin, Universitätsklinikum, Essen, Germany; [4]Klinik und Poliklinik für Nuklearmedizin, Universitätsklinikum, Leipzig, Germany; [5]Klinik für Nuklearmedizin, Universitätsklinikum Carl Gustav Carus, Dresden, Germany; [6]Zentrum für moderne Diagnostik (Zemodi), Zentrum für Nuklearmedizin und PET/CT, Bremen, Germany; [7]Klinik für Nuklearmedizin, Universitätsklinikum, Münster, Germany; [8]Klinik für Nuklearmedizin, Medizinische Hochschule, Hannover, Germany; [9]Klinik für Nuklearmedizin, Universitätsklinikum, Jena, Germany; [10]Klinik für Diagnostische und Therapeutische Nuklearmedizin, Klinikum, Fulda, Germany; [11]Klinik für Nuklearmedizin, Universitätsklinikum, Aachen, Germany; [12]Institut für Diagnostische Radiologie, Neuroradiologie, und Nuklearmedizin, Johannes Wesling Klinikum, Minden, Germany; [13]Klinik für nuklearmedizinische Diagnostik und Therapie, Ernst von Bergmann Klinikum, Potsdam, Germany; [14]Radiologische Klinik und Poliklinik, Universitätsklinikum, Heidelberg, Germany; [15]Klinik für Nuklearmedizin, Brüderkrankenhaus St. Josef, Paderborn, Germany; [16]Department of Nuclear Medicine, VU University Medical Center, Amsterdam, The Netherlands; [17]Stabsstelle Strahlenschutz und Abteilung Medizinische Physik, Medizinische Hochschule, Hannover, Germany; and [18]Institut für Medizinische Informatik, Statistik, und Epidemiologie, Universität Leipzig, Leipzig, Germany

The value of interim ^{18}F-FDG PET/CT (iPET)–guided treatment decisions in patients with diffuse large B-cell lymphoma (DLBCL) has been the subject of much debate. This investigation focuses on a comparison of the Deauville score and the change-in-SUV_{max} (ΔSUV_{max}) approach—2 methods to assess early metabolic response to standard chemotherapy in DLBCL. **Methods:** Of 609 DLBCL patients participating in the PET-Guided Therapy of Aggressive Non-Hodgkin Lymphomas trial, iPET scans of 596 patients originally evaluated using the ΔSUV_{max} method were available for post hoc assessment of the Deauville score. A commonly used definition of an unfavorable iPET result according to the Deauville score is an uptake greater than that of the liver, whereas an unfavorable iPET scan with regard to the ΔSUV_{max} approach is characterized as a relative reduction of the SUV_{max} between baseline and iPET staging of less than or equal to 66%. We investigated the 2 methods' correlation and concordance by Spearman rank correlation coefficient and the agreement in classification, respectively. We further used Kaplan–Meier curves and Cox regression to assess differences in survival between patient subgroups defined by the prespecified cutoffs. Time-dependent receiver-operating-characteristic curve analysis provided information on the methods' respective discrimination performance. **Results:** Deauville score and ΔSUV_{max} approach differed in their iPET-based prognosis. The ΔSUV_{max} approach outperformed the Deauville score in terms of discrimination performance—most likely because of a high number of false-positive decisions by the Deauville score. Cutoff-independent discrimination performance remained low for both methods, but cutoff-related analyses showed promising results. Both favored the ΔSUV_{max} approach, for example, for the segregation by iPET response, where the event-free survival hazard ratio was 3.14 (95% confidence interval, 2.22–4.46) for ΔSUV_{max} and 1.70 (95% confidence interval, 1.29–2.24) for the Deauville score. **Conclusion:** When considering treatment intensification, the currently used Deauville score cutoff of an uptake above that of the liver seems to be inappropriate and associated with potential harm for DLBCL patients. The ΔSUV_{max} criterion of a relative reduction in SUV_{max} of less than or equal to 66% should be considered as an alternative.

Key Words: diffuse large B-cell lymphoma; early metabolic response to therapy; interim PET; Deauville score; deltaSUVmax approach

J Nucl Med 2021; 62:37–42
DOI: 10.2967/jnumed.120.244145

Diffuse large B-cell lymphoma (DLBCL) is the most common subtype of non-Hodgkin lymphoma, showing a widely varying response to standard chemoimmunotherapy usually encompassing 6 cycles of cyclophosphamide, doxorubicin, vincristine, prednisone, and, for patients positive for the cluster of differentiation molecule 20, rituximab (rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisone [R-CHOP]) (*1*). Although approximately one third of all patients progress after 6 cycles of R-CHOP, a substantial proportion of patients might be overtreated (*2*,*3*). Thus, risk-adapted treatment approaches are urgently needed but demand precise and reliable tools to guide therapy.

^{18}F-FDG PET has been shown to predict outcome in aggressive lymphomas (*4*). After 1–4 cycles of treatment, an interim PET/CT

Received Mar. 2, 2020; revision accepted Apr. 9, 2020.
For correspondence or reprints contact: Jan Rekowski, Institut für Medizinische Informatik, Biometrie, und Epidemiologie, Universitätsklinikum Essen, Universität Duisburg-Essen; Hufelandstraße 55, 45147 Essen, Germany.
E-mail: jan.rekowski@uk-essen.de
Published online May 8, 2020.

Published online: 2021-02-03

Third generation radioimmunoassay (RIA) for TSH receptor autoantibodies (TRAb) – one step less, similar results?

Drittgenerations – Radioimmunoassay (RIA) für TSH-Rezeptor-Autoantikörper (TRAK) – ein Schritt weniger, gleiche Ergebnisse?

OPEN ACCESS

Authors

Johannes J. Roggenbuck[1], Grit Zarske[2], Peter Schierack[3], Gerd Wunderlich[1], Karsten Conrad[4], Joerg Kotzerke[1], Dirk Roggenbuck[2, 3, 5*], Klaus Zöphel[1, 6*]

Affiliations

1 Department of Nuclear Medicine, University Hospital Carl Gustav Carus, TU Dresden, Germany
2 Medipan GmbH, Berlin/Dahlewitz, Germany
3 Institute of Biotechnology, Faculty Environment and Natural Sciences, Brandenburg University of Technology, Senftenberg, Germany
4 Institute of Immunology, University Hospital Carl Gustav Carus, TU Dresden, Germany
5 Faculty of Health Sciences, Joint Faculty of the Brandenburg University of Technology Cottbus – Senftenberg, the Brandenburg Medical School Theodor Fontane and the University of Potsdam, Germany
6 Department of Nuclear Medicine, Klinikum Chemnitz gGmbH, Chemnitz, Germany

Key words

thyroid, autoantibodies, TSH receptor autoantibody, Graves' disease, Hashimoto's thyroiditis

Schlüsselwörter

Schilddrüse, Autoantikörper, TSH-Rezeptor-Autoantikörper, Morbus Basedow, Hashimoto-Thyreoiditis

received 25.02.2020
accepted 01.10.2020

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Nuklearmedizin 2021; 60: 38–46
DOI 10.1055/a-1277-5972
ISSN 0029-5566

Georg Thieme Verlag KG, Rüdigerstraße 14, 70469 Stuttgart, Germany

Correspondence

Prof. Dr. med. Klaus Zöphel
Department of Nuclear Medicine, Klinikum Chemnitz gGmbH, Flemmingstr. 2, 09116 Chemnitz, Germany
Tel.: +49/3 71/33 33 31 00
Fax: +49/3 71/33 33 37 55
klaus.zoephel@skc.de

ABSTRACT

Aim TSH-receptor (TSHR)-autoantibody (TRAb) is the serological hallmark of Graves' disease (GD). Recently, 3rd-generation radioimmunoassays (RIA) employing monoclonal TRAb such as M22 or T7 instead of TSH for the inhibition of human TRAb binding with solid-phase TSHR (coated tubes) have been introduced into laboratory routine.

Methods As current assays typically employ a consecutive incubation of patient serum and labelled monoclonal TRAb, automation of TRAb RIA is a challenge. Thus, the assay procedure using human TSHR-coated tubes and the mouse monoclonal TRAb T7 was modified by combining both steps. The novel one-step method was compared with its corresponding consecutive 3rd-generation RIA by investigating 304 individuals encompassing 102 patients with active GD (GD_a), 43 patients with GD after successful therapy (GD_t), 31 with Hashimoto's disease (HD), 28 with non-autoimmune thyroid diseases (NAITD) and 100 healthy subjects (HS).

Results With the new method, the incubation time was shortened by approximately one hour. Both 3rd-generation RIAs did not reveal a significantly different assay performance by comparing areas under the curve (AUC) with receiver operating characteristics curve analysis (AUC one-step: 0.94, AUC two-step: 0.96, $p > 0.05$, respectively). The two-step TRAb RIA demonstrated sensitivity and specificity values of 87.5 % and 96.2 %, respectively, whereas the one-step revealed 84.6 % and 96.2 %, respectively.

Conclusion One-step 3rd-generation RIA may be used for the reliable detection of TRAb. The shorter and easier assay design may improve its use and enable automation in routine nuclear medicine laboratories.

* These authors share senior authorship.

EJA

Eur J Anaesthesiol 2021; **38:**32–40

ORIGINAL ARTICLE

Comparative effects of neurally adjusted ventilatory assist and variable pressure support on lung and diaphragmatic function in a model of acute respiratory distress syndrome

A randomised animal study

Martin Scharffenberg*, Lillian Moraes*, Andreas Güldner*, Robert Huhle, Anja Braune, Ines Zeidler-Rentzsch, Michael Kasper, Christiane Kunert-Keil, Thea Koch, Paolo Pelosi, Patricia R.M. Rocco, Marcelo Gama de Abreu† and Thomas Kiss†

BACKGROUND Variable assisted mechanical ventilation has been shown to improve lung function and reduce lung injury. However, differences between extrinsic and intrinsic variability are unknown.

OBJECTIVE To investigate the effects of neurally adjusted ventilatory assist (NAVA, intrinsic variability), variable pressure support ventilation (Noisy PSV, extrinsic variability) and conventional pressure-controlled ventilation (PCV) on lung and diaphragmatic function and damage in experimental acute respiratory distress syndrome (ARDS).

DESIGN Randomised controlled animal study.

SETTING University Hospital Research Facility.

SUBJECTS A total of 24 juvenile female pigs.

INTERVENTIONS ARDS was induced by repetitive lung lavage and injurious ventilation. Animals were randomly assigned to 24 h of either: 1) NAVA, 2) Noisy PSV or 3) PCV (n=8 per group). Mechanical ventilation settings followed the ARDS *Network* recommendations.

MEASUREMENTS The primary outcome was histological lung damage. Secondary outcomes were respiratory variables and patterns, subject-ventilator asynchrony (SVA), pulmonary and diaphragmatic biomarkers, as well as diaphragmatic muscle atrophy and myosin isotypes.

RESULTS Global alveolar damage did not differ between groups, but NAVA resulted in less interstitial oedema in dorsal lung regions than Noisy PSV. Gas exchange and SVA incidence did not differ between groups. Compared with Noisy PSV, NAVA generated higher coefficients of variation of tidal volume and respiratory rate. During NAVA, only 40.4% of breaths were triggered by the electrical diaphragm signal. The IL-8 concentration in lung tissue was lower after NAVA compared with PCV and Noisy PSV, whereas Noisy PSV yielded lower type III procollagen mRNA expression than NAVA and PCV. Diaphragmatic muscle fibre diameters were smaller after PCV compared with assisted modes, whereas expression of myosin isotypes did not differ between groups.

CONCLUSION Noisy PSV and NAVA did not reduce global lung injury compared with PCV but affected different biomarkers and attenuated diaphragmatic atrophy. NAVA increased the respiratory variability; however, NAVA yielded a similar SVA incidence as Noisy PSV.

TRIAL REGISTRATION This trial was registered and approved by the Landesdirektion Dresden, Germany (AZ 24-9168.11-1/2012-2).

Published online 7 July 2020

From the Pulmonary Engineering Group, Department of Anaesthesiology and Intensive Care Medicine, University Hospital Dresden at the Technische Universität Dresden, Dresden, Germany (MS, LM, AG, RH, AB, IZR, TKo, MGdA, TKi), Laboratory of Pulmonary Investigation, Carlos Chagas Filho Institute of Biophysics, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil (LM, PRMR), Department of Nuclear Medicine, University Hospital Dresden at the Technische Universität Dresden (AB), Institute of Anatomy, Medical Faculty Carl Gustav Carus at the Technische Universität Dresden (MK), Department of Orthodontics, University Hospital Dresden at the Technische Universität Dresden, Dresden, Germany (IZR, CKK), Department of Surgical Sciences and Integrated Diagnostics, University of Genoa (PP) and Department of Anesthesia and Intensive Care, San Martino Policlinico Hospital, IRCCS for Oncology and Neurosciences, Genoa, Italy (PP)

Correspondence to Dr Thomas Kiss, MD, Department of Anaesthesiology and Intensive Care Medicine, University Hospital Carl Gustav Carus, Technische Universität Dresden, Fetscherstr. 74, 01307 Dresden, Germany
Tel: +49 35 145 80; e-mail: Thomas.Kiss@ukdd.de

* Martin Scharffenberg, Lillian Moraes and Andreas Güldner are equally contributing first authors.
† Marcelo Gama de Abreu and Thomas Kiss share senior authorship.

DOI:10.1097/EJA.0000000000001261

Published OnlineFirst December 29, 2020; DOI: 10.1158/1078-0432.CCR-20-1775

Final Results of the Prospective Biomarker Trial PETra: [^{11}C]-MET-Accumulation in Postoperative PET/MRI Predicts Outcome after Radiochemotherapy in Glioblastoma

Annekatrin Seidlitz[1,2,3,4], Bettina Beuthien-Baumann[5,6], Steffen Löck[1,3,4], Christina Jentsch[1,2,3], Ivan Platzek[7], Klaus Zöphel[5], Annett Linge[1,2,3,4], Jörg Kotzerke[5], Jan Petr[8,11], Jörg van den Hoff[5,8], Jörg Steinbach[8,12], Dietmar Krex[9], Gabriele Schmitz-Schackert[9], Monique Falk[1,2,4], Michael Baumann[1,3,10,13], and Mechthild Krause[1,2,3,4,10]

ABSTRACT

Purpose: This prospective trial investigates the association of time to recurrence (TTR) in glioblastoma with [^{11}C]methionine (MET) tracer uptake before postoperative radiochemotherapy (RCT) aiming to guide radiotherapy boost regions.

Experimental Design: Between 2013 and 2016, 102 patients with glioblastoma were recruited. RCT was performed with concurrent and adjuvant temozolomide to a total dose of 60 Gy. Tumor residues in postresection PET and MRI were together defined as gross tumor volumes for radiotherapy treatment planning. [^{11}C]methionine (MET)-PET/MRI was performed before RCT and at each follow-up.

Results: The primary hypothesis of a longer TTR for patients without increased tracer accumulation in postoperative MET-PET was confirmed in 89 patients. With 18.9 months (95% confidence interval, 9.3–28.5 months), median TTR was significantly ($P < 0.001$) longer for patients without ($n = 29$, 32.6%) as compared with 6.3 months (3.6–8.9) for patients with MET accumulation ($n = 60$, 67.4%) in pre-RCT PET. Although MRI often did not detect all PET-positive regions, an unfavorable impact of residual tumor in postsurgical MRI ($n = 38$, 42.7%) on TTR was observed [4.6 (4.2–5.1) vs. 15.5 months (6.0–24.9), $P < 0.001$]. Significant multivariable predictors for TTR were MRI positivity, PET-positive volume, and O^6-methylguanine DNA methyltransferase (MGMT) hypermethylation.

Conclusions: Postsurgical amino acid PET has prognostic value for TTR after RCT in glioblastoma. Because of the added value of the metabolic beyond the pure structural information, it should complement MRI in radiotherapy planning if available with reasonable effort, at least in the context of maximal therapy. Furthermore, the spatial correlation of regions of recurrence with PET-positive volumes could provide a bioimaging basis for further trials, for example, testing local radiation dose escalation.

Introduction

Postoperative radiotherapy remains a mainstay clinical treatment for glioblastoma. The introduction of combined postoperative radiochemotherapy (RCT) more than 10 years ago (1) has for the first time led to a noticeable proportion of patients surviving 5 years after primary treatment. For prediction of the general prognosis of patients with glioblastoma, the recursive partitioning analysis classification in its original (2) or modified version (3) including patient's age, performance status, extent of surgery, tumor grading, and brain function, is widely used. Increasing evidence supports additional value of molecular markers and presence of isocitrate dehydrogenase (IDH) mutation and 1p/19q codeletion is now part of the World Health Organization (WHO) 2016 classification (4). However, none of these markers has become standard for treatment stratifications in clinical routine for glioblastoma (5). Several studies have tested escalated radiotherapy doses using recent techniques to improve outcome of radiotherapy in glioblastoma (6–14) and most of them showed higher local control rates and survival (7–11, 13, 15), sometimes at the price of higher toxicity. However, randomized data are missing, and some of

[1]Department of Radiation Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany. [2]National Center for Tumor Diseases (NCT), Partner Site Dresden, Germany: German Cancer Research Center (DKFZ), Heidelberg, Germany; Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany, and Helmholtz Association/Helmholtz-Zentrum Dresden - Rossendorf (HZDR), Dresden, Germany. [3]OncoRay - National Center for Radiation Research in Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Helmholtz-Zentrum Dresden - Rossendorf, Dresden, Germany. [4]German Cancer Research Center (DKFZ), Heidelberg and German Cancer Consortium (DKTK) partner site, Dresden, Germany. [5]Department of Nuclear Medicine, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany. [6]German Cancer Research Center (DKFZ), Department of Radiology, Heidelberg, Germany. [7]Institute of Radiology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany. [8]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Radiopharmaceutical Cancer Research, Dresden, Germany. [9]Department of Neurosurgery, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany. [10]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Radiooncology, Dresden, Germany. [11]Department of Biomedical Engineering, Rochester Institute of Technology, Rochester, New York. [12]Department of Chemistry and Food Chemistry, TU Dresden, Dresden, Germany. [13]German Cancer Research Center (DKFZ), Heidelberg, Germany.

Note: Supplementary data for this article are available at Clinical Cancer Research Online (http://clincancerres.aacrjournals.org/).

Corresponding Author: Annekatrin Seidlitz, Medicine Faculty and University Hospital Carl Gustav Carus, Dresden 01309, Germany. Phone 49351-458-15693; E-mail: annekatrin.seidlitz@uniklinikum-dresden.de

Clin Cancer Res 2021;27:1351–60

doi: 10.1158/1078-0432.CCR-20-1775

Medizinische Klinik
Intensivmedizin und Notfallmedizin

Originalien

Med Klin Intensivmed Notfmed
https://doi.org/10.1007/s00063-021-00814-3
Eingegangen: 8. Dezember 2020
Überarbeitet: 24. Februar 2021
Angenommen: 7. März 2021

Redaktion
M. Buerke, Siegen

Felix Wanek[1] · Stefanie Meißner[2] · Sebastian Nuding[2] · Sebastian Hoberück[3] · Karl Werdan[2] · Michel Noutsias[2] · Henning Ebelt[4]

[1] Klinik für Anästhesiologie und Intensivmedizin, Katholisches Krankenhaus Erfurt, Erfurt, Deutschland
[2] Universitätsklinik und Poliklinik für Innere Medizin III, Universitätsklinikum der Martin-Luther-Universität, Halle, Deutschland
[3] Klinik und Poliklinik für Nuklearmedizin, Universitätsklinikum Carl Gustav Carus, Dresden, Deutschland
[4] Klinik für Kardiologie und internistische Intensivmedizin, Erfurt, Deutschland

Einfluss des therapeutischen Temperaturmanagements auf den klinischen Verlauf bei intrahospital reanimierten Patienten

Eine retrospektive Analyse

In der Europäischen Union erleiden jährlich etwa 275.000 Menschen einen Herzstillstand. Zwar kann bei optimaler Versorgung bei knapp der Hälfte der Patienten ein Spontankreislauf erfolgreich reetabliert werden, dennoch versterben trotz initialer Stabilisierung im weiteren Verlauf bis zu 75 % der Patienten [1, 2]. Die Gründe für dieses vergleichsweise geringe Überleben sind vielfältig. Der Prozess, den ein erfolgreich reanimierter Patient durchmacht, wurde früher unter dem Begriff der *Postreanimationskrankheit* subsumiert und von Vladimir Negovsky in den 1970er-Jahren geprägt [3]. Heute spricht man bevorzugt vom Post Cardiac Arrest Syndrome (PCAS; [4]). Mit der Wiedererlangung eines Spontankreislaufs (ROSC) nach primär erfolgreicher Reanimation beginnen Management und Therapie des PCAS, das in seiner Komplexität mit anderen systemisch-inflammatorischen Erkrankungen, wie etwa der Sepsis, zu vergleichen ist [2]. Neben einer systemischen Entzündungsreaktion bestimmen die Myokarddysfunktion sowie die zerebrale Ischämie dabei maßgeblich Morbidität und Mortalität der Patienten [4, 5]. Natürlich betrifft die Ischämie und die daraufhin folgende Reperfusion alle Organe, und Gewebe des Körpers, insbesondere solche mit hohem Sauerstoffumsatz sind als erste von der Schädigung betroffen [2]. Innerhalb weniger Minuten erschöpfen sich die zerebralen Adenosintriphosphatspeicher [6]. Als Hauptmechanismus der Schädigung gilt eine Überladung der Zellen mit Kalzium während der Reperfusion sowie das vermehrte Aufkommen freier Sauerstoffradikale [7]. Grundsätzlich kann bei einem Herz-Kreislauf-Stillstand zwischen dem Vorliegen einer kardialen und einer nichtkardialen Genese (4H: primäre Hypoxie, Hypovolämie, Hyper- oder Hypokaliämie) unterschieden werden. Des Weiteren ist im Zuge einer Reanimation an die HITS zu denken – also an Herzbeuteltamponade, Intoxikation, ein thromboembolisches Ereignis sowie ein Spannungspneumothorax. Hier steht nicht die primäre myokardiale Ischämie als Ursache des Herz-Kreislauf-Stillstands im Vordergrund, sie entsteht lediglich konsekutiv als Folge einer anderen Organdysfunktion [8].

Die erste multizentrische Studie, die sich mit Patienten nach primär erfolgreicher Reanimation beschäftigte, wurde 1953 veröffentlicht: Bei den insgesamt 1200 Fällen, die für diese Studie ausgewertet wurden, betrug die Gesamtsterblichkeit 72 % [9]. Diese Sterblichkeit hat sich trotz aller Fortschritte der medizinischen Diagnostik und Therapie über die Jahre nicht wesentlich geändert; so zeigten Daten von über 24.000 ausgewertet Fällen aus England aus dem Jahr 2007 eine Gesamtsterblichkeit von über 70 % [10].

Im Jahre 2002 wurde die erste randomisierte kontrollierte Studie zum Einfluss eines therapeutischen Temperaturmanagements (TTM) auf die Prognose von Patienten nach stattgehabter Reanimation veröffentlicht. Hier zeigte sich in der Interventionsgruppe (43 Patienten, 55,8 %) ein insgesamt besseres neurologisches Outcome [11]. Auch aktuellere Studien belegen einen positiven Effekt dieses Verfahrens [12]. In den folgenden Jahren sind allerdings auch Untersuchungen veröffentlich worden, die die Effektivität des therapeutischen Temperaturmanagements zumindest anzweifeln oder gar einen schädlichen Einfluss postulieren [13, 14]. Bei der spezifischen Betrachtung von Patienten, die einen intrahospitalen Herz-Kreislauf-Stillstand („intrahosptial cardiac arrest“ – IHCA) erleiden, zeigt sich eine besonders kontroverse Studienlage. In einer Untersuchung von Wang et al. aus dem Jahre 2020 konnte bei

Published online: 20 April 2021

Abdominal Radiology (2021) 46:2107–2114
https://doi.org/10.1007/s00261-020-02886-9

SPLEEN

Bilateral adrenal enhancement revised—adrenal-to-spleen ratio as an appropriate mortality predictor

Robert Winzer[1] · Ron Martin[1] · Daniel Kaiser[2] · Jan Christian Baldus[1] · Sebastian Hoberück[3] · Ralf-Thorsten Hoffmann[1] · Dieter Fedders[1]

Received: 13 October 2020 / Revised: 25 November 2020 / Accepted: 27 November 2020 / Published online: 11 December 2020

Abstract

Purpose To investigate whether adrenal gland radiodensities alone or set in relation to either the inferior vena cava (IVC) or the spleen can predict hospital mortality in intensive care unit patients.

Methods One hundred thirty-three intensive care patients (90 males, age: 66.3 ± 14.5 years) with an acute clinical deterioration were included in this retrospective analysis. CT attenuation (Hounsfield units) of adrenal glands, IVC, and spleen was evaluated by 2 radiologists separately. Adrenal-to-IVC and adrenal-to-spleen ratios were calculated. Receiver operating characteristic (ROC) analysis, combined with the Matthews correlation coefficient (MCC) as a classifier, was used to assess which parameter is the most suitable for short-term, intermediate-term, and overall mortality prediction. Interrater agreement was assessed using intraclass correlation coefficient (ICC).

Results The highest discriminative power to distinguish between deceased and survivors was found for the adrenal gland-to-spleen ratio for the 72-h mortality. A threshold of > 1.4 predicted 72-h mortality with a sensitivity of 79.31% and a specificity of 98.08% (area und the curve (AUC) = 0.94; $p < 0.0001$; MCCs = 0.81). The positive likelihood ratio was 41; the positive predictive value was 92.20%. Adrenal gland-to-spleen ratio was also best suited to predict the 24-h and overall mortality. ICCs of HU measurements in adrenal gland, IVC, and spleen indicated a high interrater agreement (ICC 0.95–0.99).

Conclusions To conclude, the adrenal-to-spleen ratio in CT in portal venous phase may serve as an imaged-based predictor for short, intermediate, and overall mortality and as reproducible prognostic marker for patient outcome.

Keywords Hospital mortality · Prognosis · Mortality prediction · Intensive care unit · Adrenal enhancement

Introduction

The term CT hypoperfusion complex [1–5] includes various imaging features seen in the context of profound hypoperfusion and circulatory shock. In many patients with shock, the adrenal glands show intense enhancement as an imaging correlate of an increased release of catecholamines [6]. Catecholamines are crucial endogenous agents for increasing blood flow to the vital organs, which are typically triggered by a significant drop in blood pressure. By releasing these hormones, adrenal glands play a central role in the circulatory regulation in states of shock.

Several study groups defined adrenal enhancement as bilateral adrenal attenuation values higher than those of the inferior vena cava (IVC) [2–5, 7–11]. Boos et al. [10] and Schek et al. [11] showed that adrenal enhancement is associated with a poor outcome. However, Schek's and Boos' inclusion of the IVC in their definition of hyperattenuating raises questions about IVC's suitability as a reference region. Due to pooling, e.g., in right ventricular failure with reflux of contrast agent into the inferior vena cava, and flow phenomena or the presence of catheters, it may be challenging to attain reproducible results in close-by regions or in repeated readings. Furthermore, no explanation for the choice of the IVC as reference region is given in any of the studies.

Lubner et al. [1] described that parenchymal abdominal organs such as the spleen may also be used as reference. The

✉ Robert Winzer
robert.winzer@uniklinikum-dresden.de

[1] Department of Radiology, Dresden University Hospital, Fetscherstr. 74, 01307 Dresden, Germany

[2] Department of Neuroradiology, Dresden University Hospital, Fetscherstr. 74, 01307 Dresden, Germany

[3] Department of Nuclear Medicine, Dresden University Hospital, Fetscherstr. 74, 01307 Dresden, Germany

Clinical Imaging 70 (2021) 56–60

Contents lists available at ScienceDirect

Clinical Imaging

journal homepage: www.elsevier.com/locate/clinimag

Body Imaging

Adrenal glands enhancement in computed tomography as predictor of short-and intermediate term mortality in critically ill patients

Robert Winzer [a,*], Ron Martin [a], Jens-Peter Kühn [a], Jan Christian Baldus [a], Danilo Seppelt [a], Felix Matthias Heidrich [b], Sebastian Hoberück [c], Ralf-Thorsten Hoffmann [a], Dieter Fedders [a]

[a] Dresden University Hospital, Department of Radiology, Fetscherstr. 74, 01307 Dresden, Germany
[b] Department for Internal Medicine and Cardiology, TU Dresden, Fetscherstr. 76, 01307 Dresden, Germany
[c] Dresden University Hospital, Department of Nuclear Medicine, Fetscherstr. 74, 01307 Dresden, Germany

ARTICLE INFO

Keywords:
Hospital mortality
Prognosis
ROC curve
Mortality prediction, intensive care units
Adrenal enhancement

ABSTRACT

Purpose: To investigate whether adrenal gland radiodensities alone or compared to the inferior vena cava (IVC) can correctly predict hospital mortality in patients in intensive care.
Methods: One hundred thirteen intensive care patients (76 males, age: 67.2 ± 14.0 years) with an acute clinical deterioration were included in this retrospective analysis. For the venous and the arterial phase CT attenuation (Hounsfield units) of adrenal glands and IVC was ROI-based evaluated by two radiologists separately. ROC analysis, combined with the Matthews Correlation Coefficient (MCC) as a classifier, was used to assess whether one of the parameters is suitable for predicting short and medium-term mortality and, if so, which parameter is most appropriate. Interrater agreement was assessed using the intraclass correlation coefficient.
Results: Twenty-one patients (18.6%) died within three days in the ICU. Measurements of the adrenal glands in the portal venous phase yielded the highest discriminative power (=AUC) to distinguish between deceased and survivors. A threshold ratio of >95.5 predicted 72-hour mortality with a sensitivity of 76.19% and a specificity of 92.39% (AUC = 0.84; $p < 0.0001$). The positive likelihood ratio was 10.1; the positive predictive value was 69%. The predictive power for 24-hour mortality was slightly lower. Venous adrenal-to-IVC ratios and arterial measurements as a whole were substantially less suitable. All intraclass correlation coefficients indicated a high interrater agreement.
Conclusions: In the portal venous phase, hyperattenuating of the adrenal glands on contrast-enhanced CT can predict short and intermediate ICU mortality quite well and may serve as a reproducible prognostic marker for individual patient outcomes.

1. Introduction

CT hypoperfusion complex [1–5] is a term that comprises a variety of imaging features seen in the context of profound hypoperfusion and mostly life-threatening conditions such as shock. In many patients with shock, the adrenal glands show intense enhancement as an imaging correlate of an increased release of catecholamines [6]. Catecholamines are crucial endogenous agents for increasing blood flow to the vital organs brain and heart, a mechanism that is typically triggered by a significant drop in blood pressure. By releasing these hormones, adrenal glands play a central role in the circulatory regulation in states of shock.

Several study groups defined adrenal enhancement as bilateral adrenal attenuation values greater than in the inferior vena cava (IVC) [2–5,7–11]. Boos et al. [10] and Schek et al. [11] associated adrenal enhancement with poor outcome. However, Schek's and Boos' definition of hyperattenuation raises questions about the IVC's suitability as a reference region especially in the arterial phase [10]. Due to pooling, e.g. in right ventricular failure with reflux of contrast agent into the inferior vena cava, and flow phenomena or the presence of catheters, it may be difficult to obtain reproducible results in nearby regions or with repeated measurements when contrast agent is administered via the veins of the lower extremities.

In patients with shock, Boos et al. [10] associated an increased adrenal enhancement in the bolus triggered arterial phase with poor outcome within 14 days. Deceased Patients showed on average higher density values of the adrenal glands in comparison to survivors. In the

* Corresponding author.
E-mail address: robert.winzer@uniklinikum-dresden.de (R. Winzer).

https://doi.org/10.1016/j.clinimag.2020.10.033
Received 5 June 2020; Received in revised form 13 September 2020; Accepted 17 October 2020
Available online 23 October 2020

Strahlenther Onkol (2021) 197:19–26
https://doi.org/10.1007/s00066-020-01654-4

ORIGINAL ARTICLE

Evaluation of response using FDG-PET/CT and diffusion weighted MRI after radiochemotherapy of pancreatic cancer: a non-randomized, monocentric phase II clinical trial—PaCa-DD-041 (Eudra-CT 2009-011968-11)

Carolin Zimmermann[1,2,3,4] · Marius Distler[1,2,3,4] · Christina Jentsch[2,3,4,5] · Sophia Blum[6] · Gunnar Folprecht[2,3,4,7] · Klaus Zöphel[8] · Heike Polster[1] · Esther G. C. Troost[2,3,4,5,9,10] · Nasreddin Abolmaali[5,6,9,11] · Jürgen Weitz[1,2,3,4] · Michael Baumann[2,3,4,12] · Hans-Detlev Saeger[1] · Robert Grützmann[13]

Received: 13 January 2020 / Accepted: 2 June 2020 / Published online: 7 July 2020

Abstract

Background Pancreatic cancer is a devastating disease with a 5-year survival rate of 20–25%. As approximately only 20% of patients diagnosed with pancreatic cancer are initially staged as resectable, it is necessary to evaluate new therapeutic approaches. Hence, neoadjuvant (radio)chemotherapy is a promising therapeutic option, especially in patients with a borderline resectable tumor. The aim of this non-randomized, monocentric, prospective, phase II clinical study was to assess the prognostic value of functional imaging techniques, i.e., [^{18}F]2-fluoro-2-deoxy-D-glucose positron emission tomography/computed tomography (FDG-PET/CT) and diffusion weighted magnetic resonance imaging (DW-MRI), prior to and during neoadjuvant radiochemotherapy.

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s00066-020-01654-4) contains supplementary material, which is available to authorized users.

✉ Carolin Zimmermann
carolin.zimmermann@uniklinikum-dresden.de

1 Department of General, Thoracic and Vascular Surgery, University Hospital Carl Gustav Carus, Technische Universität Dresden, 01307 Dresden, Germany

2 National Center for Tumor Diseases (NCT), Partner Site Dresden, German Cancer Research Center (DKFZ), Heidelberg, Germany

3 Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany

4 Association/Helmholtz-Zentrum Dresden – Rossendorf (HZDR), Dresden, Germany

5 Department of Radiotherapy and Radiation Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany

6 Department of Radiology, Technische Universität Dresden, Dresden, Germany

7 Medical Department I, University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany

8 Department of Nuclear Medicine, Klinikum Chemnitz gGmbh, Chemnitz, Germany

9 OncoRay – National Center for Radiation Research in Oncology, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Helmholtz-Zentrum Dresden – Rossendorf, Dresden, Germany

10 German Cancer Consortium (DKTK) Partner Site Dresden, German Cancer Research Center (DKFZ), Heidelberg, Germany

11 Department of Radiology, Municipal Hospital and Academic Teaching Hospital of the Technical University Dresden, Dresden-Friedrichstadt, Germany

12 German Cancer Research Center (DKFZ) Heidelberg, Heidelberg, Germany

13 Department of Surgery, University Hospital Erlangen, Erlangen, Germany

Radiotherapy and Oncology 155 (2021) 204–211

Contents lists available at ScienceDirect

Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com

Original Article

Generation of biological hypotheses by functional imaging links tumor hypoxia to radiation induced tissue inflammation/glucose uptake in head and neck cancer

Sebastian Zschaeck [a,b,c,d,e,*], Klaus Zöphel [b,c,f], Annekatrin Seidlitz [a,b,c], Daniel Zips [a,g,h], Jörg Kotzerke [b,c,f], Michael Baumann [a,b,c,i,j,k], Esther G.C. Troost [a,b,c,i,j], Steffen Löck [a,b,l,1], Mechthild Krause [a,b,c,i,j,1]

[a] Department of Radiotherapy and Radiation Oncology, University Hospital Carl Gustav Carus, Technische Universität Dresden; [b] German Cancer Consortium (DKTK), Dresden, Germany, and German Cancer Research Center (DKFZ) Heidelberg; [c] OncoRay, National Center for Radiation Research in Oncology, Medical Faculty and University Hospital Carl Gustav Carus, Technische Universität Dresden, Helmholtz-Zentrum Dresden, Rossendorf; [d] Charité Universitätsmedizin Berlin, Department of Radiation Oncology; [e] Berlin Institute of Health (BIH), Berlin; [f] Department of Nuclear Medicine, Medical Faculty and University Hospital Carl Gustav Carus, Dresden; [g] German Cancer Consortium (DKTK), Tübingen, Germany, and German Cancer Research Center (DKFZ) Heidelberg; [h] Department of Radiation Oncology, University Hospital and Medical Faculty, Eberhard Karls University Tübingen; [i] Helmholtz-Zentrum Dresden - Rossendorf, Institute of Radiooncology; [j] National Center for Tumour Diseases (NCT), Partner Site Dresden, Germany: German Cancer Research Center (DKFZ), Heidelberg, Germany, Faculty of Medicine and University Hospital Carl Gustav Carus, Technische Universität Dresden, Dresden, Germany, and Helmholtz Association/Helmholtz-Zentrum Dresden, Rossendorf (HZDR), Dresden; [k] German Cancer Research Center (DKFZ), Heidelberg; and [l] OncoRay, National Center for Radiation Research in Oncology, Biostatistics and Modeling in Radiation Oncology group, Medical Faculty and University Hospital Carl Gustav Carus, Technische Universität Dresden, Helmholtz-Zentrum Dresden, Rossendorf, Germany

ARTICLE INFO

Article history:
Received 17 July 2020
Received in revised form 9 October 2020
Accepted 21 October 2020
Available online 24 October 2020

Keywords:
FDG PET
FMISO PET
Inflammation
Hypoxia
Head and neck cancer
Radiotherapy

ABSTRACT

Background and purpose: Positron emission tomography (PET) is a functional imaging modality which is able to deliver tracer specific biological information, e.g. about glucose uptake, inflammation or hypoxia of tumors. We performed a proof-of-principle study that used different tracers and expanded the analytical scope to non-tumor structures to evaluate tumor-host interactions.

Materials and methods: Based on a previously reported prospective imaging study on 50 patients treated with curative intent chemoradiation (CRT) for head and neck squamous cell carcinoma, PET-based hypoxia and normal tissue inflammation measured by repeat 18F-fluoromisonidazole (FMISO) PET and 18F-fluorodesoxyglucose (FDG) PET, respectively, were correlated using the Spearman correlation coefficient R. PET parameters determined before and during CRT (week 1, 2 and 5), were associated with local tumor control and overall survival.

Results: Tumor hypoxia at all measured times showed an inverse correlation with mid-treatment FDG-uptake of non-tumor affected oral (sub-)mucosa with R values between −0.35 and −0.6 (all $p < 0.05$). Mucosal FDG-uptake and mucosal hypoxia correlated positively but weaker (R values between 0.2 and 0.45). More tumor hypoxia in FMISO-PET (week 2) and less FDG-uptake of (sub-)mucosa in FDG-PET (week 4) were significantly associated with worse LC (FMISO TBR_{peak}: HR = 1.72, $p = 0.030$; FDG SUV_{mean}: HR = 0.23, $p = 0.025$) and OS (FMISO TBR_{peak}: HR = 1.71, $p = 0.007$; FDG SUV_{mean}: HR = 0.30, $p = 0.003$). Multivariable models including both parameters showed improved performance, suggesting that these modalities still bear distinct biological information despite their strong inter-correlation.

Conclusion: We report first clinical evidence that tumor hypoxia is inversely correlated with increased FDG-uptake during radiation, potentially expressing inflammation. This observation merits further research and may have important implication for future research on tumor hypoxia and radioimmunology. Our study demonstrates that functional imaging can be utilized to assess complex tumor-host interactions and generate novel biological insights *in vivo vero*.

Tumor hypoxia is an established negative prognostic marker in almost all solid tumors, including head and neck squamous cell carcinomas (HNSCC) [1]. Methods to assess intra-tumoral hypoxia include the classical gold standard of invasive measurement by Eppendorf electrodes, the use of serological biomarkers, particularly Osteopontin, and various hypoxia gene signatures [2–5]. For radiotherapy, the use of hypoxia specific positron emission tomography (PET) tracers is especially valuable as this modality delivers

* Corresponding author.
E-mail address: Sebastian.Zschaeck@charite.de (S. Zschaec.
[1] Shared senior authorship.

https://doi.org/10.1016/j.radonc.2020.10.030
0167-8140/