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RADIOLABELED DRUGS AND PET IMAGING FOR PERSONALIZED MEDICINE

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Therapeutic advances in cancer care have revolutionized the oncological landscape. One of the major advancements in this regard is owed to the development of targeted drug therapies. However, for successful clinical treatment of cancer patients with these drugs, proper identification of target (e.g. receptor) expression is essential. To have knowledge about target expression, tumour biopsies have to be obtained, which is often limited by practical issues, including the inability to reach the tumour, low yields of malignant tumour cells, or tumour heterogeneity. Positron emission tomography (PET), a powerful and accessible imaging technique, enables to overcome these limitations. PET can visualize and quantify tumour specific uptake of radiolabelled targeting drugs, allowing for characterization of their pharmacological and pharmacokinetic behaviour. For visualization tumour targeting with PET, tyrosine kinase inhibitors (TKIs) and monoclonal antibodies (mAbs) are most frequently used therapies. Due to receptor mutations in tumour tissue, the affinity of drugs for receptors may change, often resulting in limited clinical response. Therefore, to select the best drug for treatment for each patient, we radioactively labelled several TKIs and mAbs that are in clinical use and performed PET studies to determine pharmacological parameters, including receptor binding. PET also plays an important role to optimize dose schemes in treatment of cancer patients. Cancer patients mostly use different drugs simultaneously. Optimization of co-administration of drugs is essential for successful tumour treatment. Several examples demonstrating the role of quantitative PET imaging for receptor expression and mutation in tumour tissue, but also optimization of chemotherapeutic dose schemes will be discussed. Microdosing-PET provides a means for optimizing drug treatment in individual cancer patients, and as such would be an important step towards personalized medicine.

Biography

Harry Hendrikse has studied Pharmacy at the State University of Utrecht (Pharm D). He completed his PhD at the State University Groningen (The Netherlands) by measuring MDR in tumour tissue using positron emission tomography (PET). Subsequently he was Postdoctoral Fellow at the PET Center of the University of Washington Medical Center (Seattle, USA). He has specialized as Hospital Pharmacist and Clinical Pharmacologist at the University Hospital Groningen (UMCG) where he worked for more than 10 years. Now he is working at VU University Medical Center Amsterdam (VUmc) where he is Staff Member of the Departments of Clinical Pharmacology and Pharmacy, Radiology and Nuclear Medicine. He is also Professor in Clinical Radiopharmacology VU University Medical Center Amsterdam. He focusses on Labelling and Clinical PET Evaluation of Small Molecules and Monoclonal Antibodies in Oncology. He has published many peer reviewed manuscripts. He is a (Board) Member of several scientific (inter)national programs and Member of the Editorial Board of several scientific journals.

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