Kurzzusammenfassung:
A review of the concept of Radiomics will highlight the potentials of integrated diagnostics. Radiomics relates imaging based quantitative phenotyping to genomics, laboratory medicine, and risk scores etc., and ultimately to therapy outcomes and further clinically relevant parameters. Recently, the term Holomics was introduced to highlight the comprehensive multidisciplinary approach, and tremendous advances in machine intelligence were demonstrated and successfully applied to medical imaging problems, with mammography being one of the important fields of applications. Deep learning and convolutional neural networks will play an important role in next generations of automated imaging biomarker extraction and big data analysis systems. We will provide a few examples of what is already feasible today and also describe additional technological components required for successful clinical implementation, such as precise anatomical coregistration of multimodal and longitudinal medical images. For instance, the localized assessment of disease progress over time will be greatly facilitated by a combination of prior-to-current image registration and pattern quantification. Even deformation correction can be learnt by convolutional neural networks, leading to super-fast deformable image registration approaches. Not least, we will discuss the requirements regarding infrastructure for the validation and interactive exploration of evolving imaging biomarkers. While deep learning is often found robust to incomplete and error-prone training data, we emphasize the importance of high quality and representative validation data.

Lernziele:
• Verständnis des Zusammenspiels von Deep Learning, Radiomics und Bildregistrierung
• Verständnis der Voraussetzungen für die erfolgreiche Umsetzung
• Einblick in neuere Anwendungen maschinellem Lernens