Screening for brain metastases (BM) in patients (pts) with stage III non-small cell lung cancer (NSCLC), magnetic resonance imaging (MRI) or dedicated contrast-enhanced computed tomography (dCE-CT)? A prospective observational study

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Background: In all NSCLC guidelines it is advised to screen stage III pts eligible for therapy (tx) with curative intent for BM, preferably by MRI, or otherwise a dCE-CT. However, MRI access can be problematic. dCE-CT brain is frequently incorporated in the staging18Fluodeoxoglucose-positron-emission-tomography (18FDG-PET)-CE-CT scan. The additive value of a brain MRI after a dCE-CT brain is unknown.
Methods: Observational prospective multicentre study (3 Dutch centers, NTR3628). Inclusion: all consecutive neurologically asymptomatic stage III (based on 18FDG-PET) NSCLC pts with a dCE-CT brain incorporated in the 18FDG-PET and an additional brain MRI. Demographics, brain imaging results and development of BM in follow-up (FU) were collected. Both MRI and 18FDG-PET-CE-CT were reviewed by an experienced neuroradiologist. Primary endpoint: % pts with BM on MRI without suspect lesions on dCE-CT. 118 pts were needed to show a clinically relevant considered difference of 2%. Secondary endpoints: % of pts with BM on dCE-CT, % of pts with BM ≤ 1 year of a negative staging MRI.

Results: 118 pts were enrolled between 12-’12 until 12-’16, and were followed until 12-’17. During the year of FU 30 extra pts were included. In total 148 pts were included: 59% male; mean age 68 years, 84% WHO PS 0-1 and 44% adenocarcinoma. Median time (range) between 18FDG-PET-CE-CT and MRI was 13 (0-57) days. 5 of the first 118 pts (4.2%) had a solitary BM on MRI despite no suspect brain lesions on dCE-CT. In total 7154 pts (4.5%) had a BM on MRI without suspect lesions on dCE-CT. In retrospect, in one of these 7 pts a solitary BM could be identified on the 18FDG-PET-CE-CT. 16 (7%) of the screened pts with extracranial stage III were excluded because BM were already detected on dCE-CT brain. Of the 118 pts with a FU of 1 year, 10 (8.5%) developed BM ≤ 1 year after a negative staging brain MRI.

Conclusions: Although in 7% of stage III NSCLC pts BM were detected on staging dCE-CT, MRI brain detected BM in an additional 4.5% of pts which we consider clinically relevant in this pt population. Within 1 year after a negative staging MRI, 8.5% of pts developed BM.

Clinical trial identification: NTR3628.

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