Late gadolinium hyperintensity (LGH) of solid focal liver lesions on MRI with extracellular contrast agents is typically considered a “benign” finding seen most commonly with hemangiomas, but has also been observed with colorectal liver metastases (CRLM). In the first part of this thesis, we determined the prevalence of LGH in CRLM on MRI with extracellular contrast agents. In a retrospective cohort of 134 patients with 232 pathology-confirmed CRLMs, the prevalence of LGH in CRLMs was 47.8% (95% CI: 39.7%-56.0%). It is also known that some CRLMs demonstrate tumour fibrosis, a finding that is associated with long-term survival. LGH with extracellular contrast agents in CRLMs may be due to leakage of contrast and progressive accumulation in the extracellular space of fibrotic tumours. In the second part of this thesis, we determined whether LGH is associated with tumour fibrosis and overall survival in patients with CRLM using extracellular contrast agents. In a retrospective cohort of 121 surgical patients who received preoperative MRI with extracellular contrast agents after chemotherapy, LGH was associated with tumour fibrosis (R=0.43, p<0.001) and with improved survival with a hazard ratio of 0.32 (95% CI: 0.14-0.75, p=0.008). If LGH occurs due to leakage of extracellular contrast into fibrotic...
tumour, then LGH would not occur in CRLM using intravascular contrast agents, which are larger molecules bound to albumin and stay within the vascular space. Therefore, in the final part of the thesis, we determined the prevalence of LGH with intravascular contrast agents and determined the diagnostic accuracy of liver MRI using intravascular contrast agents. In a prospective cohort of 48 patients with known colorectal cancer who were referred for an MRI of the liver, we performed MRI with an intravascular contrast agent. The prevalence of LGH was 11.9% (95% CI: 4.0% to 19.9%). The diagnostic accuracy of MRI with the intravascular contrast agent for diagnosing CRLM was high with a per-lesion sensitivity and specificity of 0.99 and 0.91 respectively. In summary, LGH of CRLM on MRI with extracellular contrast agents is common and is associated with tumour fibrosis and overall survival. In contrast, LGH of CRLMs on MRI with intravascular contrast agents is uncommon, leading to an excellent diagnostic accuracy of MRI performed with intravascular contrast agents for diagnosing CRLM, and may be a useful diagnostic problem-solving tool.