Since its emergence, magnetic resonance imaging (MRI) has evolved into higher field strengths because of the higher image quality (namely, the signal-to-noise ratio) inherent of high fields. However, in the last years, low- and ultralow- MR field strengths have re-gained interest, opening up a whole world of new applications in this area, thanks to the new advances in hardware and software in MRI. Recent studies have shown that clinical practice might benefit of more affordable, portable machines accessible for developing countries, emergency rooms, intensive care units (ICU), and even surgeries. In this review, the principal applications of low and ultralow-field MRI systems will be provided by focusing on the differences in contrast mechanisms with respect to high-field MRI devices. Understanding and exploiting the characteristics of contrast mechanisms —proton density (PD), longitudinal relaxation time T1, transverse relaxation time T2, diffusion and contrast agents— permits researchers to eradicate some limitations intrinsic of low-fields and achieve the highest image quality possible in low-field MRI. The studies have shown that lowering the field strength decreases not only the SNR as previously reported, but also the relaxation times —specially the T1 values—, which resulted in the majority of the cases in a lower contrast in the images. These limitations in image quality can be, however, counteracted with the new advancements in image acquisition and processing, like artificial intelligence. The multiple advantages outweigh the limitations in low and ultralow-field MRI systems, and extend the possibilities of MRI into new fields.