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Total-Body PET: System Design and Applications

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The current generation of commercial PET scanners has excellent performance and diagnostic image quality, but the system sensitivity and dynamic imaging capability are limited by the scanner's axial length. In recent years there has been an interest in developing whole-body PET scanners with much longer AFOV that not only increase the system sensitivity but can also image the whole-body of a patient without bed translation. Currently there are at least two commercial scanners offering at least 1 m long axial field-of-view (AFOV). An important outcome of very high sensitivity is the potential to significantly reduce routine clinical scan times which can be beneficial in reducing patient motion artifacts and increase patient throughput. Alternately, the injected dose can be reduced that is beneficial in areas such as pediatric imaging and serial imaging of patients for monitoring response to therapy. Whole-body imaging with large axial coverage will allow one to perform dynamic imaging for pharmacokinetic studies over multiple organs. In this presentation we will present the design concepts underlying the development of long AFOV systems (two commercial and one research), followed by a few example studies illustrating the imaging capabilities and clinical/research potential of such systems. Finally, new design concepts that aim to reduce the cost of these system will be introduced

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