Cerenkov radiation was first observed and explained approximately 80 years ago. While the phenomenon has long been exploited in particle physics experiments, only in the last decade has it found use in nuclear medicine. Somewhat surprisingly, it was discovered that useful visible luminescence was created by the typical activity levels in preclinical small animal nuclear imaging. In addition to its direct use in imaging, Cerenkov radiation has also been studied more recently as a method for improved timing in positron emission tomography detectors. The detection of prompt Cerenkov radiation provides coincident timing resolution at the level of a few hundred picoseconds when measured using scintillation detectors, and it is being explored as a method for time-of-flight capable timing in the transparent semiconductor detector material TlBr.