

## **Development of Portable Device for Transmitting Respiratory & ECG Gating in List-Mode PET Data Acquisition**

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Respiratory motion has been known to lower the quality of images and distort the source of location in most medical imaging modalities. This paper is aiming at developing a respiratory motion detection device for correcting motion-related inaccuracies by utilizing two strain gauges with an elasticized belt in PET-CT imaging. We designed a simple electronic circuit which consists of respiratory motion, ECG detection and trigger generation parts. The respiratory motion was measured by constantan linear strain gauges (CAS Inc.), a resistance of  $120\Omega \pm 0.2\%$ , which are made of Cu 60% and Ni 40% and covered by poly-imide material. The strain gauges are attached to elasticized belts which can wrap either chest or abdomen depending on patients' breathing status. An ECG signal is synchronized with a respiratory motion signal. The images acquired from Philips PET scanner in list-mode for 10 minutes by injecting <sup>13</sup>N-ammonia are corrected by respiratory and ECG gating method employing the strain gauge and the RR interval of ECG signals. We found out that a strain gauge reflected patients' respiratory motions accurately even if the motions have minimal variations. Also, respiration gating method and ECG gating method we adopted were effective in correcting the images obtained in list-mode. Our findings show that using strain gauges can be a useful way to minimize the artifacts induced by respiratory motion effects. In addition, the device we designed has more advantages than other corresponding devices in that it is not only more accurate but also portable and much cheaper. Future studies will need to upgrade the electronic circuit and to improve an algorithm of the sliding method.

**Keywords :** Respiratory Gating, ECG Gating, Motion Effect