# Appendix A

A patient´s  is assumed vary due to two independent effects; breath hold variations and intrinsic heart movements. By this assumption, the sum of breath hold associated heart edge displacements, , and the intrinsic heart movement associated heart edge displacements,  equals the total heart edge displacement from a patient´s  mean for all occasions. Since each burst is acquired during a short period of time (2.5 seconds),  is the major contributor to the  variation within a burst. Each burst mean equals and is the sum of all effects that influence the heart position except intrinsic heart movements, i.e. different combinations of diaphragm and thorax expansions. Both  and  are orthogonal to the reference line (AD-line) and both can be positive or negative.

To achieve a high precision estimate of the general heart edge variance in the population, the mean of the heart edge variance over all patients was calculated and reported as the pooled standard deviation. For a single bed position, the , measured in frame  at burst  for patient , is denoted as , where runs over the bursts belonging to the bed position of interest. The mean  for burst and patient , i.e. , is given by

 ,

where  is the number of frames containing data for patient  in burst . The mean  for patient  is then given by

 ,

where  represents the total number of bursts for patient. Normally,  equals 12 (4 bursts per bed position in 3 CT sessions) and  equals 5 although exceptions occur. The number of frames for all patients equals , where patients.

With this notation, we can express the estimate of the total variance of  for a bed position including all patients through

 .

As we assume this variation in  to be composed of the independent variations of and 

 

where

 

is within-burst associated pooled standard deviation of , and

 

is the between-burst associated pooled standard deviation of . In a similar manner, the  was calculated for the thoracic wall.