Using AEC to Prescribe the Desired Image Quality

**AEC and Image Quality**

- **Smart mA** system guarantees the prescribed level of image quality. It is like Siemens’ CARE Dose 4D system’s capability to determine the correct mA level for each location on a patient’s body. Higher-quality images mean fewer scans and shorter patient exposure times, thereby increasing patient comfort and satisfaction.

**CAREDose4D – Variable Noise**

- GE’s method of automatically adjusting the mA based on a variable Noise Index may cause overexposure or underexposure of the tube current. As a result, some systems use a constant noise index to maintain the desired image quality. This results in a trade-off between image quality and patient exposure.

**Smart mA – Constant Noise**

- Smart mA is designed to maintain a constant signal level on the images, with reference to the scout image. This approach is based on the principle of determining the appropriate tube current for each location of the patient’s body, which is affected by patient size and anatomy. The Noise Index value approximately equals the desired noise level on the 5 mm images. For this reason, Smart mA is particularly useful for patients with anatomical variations and different body sizes.

### Important Considerations in the Clinical Use of Smart mA

- **Scout**
  - The scout is used to determine the appropriate tube current for each location. It is advisable to perform a scout with the tube current at the highest value to ensure accurate image quality.

- **Noise Index and Slice Thickness**
  - For smaller patients, Smart mA can reduce the tube current too much, resulting in a noisy slice on the images. For larger patients, on the other hand, the tube current can be higher than necessary, leading to longer scan times. This trade-off between image quality and scan time is a critical consideration when using Smart mA in clinical practice.

### Tube Capacity and Large Patients

- Larger patients may require a higher noise level on the images to maintain the desired image quality. This results in a trade-off between image quality and patient exposure. For some systems, the use of a constant noise index may cause overexposure or underexposure of the tube current.

### Implications of Smart mA’s Constant Noise Strategy

- **Scout**
  - The scout is used to determine the appropriate tube current for each location. It is advisable to perform a scout with the tube current at the highest value to ensure accurate image quality.

- **Scan Range (z)**
  - For larger patient sizes or higher signal levels, higher noise levels are accepted in order to maintain the desired image quality. This results in a trade-off between image quality and patient exposure.

### Noise Index and Slice Thickness

- **mA**
  - The noise index is a measure of the amount of image noise that is present on the images. It is used to determine the appropriate tube current for each location on the patient’s body, which is affected by patient size and anatomy. The Noise Index value is calculated based on the measurement of the noise level at the factory, which is related to the signal level at the desired signal level.

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