MARCH 2011 – BIOMEDICAL ENGINEERING AND MEDICAL IMAGING

CPD questionnaires must be completed online via www.cpdjournals.org.za. After submission you can check the answers and print your certificate.

EVALUATING FRACTURE HEALING USING DIGITAL X-RAY IMAGE ANALYSIS

1. Radiostereometric analysis relies on the use of (choose one):
- A. Quantitative computed tomography
- B. Dual energy X-ray absorptiometry
- C. Manual stiffness assessment
- D. Tantalum beads and a calibration frame
- E. Intensive computer modelling.

2. Stiffness tests should be made (choose one):
- A. Manually by clinicians
- B. Only in computer models
- C. In two orthogonal directions
- D. In only one plane
- E. Using axial loading only.

3. True (A) or false (B):
DEXA can be used to monitor fracture stiffness.

FACIAL IMAGE ANALYSIS TO DETECT GESTATIONAL ALCOHOL EXPOSURE

4. True (A) or false (B):
The facial dysmorphology associated with fetal alcohol syndrome becomes more pronounced as children grow into adolescence.

5. Which of the following is not an advantage of the use of images in anthropometry (choose one):
- A. Data acquisition is faster
- B. The risk of injury to the patient from measuring instruments is removed
- C. Data analysis always takes place during data acquisition
- D. Inaccuracies due to deformation of the facial surface by measuring instruments are eliminated
- E. Patients are not required to keep still for long periods.

6. Which one of the following is not a feature of statistical shape analysis in the study of facial dysmorphology:
- A. Data are derived from facial images
- B. The geometric arrangement of facial landmarks is lost
- C. Average facial shapes can be compared across study groups
- D. Differences in facial symmetry may be assessed across study groups
- E. Facial shapes may be used in syndrome diagnosis.

ADVANCED MAGNETIC RESONANCE IMAGING OF THE BRAIN

7. The BOLD signal arises from (choose one):
- A. Increased ratio of oxy- to deoxyhaemoglobin that accompanies neuronal activation
- B. Increased ratio of deoxy- to oxyhaemoglobin that accompanies neuronal activation
- C. Brain electrical dipoles generated by neuronal depolarisation
- D. Increased diffusion that accompanies neuronal activation
- E. None of the above.

8. Fractional anisotropy is a measure of (choose one):
- A. The amount of diffusion
- B. The extent to which the diffusion is directional
- C. The direction of the diffusion
- D. Radial diffusivity
- E. Axial diffusivity.

9. True (A) or false (B):
Functional MRI and DTI are used in presurgical planning to localise brain regions and white matter tracts that are important for critical functions.

CARDIAC MAGNETIC RESONANCE IMAGING

10. A shortfall of MRI compared with other imaging techniques is (choose one):
- A. Imaging cardiac function
- B. Coronary artery imaging
- C. Black blood imaging
- D. Perfusion imaging
- E. It is invasive.

11. True (A) or false (B):
Cardiac imaging is normally done in standard transverse, sagittal and coronal imaging planes.

12. Delayed enhancement imaging is useful for assessing (choose one):
- A. Fat distribution
- B. Blood flow
- C. Left ventricular morphology
- D. Myocardial deformation
- E. Myocardial viability.

NEW DEVELOPMENTS IN MEDICAL IMAGING TO DETECT BREAST CANCER

13. Dense breasts (choose one):
- A. Are easy to image with digital X-rays
- B. Lead to an increase in sensitivity when using mammography
- C. Are difficult to image with ultrasound
- D. Are associated with breast cancer
- E. Have a BI-RADS score of 1 or 2.

14. Multimodality imaging of the breast (choose one):
- A. Refers to all the different types of X-ray imaging
- B. Always combines digital breast tomosynthesis and radionuclide imaging
- C. Has the potential to increase sensitivity
- D. Is a method based on terahertz waves
- E. Necessarily implies an increase in ionising radiation.

15. True (A) or false (B):
The 'D' in the acronym CAD stands for 'difference'.

SHEDDING LIGHT ON THE BRAIN WITH NEAR-INFRARED SPECTROSCOPY

16. Continuous wave near-infrared spectroscopy cannot be used for (choose one):
- A. Measuring changes in oxyhaemoglobin and deoxyhaemoglobin concentration
- B. Monitoring oxygenation in the brain, breast and muscles
- C. Measuring absolute haemoglobin concentrations
- D. Measuring changes in blood volume (total haemoglobin)
- E. Measuring relative concentrations of cytochrome oxidase.

17. True (A) or false (B):
Near-infrared spectroscopy could replace functional magnetic resonance imaging because it provides the same information and is suitable for use in women and children.

18. True (A) or false (B):
Near-infrared spectroscopy has been used to investigate the regulation of emotion in pregnancy.

COMPUTER-AIDED DIAGNOSIS IN CHEST RADIOGRAPHY

19. Which one of the following is not a feature of chest radiographs:
- A. They are difficult to interpret
- B. They are characterised by overlapping anatomical structures
- C. Their texture can be analysed by computer algorithms to detect interstitial disease
- D. They are an important tool in the diagnosis of childhood tuberculosis in endemic settings
- E. Computer-aided methods for detecting tuberculosis in chest radiographs are well established.

20. True (A) or false (B):
The main purpose of current computerised diagnostic systems in chest radiography is to assist radiologists in their interpretation and improve diagnostic accuracy.

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