Quiz for Week 14 - Questions

Question 1. a) Outline the embryology of the heart.
   b) Which processes need to fail to cause septal defects or malformation of the great vessels?

Question 2. a) List the four pathological features that characterise Fallot's tetralogy.
   b) Briefly describe how these cause cyanosis.

Question 3. Explain the function of the foramen ovale and ductus arteriosus.

Question 4. What are the functional effects of a ductus arteriosus failing to close at birth?

Question 5. What are the main pitfalls in randomised controlled trials?


Question 7. What are the predictors of a successful vaccination program?

Question 8. a) What is the likelihood of foetal infection in cases of maternal infection with rubella in the first trimester of pregnancy?
   b) List the most common congenital defects that occur as a result of intrauterine rubella infection. At what stage of gestation are these most likely? Why?

STOP!
DON'T TURN THE PAGE UNTIL YOU HAVE WORKED ON THESE QUESTIONS IN MONDAY'S PBL TUTORIAL, OR ATTEMPTED WRITTEN ANSWERS YOURSELF.
**Quiz for Week 14 – Answer Guides**

**Question 1.**

a) Outline the embryology of the heart.

b) Which processes need to fail to cause septal defects or malformation of the great vessels?

This is a big question – a full page and ten minutes would be needed to do it any justice.

a) The main points are:

* Fusion of the two cardiac tubes to form the single primitive heart, which commences to beat around day 22.
* Looping of the tube to form the precursors of the four definitive chambers, in the correct spatial relationship. This is complete by about day 28.
* Remodelling of the arterial and venous systems to provide separate pulmonary and systemic circuits.
* Remodelling and septation of the atria, with the flap-valve of the foramen ovale providing the right to left shunt needed for the foetal circulatory pattern.
* Ventricular septation and remodelling allowing the two ventricles to operate separately and align with their outflow tracts. In the arterial system, the ductus arteriosus diverts blood from the pulmonary circuit to the systemic. AV valves form along with their cordae bracing their edges to the papillary muscle extensions of the myocardium.
* Pacemaker and conduction systems form early, taking over from the ventricular muscle as pacemaker when the atria are developing.

b) Some mention of the specific defects arising from failure of rotation or failure of septation, etc, could be appropriate, depending on the time allotted and the context of the PBE in which this question was embedded.

**Question 2.**

a) List the four pathological features that characterise Fallot’s tetralogy.

c) Briefly describe how these cause cyanosis.

a) The four features are:

* Ventricular septal defect
* Over-riding aorta
* Pulmonary artery stenosis
* Right ventricular hypertrophy

b) Pulmonary artery stenosis alters the pressure in the right ventricle and results in a right-to-left shunt of deoxygenated blood through the septal defect into the left ventricle which then enters the systemic arterial circulation through the aorta. Deoxygenated blood is also taken directly into the aorta because it over-rides the septal defect.

**Question 3.** Explain the function of the foramen ovale and ductus arteriosus.

In antenatal life, the oxygenated blood from the placenta crosses through the FO to the left heart and is pumped on to the head and arms via the aorta. The output from the right ventricle cannot pass through the collapsed lungs and diverts from the pulmonary artery to the aorta through the DA, then on to perfuse the hind body and the placenta.

**Question 4.** What are the functional effects of a ductus arteriosus failing to close at birth?

Increased pulmonary blood flow and a dramatic murmur that is both systolic and diastolic. The important point is that if this is the only abnormality, the patient will NOT be cyanosed. (Cyanosis may occur in adult life if untreated because the pulmonary hypertension can damage the vessels resulting in reversal of the shunt in addition to pulmonary hypertension. Another good reason for learning to use a stethoscope! )
Question 5. What are the main pitfalls in randomised controlled trials?

Groups not comparable/properly randomised; measurement bias; placebo effects.


Temporal relationship, dose-response relationship, strength of the association, specificity, consistency, biological plausibility, coherence of evidence.

Question 7. What are the predictors of a successful vaccination program?

- Vaccine which reliably produces long lasting immunity;
- Organism with stable antigenic profile (compare measles with influenza);
- Public education to promote / increase compliance rates;
- Importance of the disease in public health terms - burden of illness, esp. chronic sequelae.

Question 8. a) What is the likelihood of foetal infection in cases of maternal infection with rubella in the first trimester of pregnancy?

   c) List the most common congenital defects that occur as a result of intrauterine rubella infection. At what stage of gestation are these most likely? Why?

a) 20%

b) The most common are cataract, cardiac defects and deafness and occur in the first 5 weeks’ gestation – the most susceptible organogenic period for the eye, internal ear, heart and brain.