Parvovirus b19: a different kind of pathogen

Blood transfusions save lives. There is no other way to put it. There is no other way tostressits importance. Without this service there would be no other way to save those who are victims of gunshot wounds, accidents that resulted in major blood loss, surgeries that require transfusion and many more medical procedures that require the availability of safe blood.

As mentioned earlier blood banks have reached a level of sophistication that can assure safe blood processing, sterilisation, storage and finally transfusion. In information found in the 12th International Convocation on Immunology one can see that in the 20th century it is almost impossible to find infected blood such as those having HIV, Hepatitis B and C viruses in blood banks (C. J. van Oss, 1995).

Yet, in the same convention, the delegates had to agree that there are still pathogens that could not be eliminated using conventional methods. And one of those pathogens is called Parvovirus B19, which is also known as human parvovirus. It is therefore important to test for the presence of Parvovirus B19 in donated blood. The importance of which will be seen later as introduction of the virus to at risk patients can be fatal.

Parvovirus B19

According to Broliden, Tolfvenstam, & Norbeck (2006) “ B19 is thought to exclusively infect humans, and shows a pronounced tropism for erythroid precursors.” Moreover, they added that with regards to infection shows a seasonal variation in temperature climates, “...being more common during the winter and early spring [...] B19 is normally transmitted through the respiratory route, but can also be transmitted vertically from the mother to

the foetus, through BM and organ tranplantations, and via transfused blood products” (Broliden, Tolfvenstam, & Norbeck, 2006).

A more technical description of the virus can be found in Murphy and Pamphilon’s work and the authors made the following remarks concerning the human parvovirus: The parvoviruses are one of the smallest DNA viruses that infect humans. They are very stable non-enveloped viruses that are resistant to many chemical and physical inactivation techniques. Parvovirus B19 is the only definite member of the genus erythrovirus – the virus replicates in erythroid progenitor cells (1995). In the world of Pediatrics, Katie Barnes highlights the following attributes of the virus:

1. Parvovirus B19 (human parvovirus) is the causative agent for erythema infectiosum or fifth disease so named because it was the fifth disease to be described with similar rashes like measles, rubella, scarlet fever and roscola.
2. It appears commonly as an erythermatous, macular, papular rash in a patient that otherwise is a febrile and well appearing.
3. Due to the ever-present nature of the virus, community outbreaks are common. Infection is possible throughout the year.
4. Infection can result in transient aplastic crisis (TAC) among children with hereditary haemolytic anaemia like sickle cell disease, spherocytosis and thalassaemia or marked immunosuppression.
5. B19 infection among pregnant women has been linked to fetal infection and subsequent pregnancy loss and spontaneousabortion.

6. B19 infection is widespread and occurs worldwide. School-aged children are most frequently affected and highest incidence can be found among children between 5 to 15 years of age (2003).

In addition to the above here is another facet of the virus that informs on those who are at high risk when infected with B19: it does interfere with red cell production in the marrow; and a recipient with a compensated haemolytic anaemia may have a very abrupt and dangerous fall in haemoglobin when exposed to this virus. An immunologically impaired recipient of the virus may be unable to eliminate the virus, and severe chronic anaemia may result (C. J. van Oss, 1995).

Detection

Detecting the presence of B19 virus in donated blood would not be an easy task. As described earlier the human parvovirus is one of the smallest DNA viruses ever found (Murphy & Pamphilon, 1995). Peterlana et al (2006) described some of the standard assays that was used for detecting the presence of B19:

1. Dot Blot Hybridization – this uses cloned viral DNA and was found to be sensitive to 104 viral particles.
2. Nucleic Acid AmplificationTechnology

Schneider et al., (2005) do stand by the result of real-time Polymerase Chain Reaction procedure. This was carried out using a LightCycler – a Parvovirus B19 Quantification Kit from Roche Diagnostics. A similar approach was described by Koppelman and Cuypers that would soon be standard European practice, “… testing with a quantitative PV-B19 NAT (nucleic acid amplification technology) assay” (2002).