

I NEED TO KNOW ABOUT PLASMA FRACTIONATION

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What is plasma?

Although blood looks red, it is composed of cells suspended in straw-coloured liquid called plasma. Plasma can be separated and used for many different medical applications.

How do we obtain plasma?

Plasma is taken from donors when whole blood is donated, or by plasmapheresis, where only plasma is taken. The plasma may be used as Fresh Frozen Plasma (FFP) for replacement of clotting factors. However, most plasma is used for products derived from plasma fractionation.

Why is plasma fractionated?

Plasma contains thousands of different proteins, however only about 20 of these are used to produce therapeutic plasma products. These fit into three classes:

- immunoglobulins – used to enhance immune response to disease and treat auto-immunity
- clotting factors – used to treat haemophilia and other bleeding disorders, and
- albumin – used to treat fluid loss or supplement low albumin levels.

How is plasma fractionated?

Plasma is a 'soup' of proteins – so small they can be seen only by using electron microscopes. We owe the science to American chemist Dr Edwin Cohn, who discovered in the 1940s that proteins could be selectively extracted from plasma if it was at just the right combination of temperature, pH, ethanol and salt concentration. By adjusting all these factors, Cohn found he could purify immunoglobulin and albumin 'fractions'. A modified Cohn's method is still used today.

Where is plasma fractionated?

Frozen plasma is trucked and air-freighted weekly from all over Australia to CSL Bioplasma in Melbourne. In 2011/12 Australians donated 502 tonnes of plasma for fractionation.

Safety first

Each unit of plasma is tested for blood-borne viruses at the Blood Service and sent to CSL Bioplasma where it is tested again. Thousands of individual donations are thawed, and



pooled, to begin making each batch of plasma product. There are also dedicated virus inactivation procedures performed on each batch.

How is Australian plasma fractionated?

CSL Bioplasma uses a purification method known as chromatography. The plasma is passed through stainless steel cylinders (called 'columns', pictured) with absorbent material that binds to the required proteins. The plasma derivatives are then specifically removed from the columns, in purified form.

Plasma products and the future

Some genetically engineered (recombinant) clotting factors are now available giving patients a choice of product. Saline or starch solutions are alternatives to albumin for treating fluid loss. The functions of plasma-derived immunoglobulins have yet to be replicated by recombinant products. We currently do not have enough plasma donated in Australia to meet the Australian demand for intravenous immunoglobulin and imported products supplement the clinical requirement.

BLOOD FACT

Cohn invented fractionation to isolate albumin, which proved a great substitute for plasma in WWII.