# بسم الله الرحمن الرحيم

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تم عمل المسح الضوئي لهذة الرسالة بواسطة / سامية زكى يوسف

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

**ملاحظات:**

- بالرسالة صفحات لم ترد بالأصل
- بعض الصفحات الأصلية تالفة
- بالرسالة صفحات قد تكون مكررة
- بالرسالة صفحات قد يكون بها خطأ ترقيم

# Autotransfusion and Anesthesia

**Essay Submitted for Partial Fulfillment of M.Sc. Degree in Anesthesiology**

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# Introduction

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Although the blood supply is safer than it has ever been due to improved testing, it is still not absolutely safe and can transmit diseases *(Sloand et al., 1995)*.

The possible transmission of acquired immune deficiency syndrome (AIDS) and the fear of transmission of other transfusion-transmitted disease from homologous transfusion, are the major stimuli to search for alternatives to homologous transfusion where the most important is the autologous blood transfusion *(Dale et al., 1986)*.

Today, major effects are being made to conserve blood products by reducing bleeding and using autologous blood products. Intraoperative and postoperative autotransfusion reduce the administration of blood products markedly *(Spiess et al., 1995)*.

Since the mid-1980s, the popularity of preoperative autologous blood donation has progressively increased. Today it has become a routine at most medical centers for elective procedures which may require a blood transfusion. The advantages of preoperative autologous blood donation are avoiding transfusion reactions, viral disease transmission as well as stimulating red cell

production as it was thought. In recent years the practice of autologous blood donation has been scrutinized with respect to both cost and safety *(Canter, 1996)*.

# Physiological Considerations

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The cellular elements of the blood - white blood cells, red blood cells, and platelets - are suspended in the plasma. The normal total circulating blood volume is about 8% of the body weight (5600 mL in a 70-kg man). About 55% of this volume is plasma *(Ganong, 1995)*.

## A) The Cellular Elements of Blood:

### I. White Blood Cells:

There are normally 4000 - 11000 white blood cells per microliter of human blood. Of these, the granulocytes [polymorphonuclear leukocytes (PMNs)] are the most numerous. Young granulocytes have horseshoe-shaped nuclei that become multilobed as the cells grow older. Most of them contain neutrophilic granules (neutrophils), but a few contain granules that stain with acidic dyes (eosinophils), and some have basophilic granules (basophils). The other 2 cell types found normally in peripheral blood are lymphocytes, which have large round nuclei and scanty cytoplasm, and monocytes, which have abundant agranular cytoplasm and kidney-shaped nuclei. Acting together, these cells provide the body with powerful defenses against tumors, viral, bacterial, and parasitic infections *(Babior, 1994)*.

## II. Platelets:

The platelets are small, granulated bodies 2-4 μm in diameter. There are about 300,000/μL of circulating blood, and they normally have a half-life of about 4 days. The megakaryocytes, giant cells in the bone marrow, form platelets by pinching off bits of cytoplasm and extruding them into the circulation. Platelet production is regulated by the colony-stimulating factors that control the production of megakaryocytes. Their cytoplasm contains actin, myosin, glycogen, lysosomes, and 2 types of granules: (1) dense granules, which contain the non-protein substances that are secreted in response to platelet activation, including serotonin and ADP and other adenine nucleotides, and (2) α-granules, which contain secreted proteins other than the hydrolases in lysosomes. These proteins include clotting factors and platelet-derived growth factors (PDGF). When a blood vessel wall is injured, platelets adhere to the exposed collagen, laminin, and von Willebrand factor in the wall via integrins. This process of platelet adhesion, unlike aggregation, does not require platelet metabolic activity. However, binding to collagen initiates platelet activation. Activation can also be produced by ADP and thrombin. The activated platelets change shape, put out pseudopodia, discharge their granules, and stick to other platelets (platelet aggregation). Aggregation is also fostered by platelet-activating factor (PAF), a cytokine secreted by neutrophils and monocytes as well as platelets ***(Ganong, 1995)***.