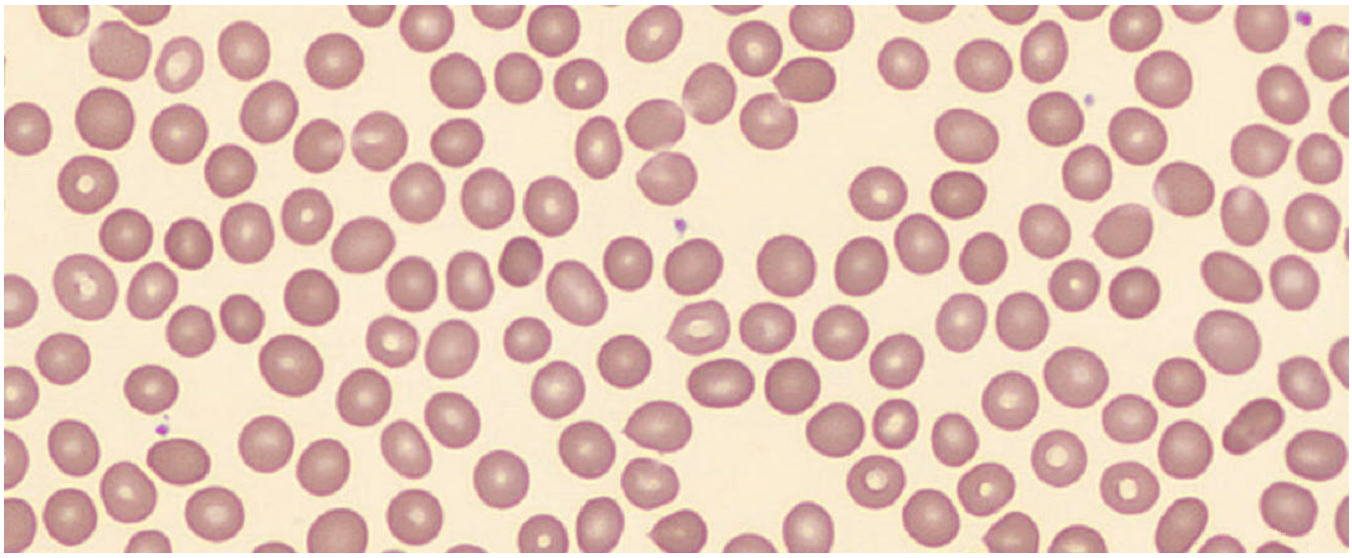
13 Cell Types Included in Results: Erythrocyte, Reticulocyte, Platelet, Neutrophil, Eosinophil, Basophil, Mast Cell, Monocyte, Natural Killer Cells, CD8+ T-cell, CD4+ T-cell, Mature B-lymphocyte, Plasma Cell

The Erythrocyte Personality: There is almost a restlessness to you, as you are energetic and always on the move! You are motivated, intense, and purposeful in what you do, your seemingly endless drive moving you from one thing to the next. Your flexibility, resilience, and resourcefulness are also notable strengths. Every now and again you feel a little burnt out from forgetting to eat your leafy greens, engaging in a toxic interaction, or just the shear stress of it all, but before you know it you are up and running and on to the next thing.

About the RBC: Red blood cells are derived from myeloid progenitor cells in the bone marrow. Erythropoietin (EPO) produced in the kidneys helps stimulate their proliferation and maturation. Mature erythrocytes are approximately 7 to 8 μm in diameter and undergo extensive deformation to pass through 3-μm diameter capillaries and the 1-μm wide and 0.5-μm thick endothelial slits in the red pulp of the spleen. The ability of the red cell to undergo extensive reversible deformation is essential for both its function and its survival (they are rather resilient and undergo a lot of wear and tear moving in and out of small spaces). Their biconcave disc shape allows them to be flexible as they move all over the body to deliver oxygen, which is carried by hemoglobin and then released in tissues. If mitochondria are the powerhouse of the cell, the erythrocyte is their hype man. Their life span is approximately 120 days.

Clinical Correlations: Pathology of the RBC results in anemia (not enough) or erythrocytosis (too much). Anemias are often characterized by RBC cell size (macrocytic, microcytic, or normocytic) and can result from blood loss, nutritional and metabolic deficiencies, hemoglobin defects, and cytoskeletal defects.

Erythrocyte Appearance Under a Microscope:

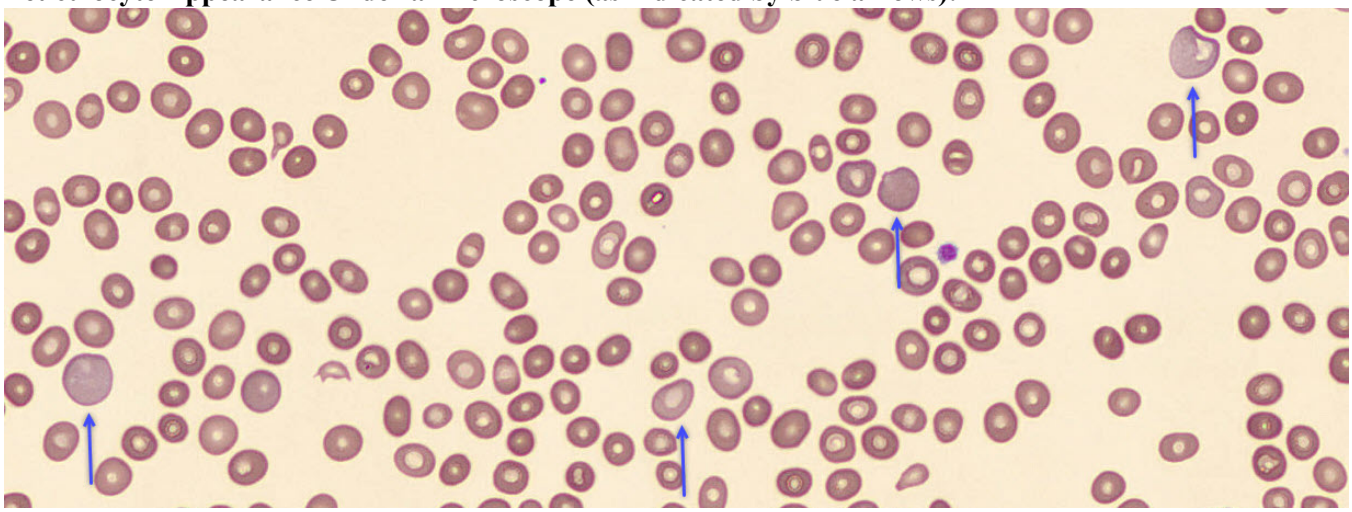


The Reticulocyte Personality: You are imaginative and adventurous, always having big dreams and ideas. You love trying new things and are one of those people who say yes to everything and trust that it will be okay. You're very curious and can be a bit immature, which is a combination for trouble sometimes, but you're easily forgiven due to the good intentions underlying your actions.

About the Reticulocyte: Reticulocytes represent the last stage of erythropoiesis before becoming mature RBCs. They mature over 2 to 3 days, first in the marrow and then in circulation, into the discoid erythrocyte. Reticulocytes are relatively larger than mature RBCs and can be distinguished under light microscopy using supravital stains that highlight ribosomal remnants from the nucleus. During reticulocyte maturation, cytoplasmic inclusions including residual mitochondria and ribosomal RNA are degraded and the reticulocyte loses surface area to achieve the mean cell volume and surface area of a discoidal erythrocyte.

Clinical Correlations: Reticulocyte count is reported as a *percent* of the total number of RBC's. In order to determine if the reticulocyte response is appropriate for the degree of anemia, a correction factor, known as the reticulocyte index is calculated. The reticulocyte index takes into account the reduced number of circulating mature red blood cells (hct/ideal hct) as well as the prolonged retic maturation time (lower the hgb, the longer the maturation time) and provides a more accurate representation of the reticulocyte response in the setting of anemia. The reticulocyte index is used to determine if the anemia is due to a synthetic defect in the marrow vs due blood loss or destruction. When the reticulocyte index is elevated (>3), it often signifies a proliferative state of the bone marrow. This is an appropriate response during hemolysis or blood loss. A reticulocyte index of <2 may indicate an inadequate bone marrow response. This may be caused by nutritional deficiency, bone marrow suppression, chronic inflammation, or bone marrow failure. Often the reticulocyte index and the mean corpuscular volume are useful tools in determining the etiology of an anemia.

Reticulocyte Appearance Under a Microscope (as indicated by blue arrows):



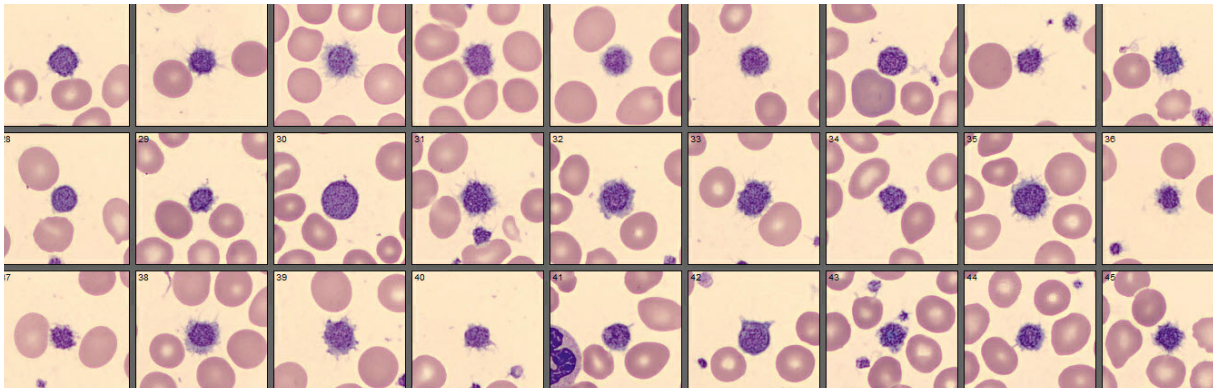
The Platelet Personality: Silly, outgoing, and fun are ways friends may describe you. You are a little touchy-feely and always trying to connect with others. Much like primary hemostasis, if a loved one is feeling down or injured, you respond right away. In addition to your fun-loving nature, your empathy is a great strength. A weakness for platelet personalities is that they sometimes get too stuck on what everyone else thinks.

About the Platelet: Derived from megakaryocytes, platelets are anucleate cell fragments central to primary hemostasis. Their average lifespan is 10 days. Under normal circumstances, 30% of platelets are stored in the spleen at any time, but up to 90% may be sequestered there when the spleen is enlarged. Normally, platelets circulate in an inactive form. However, when the sub-endothelium is exposed in vascular injury, it triggers a cascade of adhesion, activation, and aggregation. GP-1b receptors on platelets adhere to Von-Willebrand Factor, their shape changes, and the secrete granules to further recruit fellow platelets to the scene of injury. As they aggregate, GP-IIb/IIIa is exposed resulting in cross-linkage of adjacent platelets via fibrinogen to form a platelet plug.

Fun fact, since platelets are so sticky, they are stored in a machine that oscillates, constantly moving to prevent them from forming clots. It's like they're always dancing!

Clinical Correlations: Thrombocytopenia frequently results from excess destruction of platelets due to immune mediated processes such as immune thrombocytopenic purpura (ITP), or mechanical destruction. Platelets are also consumed in thrombotic thrombocytopenic purpura (TTP), disseminated intravascular coagulation (DIC), and HELLP syndrome (Hemolysis, Elevated Liver enzymes and Low Platelet count – a complication of pregnancy associated with pre-eclampsia). Platelets are also susceptible to myelosuppressive agents. In patients with portal hypertension platelets can get sequestered in the spleen as a result of splenomegaly. Thrombocytosis (increased platelet count >450,000) can be seen in hematologic disorders such as essential thrombocythemia and primary myelofibrosis. Antiplatelet medications include $P2Y_{12}$ inhibitors (clopidogrel), cyclooxygenase inhibitors (aspirin), protease-activated-receptor 1 (vorapaxar) and glycoprotein IIa/IIIb receptor inhibitors.

Platelet Appearance Under a Microscope:

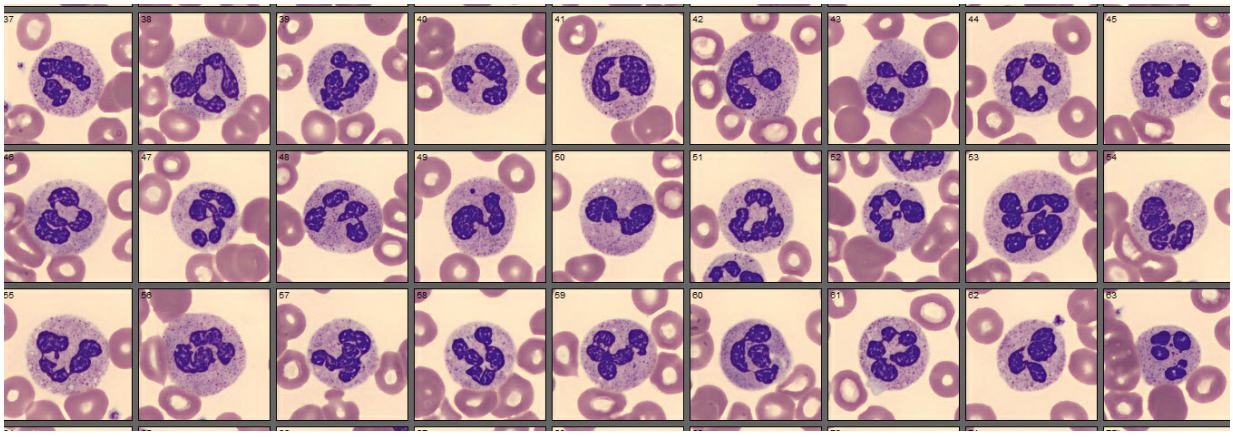


The Neutrophil Personality: You are fierce and a force to be reckoned with (likely the number one draft pick of anyone going to any sort of battle). Your bravery and confidence are fueled by a selfless desire. You are a loyal friend who helps those in need and seeks to correct the injustices of the world. Your quickness to respond, while one of your strengths, is occasionally a weakness as you sometimes make decisions without taking time to gather all information and think things through.

About the Neutrophil: Part of the innate immune system, neutrophils are the body's first line of defense; an increase in number can signal early infection. Neutrophils are the most predominant WBC on average, making up 50-70% of the WBC differential in healthy adults. Mature neutrophils are stored in the marrow before they are released into the blood. In the absence of an inflammatory focus, they leave the circulation randomly, with a half-disappearance time of approximately 7 hours. In the presence of an inflammatory focus, the cells then enter the tissues and probably function for 1 or 2 days before their death or loss into the gastrointestinal tract through mucosal surfaces. The migration of neutrophils from blood into tissue at sites of inflammation involves a series of steps including chemoattraction, tethering (rolling adhesion), tight adhesion, and endothelial transmigration. This process normally takes place in postcapillary venules where shear forces are minimized (think about trying to enter an artery vs a vein). Neutrophils have a characteristic dense nucleus with 2-5 lobes. In vitamin b12 deficiency and folic acid the number of lobes is >6 due to delayed maturation of the nucleus. Neutrophils contain granules rich in factors with antimicrobial activity. Some (e.g., myeloperoxidase) function in conjunction with the reduced form of nicotinamide adenine dinucleotide phosphate (NADPH) oxidase, whereas others (e.g., defensins) exhibit activity independent of the oxidative burst.

Clinical Correlations: Elevated neutrophil counts can be seen in infection, steroid therapy or smoking. Low white-blood cell counts are a common side effect of myelosuppressive chemotherapy. This means many patients become neutropenic (defined by absolute neutrophil count <500). Neutropenic fever (when ANC is <500 and single temperature of 38.3 or 38.0 sustained over an hour) is a common complication in patients receiving chemotherapy and requires thorough investigation as the body cannot mount the usual immune response. In addition, certain medical conditions and other non-chemotherapy based medications can cause neutropenia. Medications that cause neutropenia include but are not limited to clozapine, dapsone, methimazole, penicillin, rituximab, and procainamide. Ganciclovir and valganciclovir are both associated with bone marrow suppression, particularly leukopenia. In addition, neonates born to mothers with pre-eclampsia have a 50% rate of being neutropenic. Another cause of low neutrophil count is benign ethnic neutropenia (BEN). It is usually observed in individuals of African descent and is characterized by an ANC < 1500/uL in the absence of secondary causes. In contrast to other causes of neutropenia, BEN does not increase risk of oral or systemic infections and is protective against malaria. The underlying mechanism is unknown.

Neutrophil Appearance Under a Microscope:

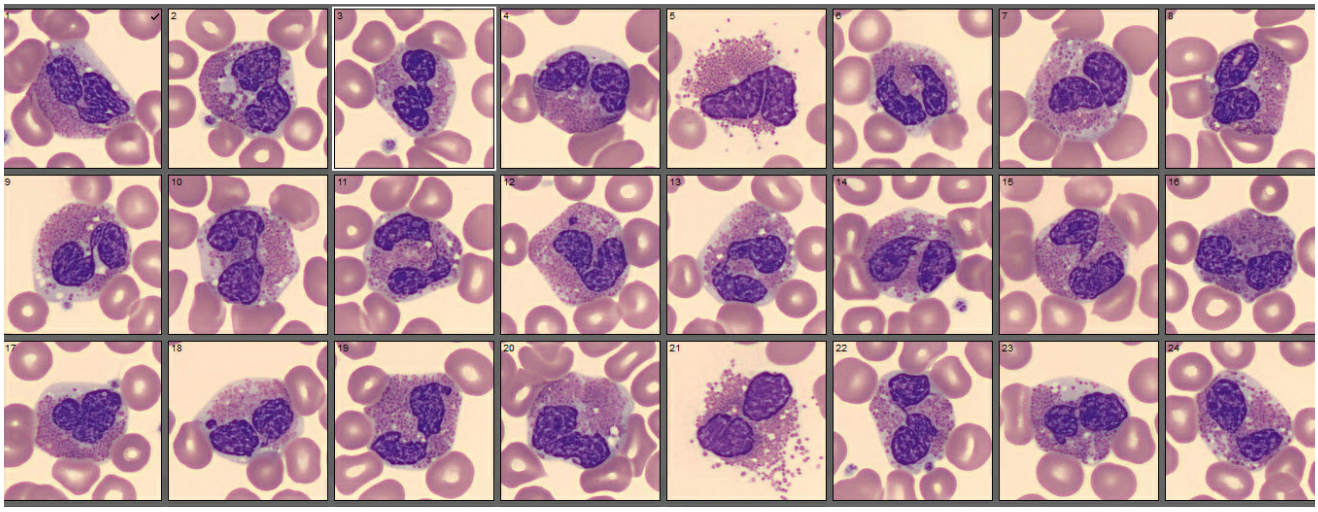


The Eosinophil Personality: You're in touch with your sensitive side but use it as a strength to connect. You have a distinct sense of style, which is admired and appreciated by all. Unafraid to tackle challenges, you're tough and strong but never at the expense of others. Sometimes your (hyper)sensitivity makes you overreact, but it's an asset overall.

About the Eosinophil: Stemming from myeloid progenitor cells, eosinophils are part of the granulocyte family. They are classically lighter than basophils and appear pink under a hematoxylin and eosin stain. The relatively specific features which distinguish the eosinophil from other leukocytes are the bilobed nucleus, the specific granules with an electron dense core, and the paucity of mitochondria (approximately 20 per cell). Eosinophil production and function are influenced by interleukin (IL)-5. Activated eosinophils target parasitic infections by binding to IgE tagged schistosomes and helminths. They also play a role in tissue repair by removing fibrin during inflammation.

Clinical Correlations: Eosinophilia is associated with diseases characterized by T-helper (Th)2-mediated immune responses, including infections by helminthic parasites and extrinsic asthma. However, eosinophilia also occurs in diseases not obviously associated with Th2 dominance, such as intrinsic asthma and hypereosinophilic syndromes (HESs). Eosinophilic granulomatosis with polyangiitis (EGPA, formerly Churg-Strauss syndrome), allergic fungal airway disease, eosinophilic pneumonia, or certain drug reactions (drug-induced eosinophila) can also elevate one's eosinophil count.

Eosinophil Appearance Under a Microscope:

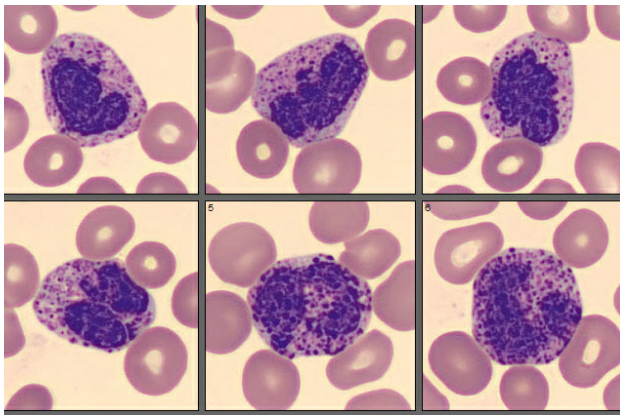


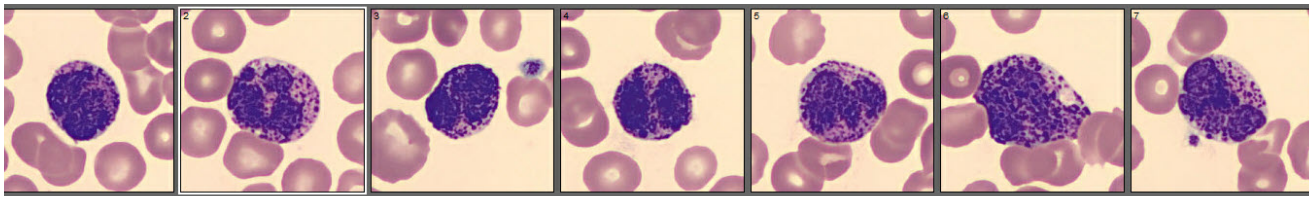
The Basophil Personality Type: You are confident in your idiosyncrasies and have a strong sense of self. You love travel and prefer not to be rooted for too long in one place. While others would have you join their groups, you are happy as a lone wolf as you are even more energized by one-on-one interactions or being by yourself. It takes a lot to get a rise out of you, but in the rare instances when are triggered, the floodgates open.

About the Basophil: The least common of the three granulocytes, typically accounting for less than 0.5 percent of blood leukocytes, you may have found yourself wondering at times, "what does a basophil even do?" Basophils circulate as mature cells and can be recruited into tissues, particularly at sites of immunologic or inflammatory responses, but they ordinarily do not reside in tissues. Basophils have more darkly stained granules when compared to the eosinophils that stain lighter/pink. Degranulation is associated with histamine release. They are commonly involved in allergic reactions/anaphylaxis (type I hypersensitivity) via IgE receptor cross-linking that triggers degranulation.

Clinical Correlations: Basophils are implicated in asthma, hay fever, and other allergic disorders. An increased number of basophils may be a sign of progression in myeloproliferative disorders. Disorders of basophil deficiency are exceedingly rare.

Basophil Appearance Under a Microscope:



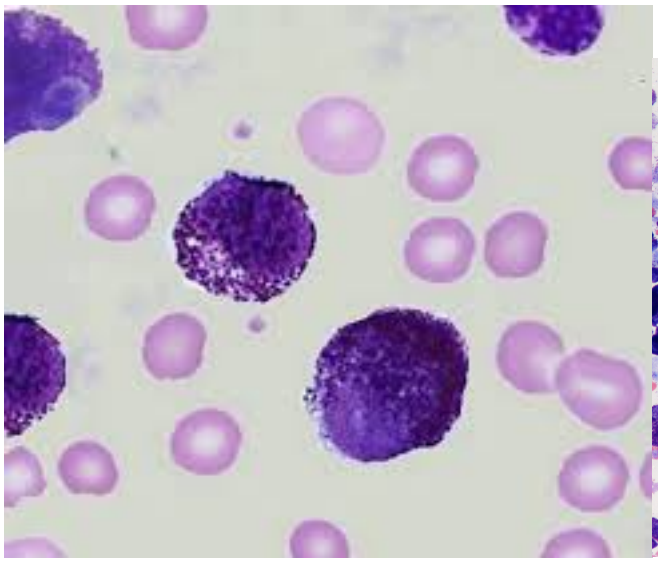


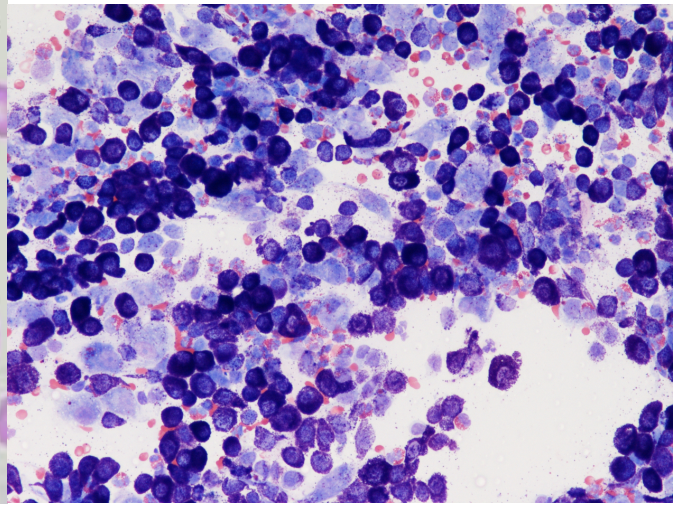
Mast Cell Personality: You play by your own rules (or disregard rules altogether) and do what you want when you want. Friends would describe you as extroverted and spontaneous but may also say you are drawn towards drama and cannot tolerate idleness or boredom. While this may be true, it also means everything is an adventure with you.

About the Mast Cell: Mast cells normally reside in the connective tissue, particularly beneath epithelial surfaces and around blood vessels. It was once believed mast cells were tissue resident basophils (like macrophages are to monocytes), yet this was shown to not be the case as the two stem from distinct hemopoietic lines. Similar to basophils, mast cells are implicated in type-1 hypersensitivity reaction (think intense inflammatory reaction characterized by bronchospasm, urticaria, anaphylaxis) through IgE receptor activation and granule release. They also contain heparin and histamine. Unlike basophils, mast cells can be long-lived.

Clinical Correlations: Anaphylaxis, allergy, asthma. Mastocytosis, or too many mast cells, can present locally with urticaria pigmentosa or be systemic with GI symptoms, skin manifestations, bony changes, and pleural effusions. Most patients with mastocytosis have an activating KIT mutation.

Mast Cell Tumor Cytology:





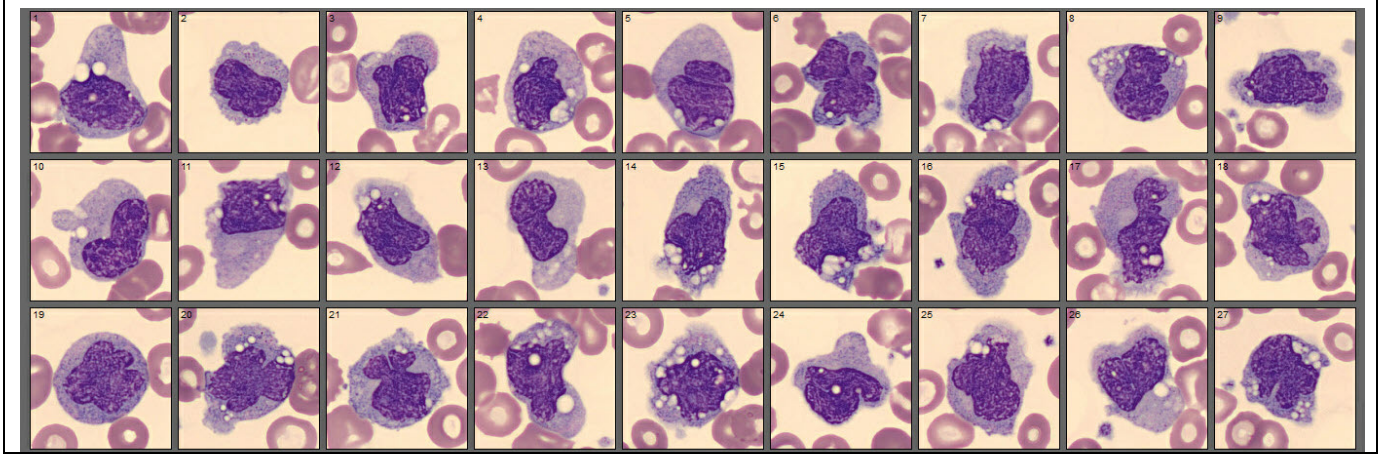
The Monocyte Personality: Your determination and grit are complimented by your ingenuity and creativity. There's nothing you can't do and you thrive in unfamiliar situations, adapting well to your surroundings. You have a fierce independence and self-starting quality. Best not to get on your bad side as you engulf your opponents whole.

About the Monocyte: Monocytes are phagocytes that circulate in the blood. Once in tissues they differentiate into macrophages. Cell shape and function varies, depending on the tissue in which the macrophage resides (e.g., lung, liver, spleen, brain). A characteristic feature of macrophages is their prominent electron-dense membrane-bound lysosomes, which can be seen fusing with phagosomes to form secondary lysosomes. They are also identified by their "horse shoe" appearance under the microscope. Macrophages differ in appearance, biochemistry, and function based on the environment in which they mature from monocytes. These differences are exemplified by the diversity among dendritic cells of lymph nodes (key for antigen presentation), histiocytes of connective tissue, osteoclasts of bone, Kupffer cells of liver, microglia of the central nervous system, and macrophages of the serosal surfaces, each fashioned to meet the local needs of the mononuclear phagocyte system, which plays a role in inflammation and host defense against microbes. While monocytes live for a few days in the blood, resident macrophages are long lived, up to months in tissues.

Fun Fact: Monocytes are the first of the WBC to recover after myelosuppressive chemotherapy and serve as a signal that neutrophils are soon to follow. Hooray!

Clinical Correlation: Splenic macrophages are responsible for accelerated red blood cell clearance in autoimmune hemolytic anemia (AIHA). Most patients undergoing splenectomy will have slight monocytosis due to delayed clearance of macrophages. Chronic myelomonocytic leukemia (CMML) is malignant hematopoetic stem cell disorder characterized an increase in peripheral monocytes. Disorders that exclusively result in abnormalities of monocytes, macrophages, or dendritic cells are usually referred to as histiocytosis. These disorders can be inherited, such as familial hemophagocytic lymphohistiocytosis; inflammatory, such as infectious hemophagocytic lymphohistiocytic syndrome; or clonal (neoplastic), such as Langerhans cell histiocytosis. Pathologies can result from an inherited enzyme insufficiency in macrophages that lead to exaggerated storage of macromolecules, such as in Gaucher disease. Other disorders of monocyte/macrophage dysfunction include Chédiak-Higashi syndrome and Chronic granulomatous disease.

Monocyte Appearance Under a Microscope:

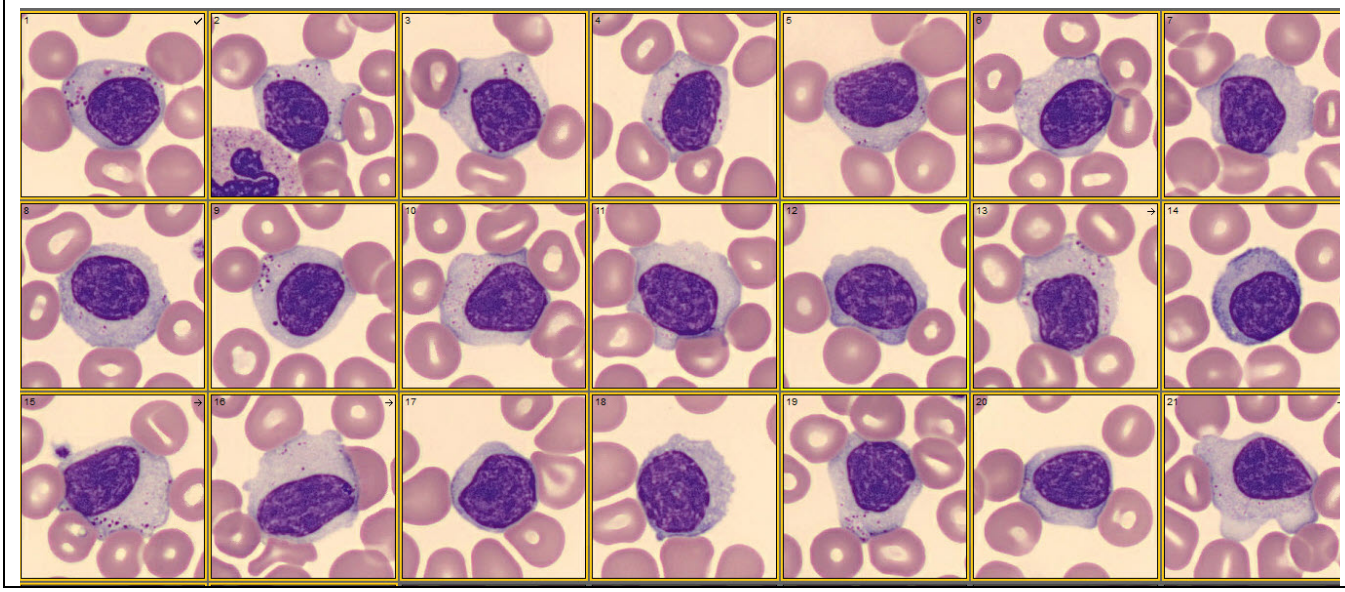


Natural Killer Cell Personality: If neutrophils are the general army, NK cells are the assassins. You don't waste words. You have a quiet confidence about you, are direct, and very effective. These traits are valued by the professional organizations and groups in which you work, although more sensitive types may perceive your manner (aka lack of interest in water cooler chit chat) as being slightly abrasive. In accomplishing a goal, you do what needs to get done and do not rely on others to do it.

About the Natural Killer (NK) Cell: NK cells are large granular lymphocytes that migrate from blood into tissues to fight off viral infections as part of the innate immune system. Activated by type I interferons, TNF-alpha, and IL-12, they synthesize interferon gamma which in turn activate macrophages and dendritic cells to produce more IL-12 and keep the positive feedback loop going. The balance of inhibitory and activating receptors on a cell determines if an NK cell will bind and attack. Viral infection favors the activating ligands, allowing the NK cell to bind and kill virally infected cells with the release of lytic granules. While NK cells are not sufficient to fully eradicate viral infections, they can keep them at a steady level until the adaptive immune system can respond. Natural killer cells have also been noted to have anti-tumor abilities and are being explored as a type of cancer fighting therapy.

Clinical Correlations: NK cell function and NK cell numbers are often decreased in pathologic conditions, including cancer and AIDS. Less responsive NK cell can also be seen in patients with Chédiak-Higashi syndrome. While NK cell numbers are normal in these patients, they present with a single, large granule in the cytoplasm and have a markedly reduced ability to mediate cytotoxicity. Malignant acute expansion of NK cells is rare, but is more frequent in Asians than in Caucasians, and is often associated with Epstein-Barr virus infection. When it does occur, NK cell leukemia or lymphoma mostly affects extranodal tissues.

NK Cell Appearance Under a Microscope:

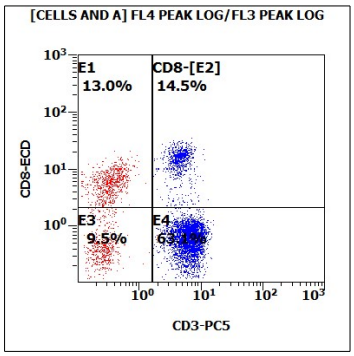


CD8+ T-cell Personality: You rely on the support of your community to fuel you and anchor you in your quest for greatness. They give you confidence and strength, making you feel powerful and unstoppable. And the truth is, you are. When you're in your element you slay! CD8+ T-cell types care deeply about the opinions of those with whom they're close, but give zero fluffs when it comes to everyone else.

About the CD8+ T-cell: Progenitor T-cells migrate from the bone marrow to the thymus where they undergo T-cell receptor recombination as well as positive and negative selection (ensuring they recognize major histocompatibility complex but not self peptide). Following selection, downregulation of either co-receptor produces naïve CD8 or CD4 single positive cells. CD8 + T-cells normally make up 25-35% of the peripheral T-cell population. They recognize antigens presented by MHC class I molecules and differentiate into cytotoxic CD8 T cells. Their main function is lysis of the target cell bearing the surface antigens for which a cytotoxic T cell is specific. These often include cancer cells and intracellularly infected cells. Cytotoxic T-cell killing is mediated by either the Fas-Ligand pathway or the caspase cascade via granzymes, perforins, and granulyosin.

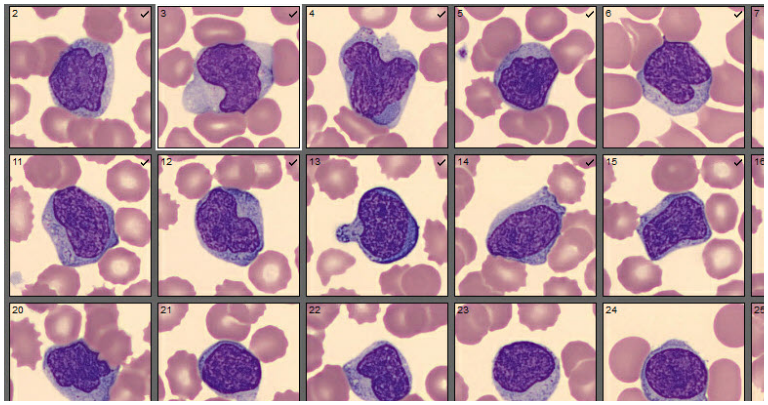
Clinical Correlations: SCID is a syndrome caused by mutations in any of several genes whose products are crucial for the development and function of both T and B cells and may also affect natural killer (NK) cells. In some cases, the molecular defect results in only T cell deficiency, while B cells are intrinsically normal. However, serious T cell dysfunction precludes effective humoral immunity since B cells require stimulation from T cells to produce antibody.

It is difficult to distinguish between lymphocytes with light microscopy. Flow cytometry is helpful!



[CELLS AND A] FL4 PEAK LOG/FL3 PEAK LOG

Region	Number	%Total	%Gated	X-Mean	Y-Mean
ALL	5000	14.70	100.00	5.02	3.47
CD8-[E2]	725	2.13	14.50	4.76	15
E1	648	1.91	12.96	0.371	6.41
E3	473	1.39	9.46	0.287	0.559
E4	3154	9.27	63.08	6.75	0.639



CD4+ T-cell Personality: You are kind, collaborative, and nurturing. You care more about the end product than getting credit and improve the environment of any team you're a part of. You exude a sense of calm and organization, this combined with your kindness puts those around you at ease.

About the CD4+ T-cell: Progenitor T-cells migrate from the bone marrow to the thymus where they undergo T-cell receptor recombination as well as positive and negative selection (ensuring they recognize major histocompatibility complex but not self-peptide). Following selection, downregulation of either co-receptor produces naïve CD8 or CD4 single positive cells. Making up ~65% of blood T-cells, CD4+ T cells can be subdivided into two major groups: helper T cells and regulatory T-cells (Treg). Generally, their function is the production of lymphokines upon activation by foreign antigens presented by MHC class II molecules, which in turn modulate the adaptive immune response. Helper T cells can differentiate into various subtypes, each with its own function. The two main subtypes are T-helper type 1 (Th1) and T-helper type 2 (Th2); others are Th17, Th9, and Tfh. Naïve T cells differentiate into helper T-cells based on the cytokines present during activation. The process by which commitment develops is called polarization.

In general, Th1 cells are a major source of interferon-γ (IFN-γ), and the main T-cell population involved in activating macrophages and clearing intracellular pathogens. Th1 cells help fight viruses and other intracellular pathogens, eliminate cancerous cells, and stimulate delayed-type hypersensitivity (DTH) skin reactions. Th2 cells are a major source of IL-4 and are important for the generation of immunoglobulin (Ig) E, the production of eosinophils, and the immune defense against infections by parasites.

Th2 cells drive humoral immunity and upregulate antibody production to fight extracellular organisms. They initiate the antibody response to antigen by activating naïve antigen-specific B cells to produce IgM antibodies, subsequently stimulate the production of switched immunoglobulin isotypes. Cytokines produced by Th2 cells also trigger differentiation of mast cells and eosinophils.

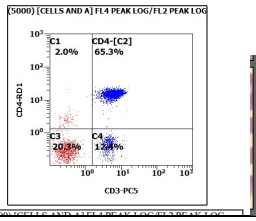
Regulatory T-cells suppress helper T-cell activity via FOXP3 transcription. Some CD4+ T cells become long-lived memory T cells; the lineage for these T cells is uncertain.

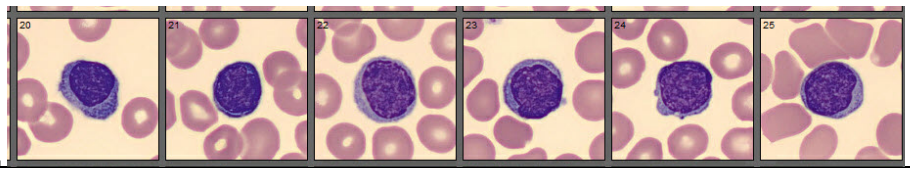
Clinical Correlations: Bare lymphocyte syndrome, caused by genetic defects in one's ability to produce MHC class II molecules, will have normal B and T cell counts but a decrease in CD4+ cells. Most notably, CD4 is a cellular co-receptor for HIV. Binding of CD4 along with chemokine receptors such as CCR5 or CXCR4 facilitates entry of the virus into host T cells and stimulates them in an antigen-driven immune response. Targeting HIV entry/fusion by specific monoclonal antibodies and/or inhibitors is, therefore, an important therapeutic approach in HIV and CD4 count is also a way to monitor immune system strength and function for those with the disease.

Patients with the immune dysregulation, polyendocrinopathy, enteropathy, X-linked syndrome (IPEX syndrome) are found to have germline mutations in the gene encoding FOXP3, which manifest in multi-organ autoimmune problems, such as bullous pemphigoid or alopecia universalis.

CD4+ T-cells are also affected in SCID.

It is difficult to distinguish between lymphocytes with light microscopy. Flow cytometry is helpful!





B-lymphocyte (Memory B-cell) Personality: You're highly adaptable and incredibly easy-going. When the unexpected arises, you don't get flustered, but rather respond quickly and competently. Other strengths include inspiring others, excelling in team settings, and being wonderfully resourceful.

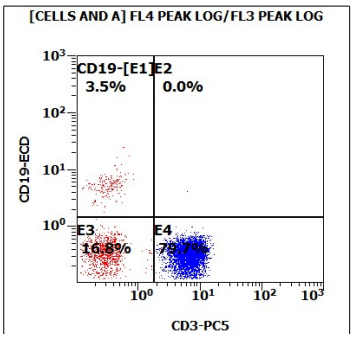
About the B-lymphocyte and Memory B-cell: B lymphocytes mediate humoral adaptive immunity. CD20 and CD19 markers are present on almost all B-cells. B-cells develop in the bone marrow where they undergo VDJ recombination which contributes to diversity of the Ig chain. These immunoglobulin heavy chains and light chains form the membrane-bound proteins that act as antigenic receptors. Mature B cells exit the marrow and migrate to secondary lymphoid organs - principally the lymph nodes, tonsils, spleen, Peyer's patches. Less well-organized collections of lymphocytes are also found in the respiratory tract, gastrointestinal tract, and the skin. Antigen binding to surface immunoglobulin, along with co-stimulation from an antigen-specific helper T cell, initiates a series of responses that lead to two principal changes: cell proliferation resulting in expansion of the clone, and differentiation to either plasma cells actively secreting antibodies or to memory B cells.

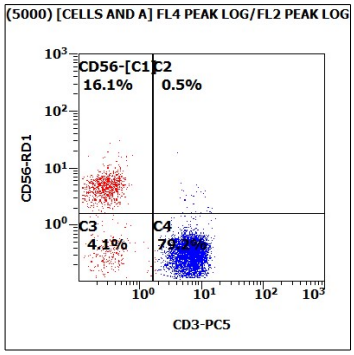
Memory B cells differ from plasma cells in morphology and function. In contrast to plasma cells, memory B cells do not secrete immunoglobulin, but rather express surface immunoglobulin that can bind antigen and can be induced to differentiate rapidly into immunoglobulin secreting plasma cells after secondary challenge with antigen. Also, memory B cells may reengage the germinal center to undergo additional rounds of somatic hypermutation to enhance further the Ig repertoire. In addition, memory B cells have high-level expression of antiapoptotic genes BCL2 and BCL-XL, which help enhance their long-term survival. Finally, memory B cells lack expression of BCL6, which actually can repress memory B-cell development.

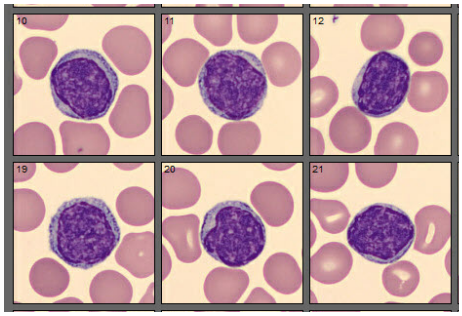
Clinical Correlations: Lymphoma consists of a wide range of tumors that originate in lymph tissue and occur with clonal expansion of NK cells, T-cells, and B-cells. B-lymphocytes are commonly implicated in both Hodgkin's and Non-Hodgkin's Lymphoma. Hodgkin's lymphoma is characterized by Reed-Sternberg cells, distinctive giant cells with an "owl eye" appearance" that are derived from B-lymphocytes. This is in contrast to Non-Hodgkin's lymphoma (NHL) which is usually characterized by mature lymphoid cells. Aggressive NHL include diffuse large B cell lymphoma, Burkitt lymphoma, precursor B and T lymphoblastic leukemia/lymphoma. More indolent varieties of NHL include follicular lymphoma, chronic lymphocytic leukemia/small lymphocytic lymphoma, and splenic marginal zone lymphoma.

It is difficult to distinguish between lymphocytes with light microscopy. Flow cytometry is helpful!

(B-lymphocyte CLL under LM pictured below)





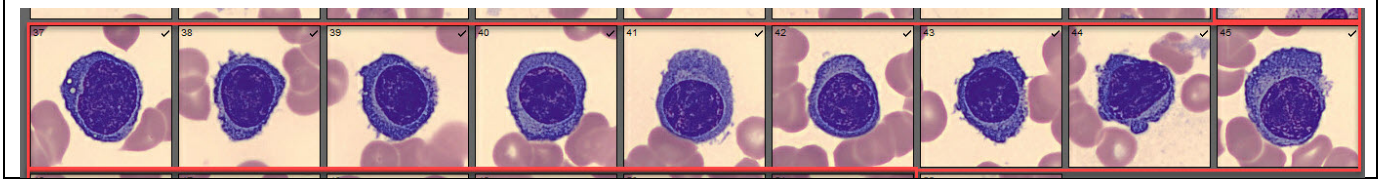


Plasma Cell Personality: You are supportive and highly reliable. You are great at anticipating the needs of those close to you - your thoughtfulness and attention to detail are particular strengths. You also excel at organization and have a tremendous ability to plan ahead. While you enjoy the occasional adventure, you are most comfortable with routine and stability and thrive in structured scenarios. It is not uncommon for you to perseverate on things you find troubling – some find this quality a bit neurotic. Rapid change is not your favorite but with time, you adapt.

About the Plasma Cell: The plasma cell is large, up to 20 microns in diameter, and secretes antibodies prodigiously, although it has few antibody molecules on its surface. Plasma cells that arise from follicular B cells are found mainly in the bone marrow and are long-lived (months to years), whereas plasma cells arising from non-follicular B cells have life spans of only days to a few weeks. Part of the adaptive immune system, plasma cells secrete large quantities of antibodies in response to being presented specific antigens. Each plasma cell has the same clonal rearrangement of its V(D)J (variable diversity joining) Ig genes as its predecessor B lymphocyte. Immunoglobulins produced by plasma cells can be IgG, IgA, or IgM. Unlike other B-cells, plasma cells are not CD20 or CD19 positive, but are CD27++ and CD138+ instead, the latter of which is often a target for chemotherapy drugs in multiple myeloma. Histology buzzwords you'll hear for this cell are "clock faced chromatin"

Clinical Correlations: When a plasma cell clone loses the ability to diversity its antibody product, it results in a monoclonal antibody being produced. Pathologies that occur when the monoclonal antibody takes over include monoclonal gammopathy of undetermined significance (MGUS), Multiple Myeloma, and amyloidosis. Plasma cells are also a classic histological finding in many disorders such as chronic endometritis and autoimmune hepatitis.

Plasma Cell Appearance Under a Microscope:



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11. M1 lecture notes

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