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NORMAL ADULT HEMOGLOBIN			
HBA	$Alpha_2Beta_2$ (97%)		
HbA_2	$Alpha_2Delta_2$ (2.5%)	Increased in Beta-thal trait	
HbF	$Alpha_2Gamma_2$ (<1%)	Increased levels ameliorate sickle cell disease	
Diseses	**Genotype**	**Clinical**	**Diagnosis**
Alpha-Thal-2	1 Alpha-chain defective	Silent	DNA analysis, family history
Alpha-Thal-1	2 Alpha-chains defective	Microcytosis, mild anemia (mid 30's)	DNA analysis, family history
Hb H disease	3 Alpha-chains defective	Microcytosis, hemolysis, splenomegaly, moderate anemia	DNA analysis, family history, Heinz body prep
Beta-thal minor ($Beta^+$thal)	1 Beta-chain defective	Microcytosis, target cells, mild-moderate anemia (30's)	Hb electrophoresis
Beta-thal major ($Beta^o$)	2 Beta-chains defective	Severe anemia, hemolysis	Hb electrophoresis
Beta-thal intermediate ($Beta^-$)	2 Beta-chains defective with residual normal Beta-chain production	Variable between minor and major thal	Hb electrophoresis
Hb E trait	$Alpha_4Beta_1E_1$	Microcytosis, not anemic	Hb electrophoresis
Hb E disease	$Alpha_4E_2$	Microcytosis, target cells, not anemic	Hb electrophoresis
Sickle cell disease	HbS	Sickle cell disease	Hb electrophoresis
Sickle cell trait	HbSA	None	Hb electrophoresis
SC disease	HbS/HbC	Mild-mod sickle disease, target cells, splenomegaly	Hb electrophoresis
Sickle-thal	HbS/Beta-thal gene	Severe sickle disease with microcytosis	Hb electrophoresis
Alpha-thal/Beta-thal major	Alpha-thal/Beta-thal major	Beta-thal intermediate	Hb electrophoresis
HbE/Beta-thal	HbE/Beta-thal	Beta-thal major	Hb electrophoresis