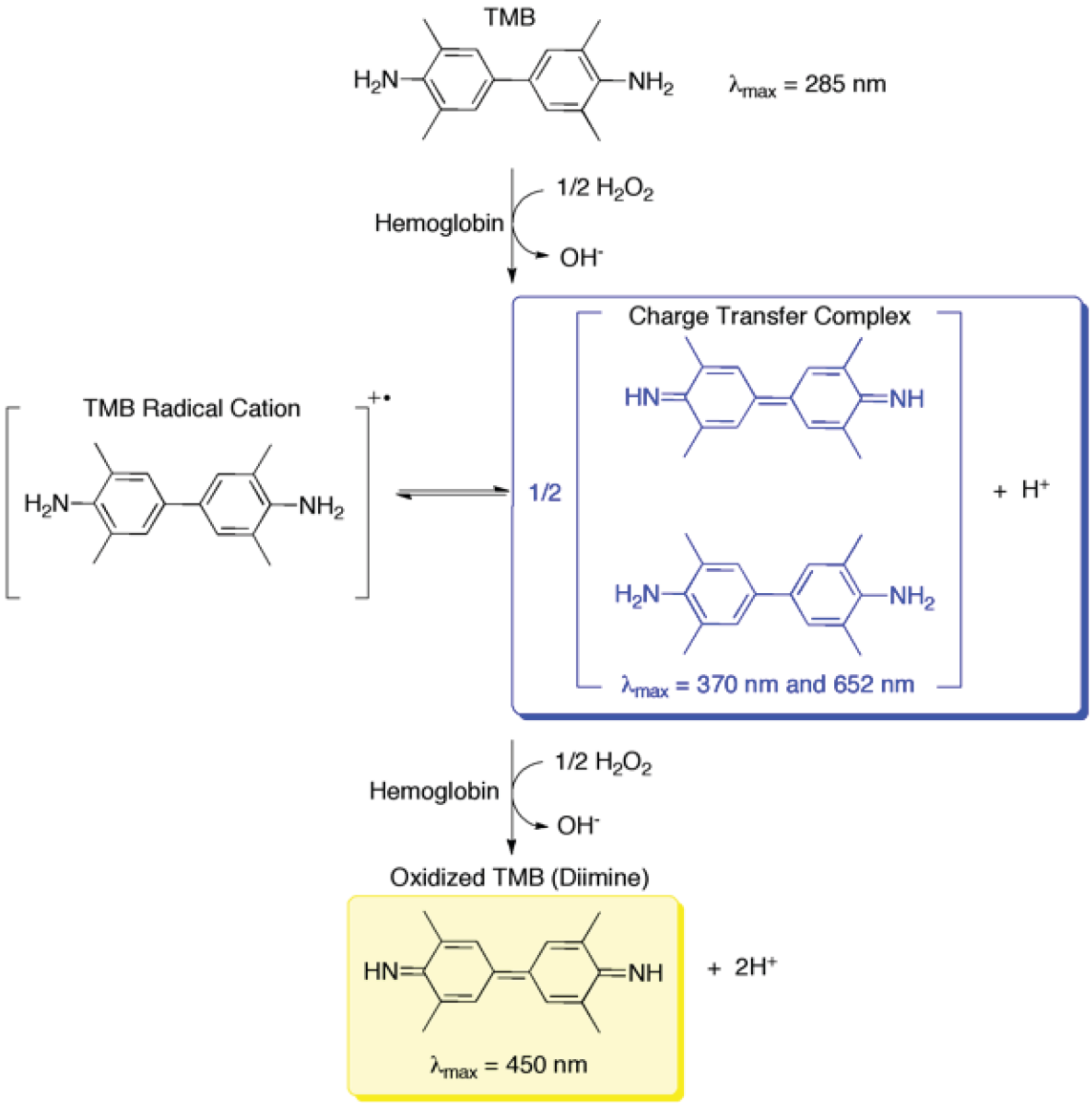


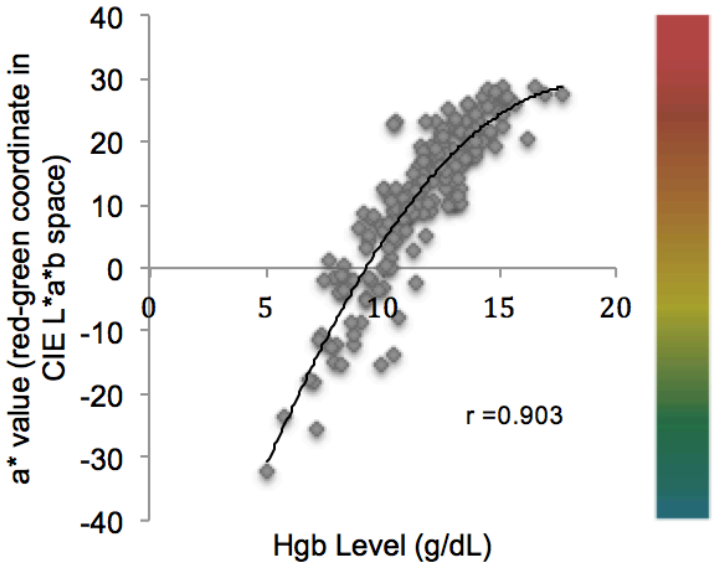
Supplemental Figure 1: The 3,3',5,5'-tetramethylbenzidine (TMB) oxidation-reduction reaction in which hemoglobin acts as a catalyst. In the presence of hydrogen peroxide (oxidizing agent) and small amounts of hemoglobin, TMB reacts to form a one-electron charge transfer complex, which exhibits a blue color. In the presence of higher amounts of hemoglobin, the reaction will go to completion and form a two-electron diimine product and exhibit a yellow color. In the presence of excess hemoglobin, the red color of the hemoglobin in combination with the yellow color of the diimine, yields an resultant orange to red, depending on the ratio of both species. Hence, our modification of this reaction enables mixtures of hemoglobin, TMB charge transfer complex, and TMB diimine to stably yield resultant solutions of different wavelengths that span the visual spectrum.

Supplementary Table 1

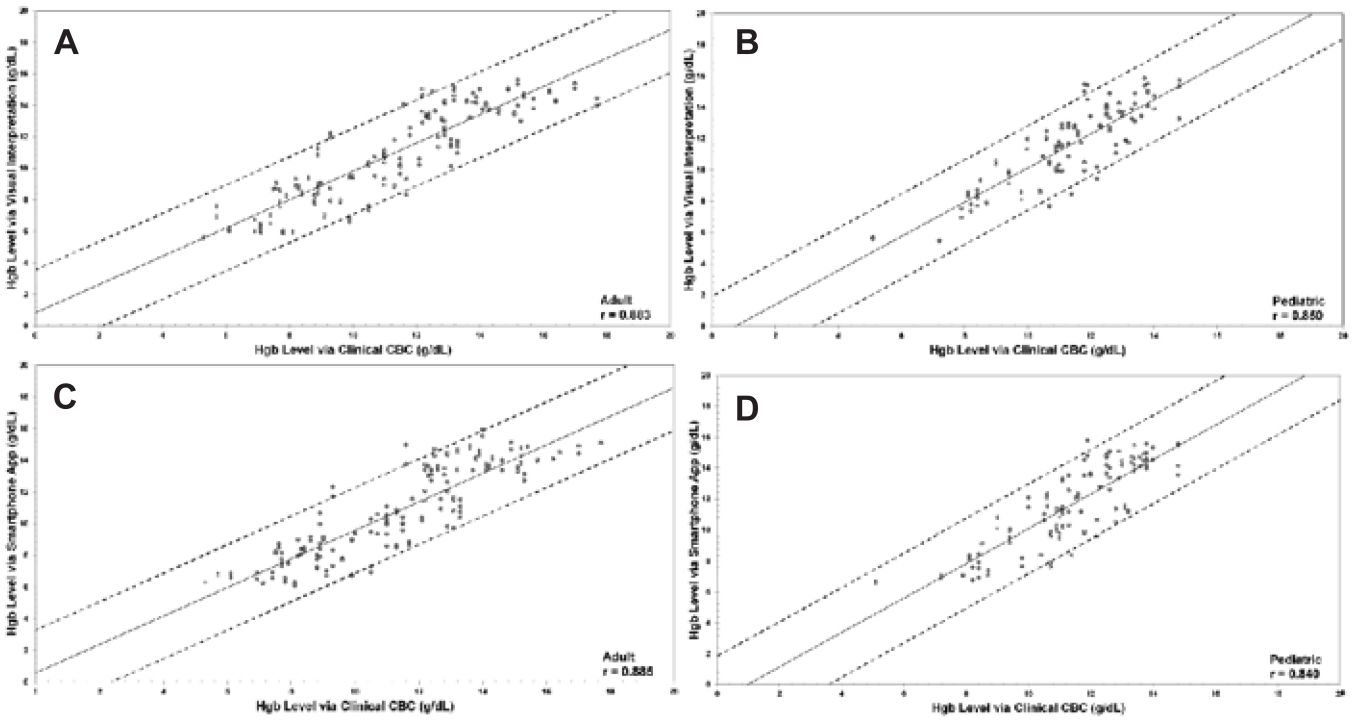
List of diagnoses for all patients involved (n=238) in the clinical assessment of the POC anemia test.

Disorder	Number of Patients, (% of Patients)
Hematologic Diseases	**114 (47.7%)**
Aplastic Anemia	14 (5.6%)
Sickle Cell Disease, Hgb SS	11 (4.6%)
Polycythemia vera	9 (3.8%)
Sickle Cell Disease, Hgb SC	7(2.9%)
Anemia, Unspecified	6 (2.5%)
Idiopathic thrombocytopenic purpura	6 (2.5%)
Thrombocythemia	6 (2.5%)
Deep venous thrombosis	3 (1.3%)
Hemolytic anemia	3 (1.3%)
Myelodysplastic syndromes	3 (1.3%)
Myelofibrosis	3 (1.3%)
Hemophagocytic lymphohistiocytosis	2 (0.8%)
Hemophilia A	2 (0.8%)
Hereditary spherocytosis	2 (0.8%)
Iron deficiency	2 (0.8%)
Klippel Trenaunay-Weber syndrome	2 (0.8%)
Neutropenia	2 (0.8%)
Sickle Cell Disease, Hgb SB Thal	2 (0.8%)
Waldenstrom's macroglobulinemia	2 (0.8%)
Wiskott-Aldrich syndrome	2 (0.8%)
Chronic thrombocytopenia	2 (0.8%)
Cyclic Neutropenia	1 (0.4%)
Eosinophilia	1 (0.4%)
Epistaxis	1 (0.4%)
Glucose 6 phosphatase deficiency	1 (0.4%)
Gorham's disease	1 (0.4%)
Hemoglobin F β-thalassemia	1 (0.4%)
Hereditary hemochromatosis	1 (0.4%)
Hgb-SS disease	1 (0.4%)
Idiopathic mast cell activation syndrome	1 (0.4%)
Idiopathic refractory anemia	1 (0.4%)
IgG Lambda MGUS	1 (0.4%)
Langerhan's cell histiocytosis	1 (0.4%)
Leukocytopenia	1 (0.4%)
Lymphadenopathy	1 (0.4%)
Monoclonal gammopathy	1 (0.4%)
Myeloproliferative disorder	1 (0.4%)
Paroxysmal Nocturnal Hemoglobinuria	1 (0.4%)
Pyruvate Kinase Deficiency	1 (0.4%)
Red cell aplasia	1 (0.4%)
Secondary polycythemia	1 (0.4%)
Thrombocytosis	1 (0.4%)
Von Willebrands Disease	1 (0.4%)
β-thalassemia major	1 (0.4%)
Oncologic Diseases, Patients Receiving Chemotherapy	**121 (50.8%)**
Acute lymphocytic leukemia	19 (8.0%)
Acute myeloid leukemia	14 (5.6%)
Multiple myeloma	8 (3.3%)

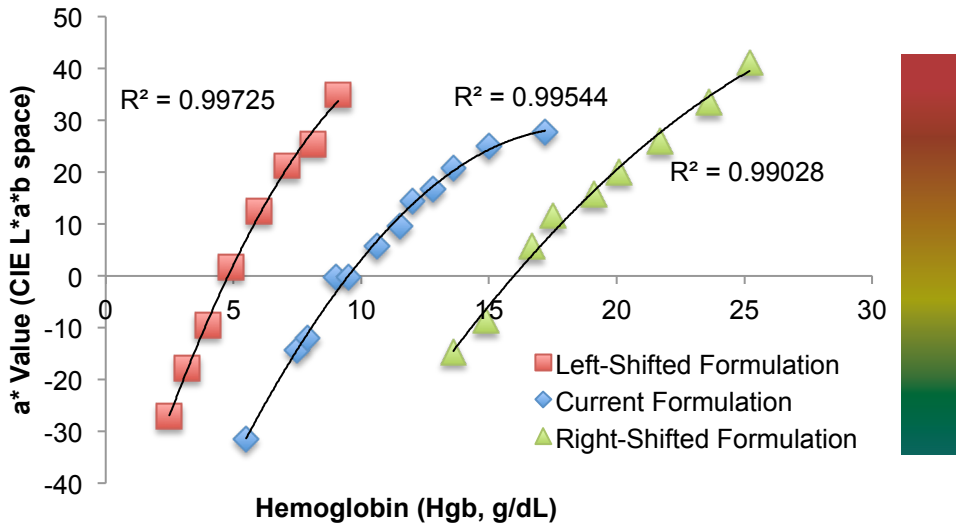
Acute lymphoblastic leukemia	7 (2.9%)
Chronic myelogenous leukemia	6 (2.5%)
Multiple myeloma	6 (2.5%)
Acute lymphoid leukemia	5 (2.1%)
Chronic lymphocytic leukemia	5 (2.1%)
Diffuse large B-cell lymphoma	5 (2.1%)
Ewing's sarcoma	5 (2.1%)
Acute premyelocytic leukemia	3 (1.3%)
B-cell acute lymphocytic leukemia	3 (1.3%)
Osteosarcoma	3 (1.3%)
Rhabdomyosarcoma	3 (1.3%)
T-cell acute lymphocytic leukemia	3 (1.3%)
Burkitt lymphoma	2 (0.8%)
IgA multiple myeloma	2 (0.8%)
Mantle cell lymphoma	2 (0.8%)
Marginal zone lymphoma	2 (0.8%)
Anaplastic large cell lymphoma	1 (0.4%)
B lymphoblastic leukemia	1 (0.4%)
Bi-lineage leukemia	1 (0.4%)
Carcinoma of thyroid	1 (0.4%)
Chronic neutrophilic leukemia	1 (0.4%)
Cutaneous T-cell lymphoma	1 (0.4%)
Germ cell tumor	1 (0.4%)
Hepatoblastoma	1 (0.4%)
Hodgkin's lymphoma	1 (0.4%)
Juvenile granulosa cell tumor, amenorrhea	1 (0.4%)
Juvenile myelomonocytic leukemia	1 (0.4%)
Leukemia, Unspecified	1 (0.4%)
Neuroblastoma	1 (0.4%)
Non-Hodgkins lymphoma	1 (0.4%)
Plasmacytic Dendritic Cell Neoplasm	1 (0.4%)
Pulmonary metastases, Unspecified	1 (0.4%)
Soft tissue sarcoma	1 (0.4%)
Squamous cell carcinoma	1 (0.4%)
Post-Hematopoietic Stem Cell Transplant Management	**3(1.5%)**



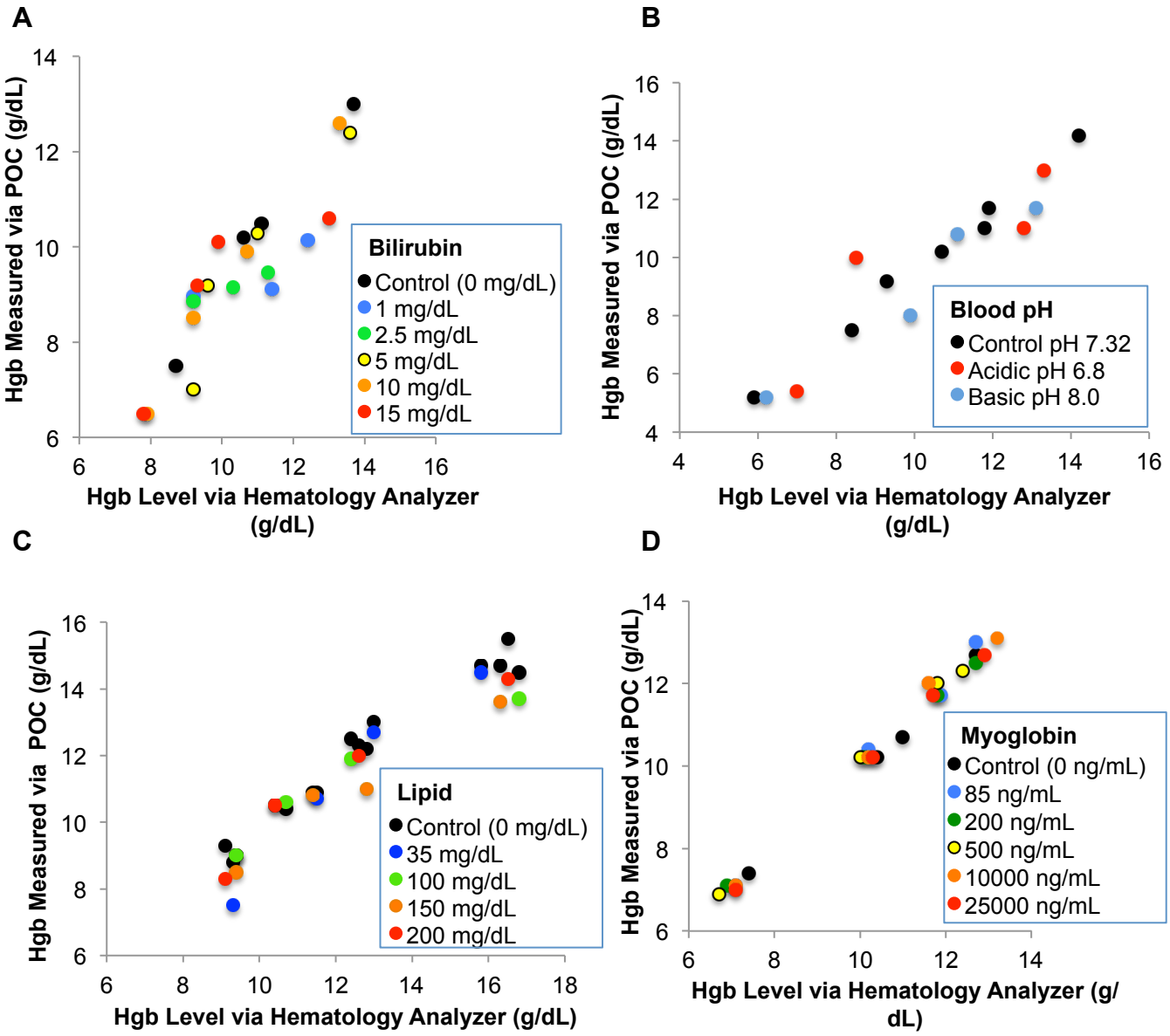
Supplemental Figure 2: Clinical Hgb levels versus a* value for each sample. Clinical Hgb results obtained from complete blood counts (CBCs) via hematology analyzers for pediatric and adult patients (n=238) are plotted against the POC anemia test results, represented by a* values. Second order polynomial fit (as done in standard calibration data in Figure 2a) indicates an r value of 0.903. Color bar correlates to resultant solution colors.



Supplemental Figure 3: Separate adult and pediatric patient data describing clinical CBC Hgb levels obtained via hematology analyzer versus visually interpreted Hgb levels and smartphone app Hgb levels. **(A-B)** CBC Hgb levels versus visually interpreted Hgb levels for adult **(A)** and pediatric **(B)** populations separated, r=0.883 and r=0.850, respectively. **(C-D)** CBC Hgb levels versus smartphone app Hgb levels for adult **(C)** and pediatric **(D)** populations separated, r=0.885 and r=0.840, respectively.



Supplemental Figure 4 Standard curves for different formulations of the POC Hemoglobin Test. Curves depict Hgb levels as measured by a hematology analyzer versus a* value, correlating to color in the CIE L*a*b space. The current formulation curve was created using our standard chemical preparation as described in methods and was used to estimate Hgb levels for our clinical blood samples. The chemical formulation of the POC Hemoglobin can be modified and finely tuned to shift the “color curves” such that resultant solution colors of the assay correspond to different hemoglobin levels. Shown here are two examples of modified formulations in which the color curve is shifted to the left (red) or right (green). Whereas the current formulation was designed for the broadest clinical applicability, left- or right-shifted formulations have more specific clinical utility. Left-shifted formulations can sensitively detect and differentiate levels of severe anemia and would be especially useful in global health and low resource settings. In contrast, clinical applications for right-shifted formulations include differentiating between milder levels of anemia or monitoring patients with polycythemia.



Supplemental Figure 5: *In vitro* interference studies. **(A)** No significant interference occurs with the addition of 0.0-15.0 mg/dL bilirubin to blood samples. **(B)** Blood pH interference results indicate no effects in the range of physiologic pH with slight differences at both severely acidic and basic blood pH levels. **(C)** Lipid interference results indicate no significant interference with the addition of 0-200 mg/dL Intralipid to blood samples. **(D)** Myoglobin interference results indicate no significant interference in the range of physiologic and injury induced myoglobin levels.