NORTHFIELD LABORATORIES INC /DE/
Form 10-K
August 14, 2007

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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

FOR ANNUAL AND TRANSITION
REPORTS PURSUANT TO SECTION 13 OR
15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

x ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended May 31, 2007

o TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from to

Commission file number 0-24050
NORTHFIELD LABORATORIES INC.
(Exact name of Registrant as Specified in Its Charter)

Delaware	**36-3378733**
(State of Other Jurisdiction of Incorporation or Organization)	(I.R.S. Employer Identification Number)
1560 Sherman Avenue, Suite 1000, Evanston, Illinois	**60201-4800**
(Address of Principal Executive Offices)	(Zip Code)

(847) 864-3500
Registrant s telephone number, including area code:

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	**Name of Each Exchange on Which Registered**
Common Stock, par value $.01 per share	The Nasdaq Stock Market LLC

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark whether the Registrant is a well known seasoned issuer, as defined in Rule 405 of the Securities Act of 1933. o Yes x No

Indicate by check mark if the Registrant is not required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934. o Yes x No

Indicate by check mark whether the Registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. x Yes o No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of the Registrant s knowledge, in the definitive proxy or information statement incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. x

Indicate by check mark whether the Registrant is a large accelerated filer, an accelerated filer or a non-accelerated filer. See definition of accelerated filer and large accelerated filer in Rule 12b-2 of the Securities Exchange Act of 1934.

Large Accelerated Filer o Accelerated Filer x Non-Accelerated Filer o

Indicate by check mark if the Registrant is a shell company (as defined in Rule 12b-2 of their Securities Exchange Act of 1934). o Yes x No

As of November 30, 2006, 26,814,475 shares of the Registrant s common stock, par value $.01 per share, were outstanding. On that date, the aggregate market value of voting stock (based upon the closing price of the Registrant s common stock on November 30, 2006) held by non-affiliates of the Registrant was $412,674,770 (26,814,475 shares at $15.39 per share).

As of July 31, 2007, there were 26,916,541 shares of the Registrant s common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Registrant s Proxy Statement for its 2007 Annual Meeting are incorporated by reference into Part III of this Form 10-K. The Registrant maintains an Internet website at *www.northfieldlabs.com.* None of the information contained on this website is incorporated by reference into this Form 10-K or into any other document filed by the Registrant with the Securities and Exchange Commission.

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CAUTIONARY STATEMENT REGARDING FORWARD-LOOKING INFORMATION

This Annual Report contains forward-looking statements concerning, among other things, our prospects, clinical and regulatory developments affecting our potential product and our business strategies. These forward-looking statements are identified by the use of such terms as intends, expects, plans, estimates, anticipates, forecasts, should, similar terms.

These forward-looking statements involve risks and uncertainties. Actual results may differ materially from those predicted by the forward-looking statements because of various factors and possible events, including those discussed under Risk Factors. Because these forward-looking statements involve risks and uncertainties, actual results may differ significantly from those predicted in these forward-looking statements. You should not place undue weight on these statements. These statements speak only as of the date of this Annual Report.

All subsequent written and oral forward-looking statements attributable to Northfield or any person acting on our behalf are qualified by this cautionary statement. We do not undertake any obligation to update or publicly release any revisions to forward-looking statements to reflect events, circumstances or changes in expectations after the time such statement is made.

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PART I

ITEM 1. *Business.*

Northfield Laboratories Inc. is a leader in developing a hemoglobin-based oxygen-carrying red blood cell substitute for the treatment of urgent, large volume blood loss in trauma and resultant surgical settings. The initial indication we are seeking for our product, PolyHeme®, is the early treatment of urgent, life-threatening blood loss following trauma when donated blood may not be immediately available. We believe that this indication addresses a critical unmet medical need, since some trauma patients bleed to death before they have access to blood. We believe that PolyHeme has the potential to improve survival in critically injured patients who have delayed access to blood and whose expected mortality without oxygen-carrying replacement would be considerably greater.

In July 2006 we announced the completion of patient enrollment in our pivotal Phase III trial with PolyHeme. This was the first study in the United States to evaluate the safety and efficacy of an oxygen-carrying red blood cell substitute beginning at the scene of injury and continuing during transport and in the early hospital period. A total of 32 Level I trauma centers across the country participated in our study. The trial had an enrollment of 720 patients.

We reported the preliminary top-line results of our study in December 2006 and announced additional results from the study in May 2007. The primary efficacy endpoint of the study was a dual superiority-noninferiority assessment of mortality at 30 days after injury. The margin to assess noninferiority, using the upper limit of the confidence interval, was set at 7% more than control. In the primary modified intent to treat population, representing the 714 patients both randomized and treated, the upper limit was 7.65%. These results did not achieve the primary endpoint for efficacy in the primary analysis population as specified in the protocol. In the as treated population, comprised of the same 714 patients, but analyzed in accordance with the treatment the patients actually received, the upper limit was 7.06%. In the per protocol population, which included the 590 patients both appropriately randomized and correctly treated as specified in the trial protocol, the upper limit was 6.21%.

Day 30 mortality was also a primary safety endpoint. There was no statistically significant difference in mortality at 30 days between patients who received PolyHeme beginning at the scene and continuing for up to 12 hours following injury, and control patients who received the standard of care, including early blood.

We believe the results of this study are best understood in the context of bleeding patients who do not have early access to blood transfusion, as did the patients in our trial. Mortality rates in that scenario would be considerably higher than those observed in the control patients in the largely urban setting of our trial, where transit times were relatively short and access to blood was rapid. We believe that when our data are extrapolated to patients who need an oxygen carrier and have delayed access to blood, PolyHeme can play an important role in saving lives.

We are presently preparing a Biologics License Application, or BLA, for PolyHeme for submission to the U.S. Food and Drug Administration, or FDA. We have submitted a detailed summary of our trial data to FDA and have participated in a pre-BLA meeting with the Agency. Our goal is to submit our BLA to FDA during the first half of calendar 2008. We also plan to request priority review of our BLA. We believe PolyHeme satisfies the stated criteria for priority review based on its potential to address an unmet medical need.

We believe that PolyHeme ultimately represents a substantial global market opportunity, based on the need for a universally compatible, immediately available oxygen-carrying product with extended shelf-life and PolyHeme s potential for eventual approval for multiple indications.

BACKGROUND

The principal function of human blood is to transport oxygen throughout the body. The lack of an adequate supply of oxygen as a result of blood loss can lead to organ dysfunction or death. The transfusion of human blood is presently the only effective means of immediately restoring diminished oxygen-carrying capacity resulting from blood loss. We estimate that approximately 14 million units of blood are transfused in the United States each year, of which approximately 8.4 million units are administered to patients suffering the effects of acute blood loss.

The use of donated blood in transfusion therapy, while effective in restoring an adequate supply of oxygen in the body of the recipient, has several limitations. Transfused blood can be used only in recipients having a blood

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type compatible with that of the donor. Delays in treatment resulting from the necessity of blood typing prior to transfusion, together with the limited shelf-life of blood and the limited availability of certain blood types, impose constraints on the immediate availability of compatible blood for transfusion. In addition, although testing procedures exist to detect the presence of certain diseases in blood, these procedures cannot eliminate completely the risk of blood-borne disease. There is no commercially available hemoglobin-based oxygen-carrying red blood cell substitute in this country which addresses these problems.

Our founding scientific research team was responsible for the original concept, the early development and evaluation and clinical testing of PolyHeme, and has authored over 100 publications in the scientific literature relating to hemoglobin-based oxygen carrier research and development. Members of our scientific research team have been involved in development of national transfusion policy through their participation in the activities of the National Heart Lung Blood Institute, the National Blood Resource Education Panel, the Department of Defense, the American Association of Blood Banks, the American Blood Commission, the American College of Surgeons and the American Red Cross.

OUR PRODUCT

Our product, PolyHeme, is a human hemoglobin-based oxygen-carrying red blood cell substitute in development for the treatment of life-threatening blood loss when an oxygen-carrying fluid is required and red blood cells are not available.

PolyHeme is a solution of chemically modified human hemoglobin which simultaneously restores lost blood volume and hemoglobin levels. Hemoglobin is the oxygen-carrying component of the red blood cell. PolyHeme is designed for rapid, massive infusion, which is the way blood is transfused in trauma patients.

We purchase donated red blood cells from the American Red Cross and Blood Centers of America for use as the starting material for PolyHeme. We use a proprietary process of separation, filtration, chemical modification, purification and formulation to produce PolyHeme. Hemoglobin is first extracted from red blood cells and filtered to remove impurities. The hemoglobin is next chemically modified using a multi-step process to create a polymerized form of hemoglobin. The modified hemoglobin is then incorporated into a solution which can be administered as an alternative to transfused blood. PolyHeme is designed to avoid potential undesirable effects such as vasoconstriction, kidney dysfunction, liver dysfunction and gastrointestinal distress.

One unit of PolyHeme contains 50 grams of modified hemoglobin, approximately the same functional amount of hemoglobin delivered by one unit of transfused blood.

We believe PolyHeme will have the following important benefits:

Universal Compatibility. Our clinical studies to date indicate that PolyHeme is universally compatible and accordingly does not require blood typing prior to use. The potential benefits of universal compatibility include the ability to use PolyHeme immediately, the elimination of transfusion reactions and the reduction of the inventory burden associated with maintaining sufficient quantities of all blood types.

Oxygen-Carrying Ability. Our clinical studies indicate that PolyHeme carries as much oxygen and loads and unloads oxygen in a manner similar to transfused blood.

Blood Volume Replacement. Infusion of PolyHeme also restores blood volume. Therefore, PolyHeme should be useful as an oxygen-carrying red blood cell substitute in the treatment of hemorrhagic shock resulting from extensive blood loss.

Impact on Disease Transmission. We believe, and laboratory tests have thus far indicated, that the manufacturing process used to produce PolyHeme substantially reduces the concentration of infectious agents known to be responsible for the transmission of blood-borne diseases. There are no currently approved methods in this country to reduce the quantity of such infectious agents in red blood cells.

Extended Shelf Life. We estimate that PolyHeme has a shelf life in excess of 12 months under refrigerated conditions, well in excess of the 28 to 42 day refrigerated shelf life currently permitted for blood.

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OUR PIVOTAL PHASE III TRIAL

Patient enrollment in our pivotal Phase III trial, in which PolyHeme was used for the first time to treat severely injured patients in hemorrhagic shock before they reached the hospital, was completed in July 2006. Under this protocol, treatment with PolyHeme began at the scene of the injury or in the ambulance and continued during transport and the initial 12 hour post-injury period in the hospital. The study was based on two potential life-saving benefits. The first was starting infusion of an oxygen-carrying fluid at the scene of injury and continuing during transport to the hospital. Because blood is not routinely carried in ambulances, PolyHeme represented a potential improvement over the current standard of care.

The second opportunity was the potential to improve the outcome associated with the use of donated blood in the early hospital period in critically injured patients. Although blood is the current standard of care, there is a growing body of scientific evidence pointing to the adverse immunomodulatory effects of early blood transfusion in trauma patients, specifically the incidence of multiple organ failure and the resultant associated mortality. There are also published data indicating that these same effects may not occur with PolyHeme. While blood is available in the hospital, PolyHeme was evaluated as a potentially better alternative for the early care of the injured patient.

A total of 32 Level I trauma centers across the United States participated in our study. Each of the sites that participated in the trial is designated as a Level I trauma center, indicating its capacity to treat the most severely injured trauma patients. A total of 720 patients was enrolled.

As part of our trial protocol, an Independent Data Monitoring Committee, or IDMC, consisting of independent medical and biostatistical experts, was responsible for periodically evaluating the safety data from the trial and making recommendations relating to continuation or modification of the trial protocol to minimize any identified risks to patients. The protocol included four planned evaluations by the IDMC that occurred after 60, 120, 250 and 500 patients had been enrolled and monitored for a 30-day follow up period. The IDMC focused its reviews on mortality and serious adverse events and evaluated all safety data as the trial continued. We received a recommendation from the IDMC after each review, but we did not have access to the trial data reviewed by the IDMC until enrollment had been completed and the database had been locked.

The IDMC completed all four of the planned reviews of the trial data and, in each case, recommended continuation of the trial without modification through completion of patient enrollment. This was the first time that a trial of a hemoglobin-based oxygen carrier passed this patient evaluation milestone in a high risk trauma population.

As part of its third interim evaluation, the IDMC also conducted an adaptive sample size determination as specified in the trial protocol. A blinded power analysis was performed to determine if any increase in the sample size of the study was necessary. The assessment was based on a comparison between the mortality rate predicted in the protocol and the observed mortality rate in the trial to date. The IDMC concluded that no adjustment in the number of patients to be enrolled in the study would be required. Therefore, planned enrollment remained at 720 patients.

TRIAL DESIGN AND CLINICAL ENDPOINTS

Prior to the launch of our pivotal Phase III trial, we reached agreement with FDA on Special Protocol Assessment, or SPA, for the trial. SPA is designed to facilitate the review and approval of drug and biological products by allowing for FDA evaluation of the trial sponsor s proposed design and size of clinical trials intended to form the primary basis for an efficacy claim in a BLA submitted to FDA. Our SPA reflects an agreement with FDA on our trial design, the trial endpoints and the broad concepts for clinical indications those endpoints would support in an application for product approval by FDA.

Our pivotal Phase III trial was conducted under a federal regulation, 21 CFR 50.24, that permits research to be conducted in certain emergent, life-threatening situations using an exception from the requirement for prospective informed consent by individual patients. Participation by each clinical trial site is overseen by an IRB. Under the applicable federal regulation, an IRB may give approval for patient enrollment in trials in emergency situations without requiring individual informed consent provided specific criteria are met: patients must be in a life-

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threatening situation for which available treatments are unproven or unsatisfactory and scientific evidence must be needed to assess the safety and effectiveness of alternative treatments; the experimental therapy being evaluated must also provide patients potential for direct clinical benefit, medical intervention must be required before informed consent can be obtained; and it must be impracticable to conduct the trial using only consenting patients. Where informed consent is feasible, the sponsor s consent procedures and forms must be reviewed and approved by the IRB, and attempts to obtain informed consent must be documented by the sponsor. Before enrollment can begin, the regulation requires public disclosure of information about the trial, including the potential risks and benefits, and the formation of an independent monitoring committee to oversee the trial. Consultation must also occur with representatives of the community where the study will be conducted and from which the study population will be drawn. Each of the clinical sites that participated in our trial completed the required public disclosure and community consultation procedures and received IRB approval to enroll patients in accordance with the trial protocol.

Under our trial protocol, patients enrolled in the trial were randomly assigned to either a treatment group or a control group. The treatment group received PolyHeme at the scene of injury or in the ambulance during transport, and continued to receive PolyHeme, if necessary, during the initial 12 hour post-injury period in the hospital. Patients in the treatment group were eligible to receive a maximum of six units of PolyHeme. The control group received crystalloid solution in the field and donated blood, if necessary, in the hospital.

Evaluation of the efficacy data generated in our pivotal Phase III trial focused on patient survival at 30 days after the date of injury. The mortality rate observed for patients in the treatment group in our trial was compared statistically with the mortality rate for patients in the control group. A key feature of our SPA is the agreement on dual primary endpoints of superiority and noninferiority between the treatment and control groups. The trial design is unusual in that either of the primary endpoints of superiority or noninferiority may be used to provide evidence of efficacy.

Patient enrollment in our trial was conducted primarily in urban settings because urban Level I trauma centers have the patient volume, resources and sophistication to conduct a clinical trial of this complexity. In urban areas, however, transit times in the ambulance are brief, and it was understood that patients in the control group would reach the hospital, where they would have early access to blood, in relatively short periods of time. As a result, it was recognized that the observed outcome in our trial might not demonstrate the expected survival benefit that might occur if the trial were being conducted in the rural setting, where more extended transport times are typical and where the availability of blood is often limited. It was therefore understood that the data from our study would be extrapolated to the intended setting and the intended patient population who require transfusion but have delayed access to blood.

PHASE III TRIAL RESULTS

Efficacy Analysis

The primary efficacy endpoint for our pivotal Phase III trial was a dual superiority-noninferiority assessment of mortality at 30 days after injury. A noninferiority endpoint requires the establishment of a relative margin around the control outcome. The margin to assess noninferiority in our study, using the upper limit of the confidence interval, was set at 7% more than control.

The protocol for our trial specified multiple patient populations for analysis. The primary modified intent to treat, or MITT, population is comprised of all 714 patients both randomized and treated. In this population, patients were analyzed *as randomized*, and not based on the actual treatment they received. Overall, 41 randomized patients in the study received the incorrect treatment. There were 21 patients randomized to PolyHeme who did not receive any PolyHeme were analyzed in the PolyHeme group. Two of these patients died. Similarly, there were 20 patients randomized to control who received PolyHeme, and were analyzed in the control group. One of those patients died.

The as treated, or AT, population is also comprised of all 714 patients both randomized and treated. However, in this population all patients were analyzed according to the *treatment they actually received*. Therefore, all patients who received PolyHeme were analyzed in the PolyHeme group, and all patients who did not receive any

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PolyHeme were analyzed in the control group. Although the AT population was pre-specified for safety rather than efficacy, it provides a meaningful opportunity to assess mortality as well.

The per protocol, or PP, population is comprised of the 590 patients both *appropriately randomized and correctly treated* according to the protocol. The PP population does not include 124 patients who had major protocol violations related to eligibility or treatment regimen. Since the PP patients were treated exactly as specified in the protocol, Northfield believes the PP population represents the clearest opportunity to assess a treatment effect of PolyHeme in this setting.

In the primary MITT population, the upper limit of the confidence interval in our pivotal Phase III trial was 7.65%. These results did not achieve the primary endpoint for efficacy in the primary analysis population as specified in the protocol. In the AT population, the upper limit was 7.06%. In the PP population, the upper limit was 6.21%. The data are shown in the following table:

DAY 30 MORTALITY

	PolyHeme Group (Deaths/Number of Patients)	**Mortality Rate (%)**	**Control Group (Deaths/Number of Patients)**	**Mortality Rate (%)**	**Upper Limit (%)**
MITT	47/350	13.4	35/364	9.6	7.65
AT	46/349	13.2	36/365	9.9	7.06
PP	31/279	11.1	29/311	9.1	6.21

Secondary efficacy endpoints of the study included Day 1 mortality, the incidence of multiple organ failure, the use of donated blood through Day 1, and an analysis of mortality by the mechanism of injury (blunt versus penetrating trauma). The incidence of transfusion of donated blood was significantly lower in the PolyHeme group at 41% than the control group at 51% ($p \leq 0.05$). A p-value ≤ 0.05 indicates that the probability the result is due to chance is equal to or less than 5%. There was no statistically significant difference between PolyHeme and control patients for the other efficacy endpoints. The Day 1 mortality data is shown in the following table:

DAY 1 MORTALITY

	PolyHeme Group (Deaths/Number of Patients)	**Mortality Rate (%)**	**Control Group (Deaths/Number of Patients)**	**Mortality Rate (%)**
MITT	34/350	9.7	27/364	7.4
AT	33/349	9.5	28/365	7.7
PP	20/279	7.2	22/311	7.1

Safety Analysis

The primary safety endpoints in the study were Day 1 mortality, Day 30 mortality and durable serious adverse events, or SAEs. Durable SAEs were prospectively defined as SAEs which resulted in a permanently disabling outcome. There were two durable SAEs in each group. There was no statistically significant difference in mortality at Day 1 or Day 30 between patients who received PolyHeme beginning at the scene and continuing for up to 12 hours following injury, and control patients who received the standard of care, including early blood.

In addition to these primary safety endpoints, all adverse events, or AEs, SAEs, cardiac SAEs and myocardial infarction, or MI, were also analyzed. Virtually all patients in the study had adverse events. The overall incidence of AEs in the PolyHeme group of 93% (324 patients) was higher than that in the control group of 88% (322 patients), ($p \leq 0.05$). The most common AEs in both groups were anemia, fever and electrolyte imbalances. The overall incidence of SAEs in the study was 40% (141 patients) in the PolyHeme group and 35% (126 patients) in the control group ($p > 0.05$). The most common SAEs in both groups were shock, pneumonia and respiratory failure.

The incidence of cardiac AEs was 35% (123 patients) in the PolyHeme group and 29% (105 patients) in the control group ($p > 0.05$). The incidence of cardiac SAEs was 7% (23 patients) in the PolyHeme group and 4%

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(16 patients) in the control group (p>0.05). The overall incidence of MI in the study as reported by investigators was 2%: eleven PolyHeme patients and three control patients (p≤0.05). Three PolyHeme patients and one control patient died.

The medical literature documents the difficulty of making an accurate diagnosis of MI in trauma patients for multiple reasons, including direct trauma to the chest. MI and myocardial ischemia are traditionally assessed by electrocardiograms and measurement of the levels of the cardiac enzymes Troponin I and CK-MB, both of which can be altered by direct trauma. Approximately 75% of the patients in this study had abnormal electrocardiograms or elevated cardiac enzymes. Because of the disparity between the low number of reported MIs and the high incidence of abnormal electrocardiograms and elevated cardiac enzymes, Northfield has established an independent panel of cardiac experts to review the cardiac profiles of all 720 randomized patients in a blinded fashion to categorize MIs in the study.

THE MARKET OPPORTUNITY

Transfused blood represents a multi-billion dollar market in the United States. We estimate that approximately 14 million units of blood are transfused in the United States each year. The transfusion market in the United States consists of two principal segments.

The acute blood loss segment, which we estimate comprises approximately 60% of the transfusion market, includes transfusions required in connection with trauma, surgery and unexpected blood loss. The chronic blood loss segment, which we believe represents approximately 40% of the transfusion market, includes transfusions in connection with general medical applications and chronic anemias.

We believe that PolyHeme will be useful in the treatment of acute blood loss. The principal clinical settings in which patients experience acute blood loss are unplanned blood loss in trauma, emergency surgery and other causes of urgent hemorrhage, and planned blood loss in elective surgery. For trauma and emergency surgical procedures, the immediate availability and universal compatibility of PolyHeme may provide significant advantages over transfused blood by avoiding the delay and opportunities for error associated with blood typing. In elective surgery, PolyHeme has the potential to increase transfusion safety for patients and health care professionals.

In addition to the foregoing applications for which blood is currently used, there exist potential sources of demand for which blood is not currently used and for which PolyHeme may be suitable. These include applications in which the required blood type is not immediately available or in which transfusions are desirable but not given for fear of a transfusion reaction due to difficulty in identifying compatible blood. For example, we believe PolyHeme may be used by Emergency Medical Technicians at the scene of injury and during transport to the hospital by ground or air ambulance. Emergicenters and surgicenters also both experience events where PolyHeme may be useful. In addition, the United States military has expressed interest in the use of hemoglobin-based oxygen carriers for the treatment of battlefield casualties. There may also be potential market opportunities for PolyHeme in novel areas such as ischemia, oncology, organ preservation, pancreatic islet cell transplantation and sickle cell anemia.

We believe that the initial indication we are seeking for PolyHeme - unavailability of red blood cells represents the greatest clinical and commercial opportunity for the product since it addresses a critical unmet medical need and has the potential to provide a survival benefit. At present, no adequate alternative to blood exists for the treatment of patients with life-threatening hemorrhage who need replacement of lost oxygen-carrying capacity. PolyHeme is the first hemoglobin-based oxygen carrier to pursue this indication, and our goal is for PolyHeme to be first to the market for this indication.

An independent assessment of the potential market opportunity for PolyHeme, using a variety of primary and secondary sources along with original research, indicates a potential market opportunity in the United States for PolyHeme s initial indication of unavailability in excess of 350,000 units per year, representing an estimated market value of $400 to $500 million. In addition, the global opportunity for our initial indication, as well as multiple other potential indications, is estimated to be six to seven times the U.S. unavailability projection, or $2 to $3 billion.

In an effort to further understand the potential market opportunity for PolyHeme, we have initiated pharmacoeconomic research designed to better understand and help develop policy and reimbursement strategies

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for the commercialization of PolyHeme. This work will continue during the current fiscal year. We continue to work with community leaders, hospitals and emergency response teams to identify issues and opportunities associated with the adoption of PolyHeme in the treatment of life threatening blood loss when red blood cells are not available.

MANUFACTURING AND MATERIAL SUPPLY

We use a proprietary process of separation, filtration, chemical modification, purification and formulation to produce PolyHeme. We have produced PolyHeme for use in our clinical trials in our pilot manufacturing facility in Mt. Prospect, Illinois. Our pilot manufacturing facility has the capacity to produce approximately 10,000 units of PolyHeme per year. We plan to submit our BLA based on the use of this facility for our initial product production.

We are presently planning to construct an expanded commercial manufacturing facility with the capacity to produce 100,000 units or more of PolyHeme per year. In June 2006, we purchased the 106,000 square foot building in Mt. Prospect, Illinois in which our pilot manufacturing facility is located and plan to construct our expanded commercial manufacturing facility at this site. In addition to manufacturing operations, the facility houses laboratory, quality control and administrative personnel. We have conducted certain engineering and size optimization activities for the planned facility. We will need to raise additional funds before we are able to proceed with this manufacturing expansion.

If FDA approval of PolyHeme is received, we presently intend to manufacture PolyHeme for commercial sale in the United States using our own facilities. We currently have licensing arrangements for the manufacture of PolyHeme in certain countries outside the United States. We may also consider entering into other collaborative relationships with strategic partners which could involve arrangements relating to the manufacture of PolyHeme.

The successful commercial introduction of PolyHeme will also depend on an adequate supply of blood to be used as a starting material. We believe that an adequate supply of blood is obtainable through the voluntary blood services sector. We have had extensive discussions with existing blood collection agencies, including the American Red Cross and Blood Centers of America, regarding sourcing of blood. We currently have short-term purchasing contracts with each of these agencies. We also have an agreement in place with hemerica, Inc., a subsidiary of Blood Centers of America, under which hemerica would supply us with up to 160,000 units per year of packed red cells, the source material for PolyHeme.

MARKETING STRATEGIES

If FDA approval of PolyHeme is received, we presently intend to market PolyHeme with our own sales force in the United States. We are exploring potential sales, marketing and distribution plans for PolyHeme. We may also consider entering into collaborative relationships with strategic partners which could involve arrangements relating to the sale and marketing of PolyHeme.

We have entered into license agreements with Pfizer Inc. and Hemocare Ltd., an Israeli corporation, to develop, manufacture and distribute PolyHeme in certain European, Middle Eastern and African countries. The license agreements permit Pfizer and Hemocare to utilize PolyHeme and related manufacturing technology in return for the payment of royalties based upon sales of PolyHeme in the licensed territories.

In March 1989, we granted Pfizer an exclusive license to manufacture, promote and sell PolyHeme in a territory encompassing the United Kingdom, Germany, the Scandinavian countries and certain countries in the Middle East. Under the terms of the license agreement, Pfizer has the right, upon consultation with us, to promote and sell PolyHeme in the licensed territory under its own trademark. The license agreement with Pfizer provides for a nonrefundable initial fee, two additional nonrefundable fees based upon achievement of certain regulatory milestones,

and ongoing royalty payments based upon net sales of PolyHeme in the licensed territory. The license agreement further provides for a reduction of royalty payments upon the occurrence of certain events. In addition, under the terms of the agreement, we have the right under certain circumstances to direct Pfizer s clinical testing of PolyHeme in the licensed territory.

In July 1990, we granted Hemocare an exclusive license to manufacture, promote and sell PolyHeme in a territory encompassing Israel, Cyprus, Ivory Coast, Jordan, Kenya, Lebanon, Liberia, Nigeria and Zaire. Under the

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terms of the license agreement, Hemocare has the right, upon consultation with us, to promote and sell PolyHeme in the licensed territory under its own trademark. The license agreement with Hemocare provides for royalty payments based on net sales of PolyHeme in the licensed territory. In addition, under the terms of the license agreement, we have the right under certain circumstances to direct Hemocare s clinical testing of PolyHeme in the licensed territory.

Our present plans with respect to the marketing and distribution of PolyHeme in the United States and overseas may change significantly based on the results of the clinical testing of PolyHeme, the establishment of relationships with strategic partners, changes in the scale, timing and cost of our commercial manufacturing facility, competitive and technological advances, the FDA regulatory process, the availability of additional funding and other factors.

COMPETITION

If approved for commercial sale, PolyHeme will compete directly with established therapies for acute blood loss and may compete with other technologies currently under development. We believe that the treatment of urgent blood loss is the setting most likely to lead to FDA approval and the application which presents the greatest market opportunity. However, several companies have developed or are in the process of developing technologies which are, or in the future may be, the basis for products which will compete with PolyHeme. Certain of these companies are pursuing different approaches or means of accomplishing the therapeutic effects sought to be achieved through the use of PolyHeme.

Biopure Corporation, which is developing a bovine hemoglobin-based oxygen carrier product, has stated that it intends to pursue an indication for cardiovascular ischemia and is conducting trials to explore that indication outside the United States. Biopure has submitted a marketing authorization application to the United Kingdom s Medicines and Healthcare Products Regulatory Agency for its Hemopure product for the treatment of acutely anemic adult orthopedic surgery patients less than 80 years of age and has reported receiving a provisional letter raising questions about its application. Biopure has also reported that the Naval Medical Research Center has assumed primary responsibility for submitting an Investigational New Drug application to conduct a clinical trial using Biopure s product for the out-of-hospital treatment of trauma patients. This proposed study protocol is currently on clinical hold. Synthetic Blood International, Inc., which is developing a perfluorocarbon-based oxygen carrier product, completed an eight patient proof-of-concept study in patients with traumatic brain injury at one center in the United States. Sangart, Inc., a private company, is enrolling patients in two parallel European Phase III trials in elective orthopedic surgery to gauge the ability of its human hemoglobin-based product to prevent and treat hemodynamic instability, especially hypotension, or low blood pressure, during surgery. Hemobiotech, a private company, is developing a bovine hemoglobin-based solution. It has not reported conducting clinical trials in the United States to date.

We believe that important competitive factors in the market for oxygen carrier products will include the relative speed with which competitors can develop their respective products, complete the clinical testing and regulatory approval process and supply commercial quantities of their products to the market. In addition to these factors, competition is expected to be based on the effectiveness of oxygen carrier products and the scope of the intended uses for which they are approved, the scope and enforceability of patent or other proprietary rights, product price, product supply and marketing and sales capability. We believe that our competitive position will be significantly influenced by the timing of the clinical testing and regulatory filings for PolyHeme, our ability to expand our manufacturing capability to permit commercial production of PolyHeme, if approved, and our ability to maintain and enforce our proprietary rights covering PolyHeme and its manufacturing process.

GOVERNMENT REGULATION

The commercial manufacture and distribution of PolyHeme and the operation of our manufacturing facilities will require the approval of United States government authorities as well as those of foreign countries if we expand

overseas. In the United States, FDA regulates medical products, including the category known as biological products, which includes PolyHeme. The Federal Food, Drug and Cosmetic Act and the Public Health Service Act govern the testing, manufacture, safety, effectiveness, labeling, storage, record keeping, approval, advertising and

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promotion of PolyHeme. In addition to FDA laws and regulations, we are also subject to other federal and state regulations, such as the Occupational Safety and Health Act and the Environmental Protection Act. Product development and approval within this regulatory framework requires a number of years and involves the expenditure of substantial funds.

The steps required before a biological product may be sold commercially in the United States include preclinical testing, the submission to FDA of an Investigational New Drug application, clinical trials in humans to establish the safety and effectiveness of the product, the submission to FDA of a Biologics License Application, or BLA, relating to the product and the manufacturing facilities to be used to produce the product for commercial sale, and FDA approval of a BLA. After a BLA is submitted there is an initial review by FDA to be sure that all of the required elements are included in the submission. There can be no assurance that the submission will be accepted for filing or that FDA may not issue a refusal to file, or RTF. If an RTF is issued, there is opportunity for dialogue between the sponsor and FDA in an effort to resolve all concerns. There can be no assurance that such a dialogue will be successful in leading to the filing of the BLA. If the submission is filed, there can be no assurance that the full review will result in product approval.

Preclinical tests include evaluation of product chemistry and studies to assess the safety and effectiveness of the product in animals. The results of the preclinical tests are submitted to FDA as part of the Investigational New Drug application. The goal of clinical testing is the demonstration in adequate and well-controlled studies of substantial evidence of the safety and effectiveness of the product in the setting of its intended use. With a few narrow exceptions, FDA regulations require that patients participating in clinical studies must provide informed consent. Under a federal regulation, 21 CFR 50.24, clinical research can be conducted in certain emergent, life-threatening situations without obtaining prospective informed consent from individual patients. To meet the requirements of this exception from informed consent requirements, participation by each clinical trial site is overseen by an IRB. Under the applicable federal regulation, an IRB may give approval for patient enrollment in trials in emergency situations without requiring individual informed consent provided specific criteria are met. Patients must be in a life-threatening situation for which available treatments are unproven or unsatisfactory and scientific evidence must be needed to assess the safety and effectiveness of alternative treatments. The experimental therapy being evaluated must also provide patients potential for direct clinical benefit. In addition, medical intervention must be required before informed consent can be obtained and it must be impracticable to conduct the trial using only consenting patients. Where informed consent is feasible, the sponsor s consent procedures and forms must be reviewed and approved by the IRB, and attempts to obtain informed consent must be documented by the sponsor. Before enrollment can begin, the regulation requires public disclosure of information about the trial, including the potential risks and benefits, and the formation of an independent monitoring committee to oversee the trial. Consultation must also occur with representatives of the community where the study will be conducted and from which the study population will be drawn. Each of the clinical sites that participated in our trial completed the required public disclosure and community consultation procedures and received IRB approval to enroll patients in accordance with the trial protocol.

Typically, the trial design protocols and effectiveness endpoints are established in consultation with the FDA. At the sponsor s request, FDA may meet with sponsors for the purpose of reaching agreement on the design and size of clinical trials intended to form the primary basis of an efficacy claim in a BLA. If an agreement is reached, the FDA will reduce the agreement to writing. This agreement is called a special protocol assessment, or SPA. The SPA agreement, however, is not a guarantee of product approval by FDA or approval of any permissible claims about the product. In particular, it is not binding on the FDA if previously unrecognized public health concerns later come to light, other new scientific concerns regarding product safety or efficacy arise, the sponsor fails to comply with the protocol agreed upon, or FDA s reliance on data, assumptions or information are determined to be wrong. Even after an SPA agreement is finalized, the SPA agreement may be changed by the sponsor company or the FDA on written agreement of both parties, and the FDA retains significant latitude and discretion in interpreting the terms of the SPA agreement and the data and results from any study that is the subject of the SPA agreement.

The results of preclinical and clinical testing are submitted to the FDA from time to time throughout the trial process. In addition, before approval for the commercial sale of a product can be obtained, results of the preclinical and clinical studies must be submitted to FDA in the form of a BLA. The testing and approval process requires substantial time and effort and there can be no assurance that any approval will be granted on a timely basis, if at all.

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The approval process is affected by a number of factors, including the severity of the condition being treated, the availability of alternative treatments and the risks and benefits demonstrated in clinical trials. Additional preclinical studies, clinical trials or manufacturing data may be requested during the FDA review process and may delay product approval. After FDA approval for its initial indication, further clinical trials may be necessary to gain approval for the use of a product for additional indications. FDA may also require post-marketing testing, which can involve significant expense, to monitor for adverse effects.

Among the conditions for BLA approval is the requirement that the prospective manufacturer s quality controls and manufacturing procedures conform to FDA requirements. In addition, domestic manufacturing facilities are subject to biennial FDA inspections and foreign manufacturing facilities are subject to periodic FDA inspections or inspections by the foreign regulatory authorities with reciprocal inspection agreements with FDA. Outside the United States, we are also subject to foreign regulatory requirements governing clinical trials and marketing approval for medical products. The requirements governing the conduct of clinical trials, product licensing, pricing and reimbursement vary widely from country to country.

Our regulatory strategy is to pursue FDA approval of PolyHeme in the United States. We have submitted a detailed summary of our trial data to FDA and have participated in a pre-BLA meeting with the agency. Our goal is to submit our BLA to FDA during the first half of calendar 2008. We intend to request priority review at the time our BLA is submitted to FDA. FDA may grant priority review to products that provide significant improvement in the safety or effectiveness of the treatment, diagnosis or prevention of serious or life-threatening disease. We believe PolyHeme satisfies the stated criteria for this designation based on its potential to improve patient survival. Products awarded priority review are given abbreviated review goals by the agency. FDA makes a decision as part of the agency s review of the application for filing. We cannot guarantee that the agency will grant priority review and cannot predict what impact, if any, priority review will have on the review time for PolyHeme. Priority review does not ensure that FDA will ultimately approve PolyHeme. See risk factor section for all additional disclosures.

We are also exploring the potential to seek regulatory approval outside the United States. This may involve licensing or other arrangements with other foreign or domestic companies. To date, we have not conducted any clinical trials of PolyHeme outside of the United States.

PATENTS AND PROPRIETARY RIGHTS

With the expiration in 2006 of five of our United States patents and issuance of two new patents, we now own six United States patents and several pending United States patent applications relating to PolyHeme, its uses and certain of our manufacturing processes. We have obtained counterpart patents and have additional patent applications pending in Canada, Israel, Mexico, Australia, New Zealand, Iceland, Norway, India, the Russian Federation, South Africa, Brazil, various Asian countries and various European Union countries. Our United States patents have various expiration dates; the latest to expire of our United States patents has a term that extends to 2025. Our broadest issued United States patent was originally scheduled to expire in 2006 but has been extended by the United States Patent Office to 2007. A further application for a one-year patent term extension has been filed in the Patent Office. If that extension is granted, that patent will expire in 2008 and a further application for a one-year extension will then be filed with the Patent Office seeking an extension until 2009. No extensions are possible beyond 2011. We have a policy of seeking patents covering the important techniques, processes and applications developed from our research and all modifications and improvements thereto. We also rely upon trade secrets, know-how, continuing technological innovations and licensing opportunities to develop and maintain our competitive position. We will continue to seek appropriate protection for our proprietary technology.

We cannot ensure that our patents or other proprietary rights will be determined to be valid or enforceable if challenged in court or administrative proceedings or that we will not become involved in disputes with respect to the

patents or proprietary rights of third parties. An adverse outcome from these proceedings could subject us to significant liabilities to third parties, require disputed rights to be licensed from third parties or require us to stop using our technology, any of which would result in a material adverse effect on our results of operations and our financial position.

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RESEARCH AND DEVELOPMENT

The principal focus of our research and development effort is the support of the clinical trials necessary for regulatory approval of PolyHeme. We also continue to assess our manufacturing processes for improvements and in preparation for FDA s required pre-approval inspection.

In fiscal 2007, 2006 and 2005, our research and development expenses totaled $21,060,000, $24,165,000 and $16,600,000, respectively. We anticipate that our research and development expenses, which include expenses relating to the preparation and submission of our BLA for PolyHeme, will continue during fiscal 2008 at approximately the same level as during our 2007 fiscal year.

HUMAN RESOURCES

As of August 1, 2007, we had 93 employees, of whom 82 were involved in research and development and nine were responsible for financial and other administrative matters. We also had consulting arrangements with 30 individuals and organizations as of that date. None of our employees are represented by labor unions, and we are not aware of any organizational efforts on behalf of any labor unions involving our employees. We consider our relations with our employees to be excellent.

CORPORATE INFORMATION

We were incorporated under the laws of the State of Delaware in June 1985. Our website is *www.northfieldlabs.com*. We make available free of charge on our website our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports of Form 8-K, Forms 3, 4 and 5 filed on behalf of directors and executive officers and any amendments to such reports filed pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as soon as reasonably practicable after such material is electronically filed with, or furnished to, the Securities and Exchange Commission, or SEC. Copies of our code of business conduct and ethics and other corporate governance documents are available on our website.

Item 1A. *Risk Factors.*

You should consider the following matters when reviewing the information contained in this document. You also should consider the other information incorporated by reference in this document.

We are a development stage company without revenues or profits.

Northfield was founded in 1985 and is a development stage company. Since 1985, we have been engaged primarily in the development and clinical testing of PolyHeme. No revenues have been generated to date from commercial sales of PolyHeme. Our revenues to date have consisted solely of license fees. We cannot ensure that our clinical testing will be successful, that regulatory approval of PolyHeme will be obtained, that we will be able to manufacture PolyHeme at an acceptable cost and in appropriate quantities or that we will be able to successfully market and sell PolyHeme. We also cannot ensure that we will not encounter unexpected difficulties which will have a material adverse effect on us, our operations or our properties.

We have a history of losses and our future profitability is uncertain.

From our inception through May 31, 2007, we have incurred net operating losses totaling $199,808,000. We will require substantial additional expenditures to pursue regulatory approval for PolyHeme, to establish expanded commercial scale manufacturing processes and facilities, and to establish marketing, sales and administrative

capabilities. These expenditures are expected to result in substantial losses for at least the next few years and are expected to substantially exceed our currently available capital resources. The expense and the time required to realize any product revenues or profitability are highly uncertain. We cannot ensure that we will be able to achieve product revenues or profitability on a sustained basis or at all.

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Our financial resources are limited and we will need to raise additional capital in the future to continue our business.

As of May 31, 2007, we had cash and cash equivalents of approximately $40,688,000. During our 2007 fiscal year, we spent approximately $34,969,000 to operate our business, and we expect to spend approximately the same amount during our 2008 fiscal year. We anticipate that our existing financial resources will be adequate to permit us to continue to conduct our business for the next 18 to 20 months. We will need to raise additional capital to continue our business after this period. Our future capital requirements will depend on many factors, including the timing and outcome of regulatory reviews, administrative and legal expenses, the status of competitive products, the establishment of manufacturing capacity and the establishment of collaborative relationships. We cannot ensure that additional funding will be available or, if it is available, that it can be obtained on terms and conditions we will deem acceptable. Any additional funding derived from the sale of equity securities may result in significant dilution to our existing stockholders. In addition, we are subject to a putative class action lawsuit alleging violations of the federal securities laws and we also have received separate requests from both the SEC and the Senate Committee on Finance asking us voluntarily to provide certain information. These matters involve risks and uncertainties that may prevent Northfield from raising additional capital or may cause the terms upon which Northfield raises additional capital, if additional capital is available, to be less favorable to Northfield than would otherwise be the case.

We are developing a single product that is subject to a high level of technological risk.

To succeed as a company, we must develop PolyHeme commercially and sell adequate quantities of PolyHeme at a high enough price to generate a profit. We may not accomplish either of these objectives. Our operations have to date consisted primarily of the development and clinical testing of PolyHeme. We do not expect to realize product revenues unless we successfully develop and achieve commercial introduction of PolyHeme. We expect that such revenues, if any, will be derived solely from sales of PolyHeme directly or through licensees. We also expect the use of PolyHeme initially to be limited to the acute blood loss segment of the transfusion market. The biomedical field has undergone rapid and significant technological changes. Technological developments may result in PolyHeme becoming obsolete or non-competitive before we are able to recover any portion of the research and development and other expenses we have incurred to develop and clinically test PolyHeme. Any such occurrence would have a material adverse effect on us and our operations.

We are required to receive FDA approval before we may sell PolyHeme commercially, data from our clinical trials to date may not be adequate to obtain FDA approval, and we may be required to conduct additional clinical trials in the future.

The primary efficacy endpoint of our pivotal Phase III trial was a dual superiority-noninferiority assessment of mortality at 30 days after injury. The results from our trial did not achieve the primary efficacy endpoint in the primary patient population as specified in the protocol. There was no statistically significant difference between the PolyHeme and control group for any of the primary safety endpoints for our trial. There were, however, statistically significant differences observed with respect to certain secondary safety endpoints, including the incidence of myocardial infarction. Based on these results from our trial, there can therefore be no assurance that the data from the trial will be sufficient to demonstrate the safety and effectiveness of our PolyHeme product for purposes of obtaining FDA approval for the commercial sale of the product in the United States.

Our goal is to submit our BLA for PolyHeme to FDA during the first half of calendar year 2008. The preparation of a BLA is a complex and time-consuming process and there can be no assurance that we will be able to submit our BLA within this time period. If the completion of our BLA takes longer than expected, FDA approval for the commercial sale of PolyHeme may be substantially delayed.

Once we submit our BLA, there can be no assurance that the submission will be accepted for filing or that FDA may not issue a refusal to file, or RTF, if it believes the filing is inadequate or incomplete. FDA previously issued an RTF to us in 2001 when we submitted a BLA based on data from our prior Phase II trauma trials. We intend to seek priority review of our BLA filing. Even if FDA accepts the submission of our BLA, there can also be no assurance that FDA will grant the BLA priority review. There also can be no assurance that FDA will determine that the trial data included in our BLA are sufficient to demonstrate that PolyHeme is safe or that we have achieved the clinical

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endpoints for effectiveness that are part of the trial protocol for our pivotal Phase III trial. FDA may accordingly refuse to approve PolyHeme for commercial sale or may require us to conduct additional clinical trials of PolyHeme in order to obtain approval. Even if FDA approval for the commercial sale of PolyHeme is obtained, it may include significant limitations on the indicated uses for which PolyHeme may be marketed. FDA requires a separate approval for each proposed indication for the use of PolyHeme in the United States. If we want to expand PolyHeme s indications, we will have to design additional clinical trials, submit the trial designs to FDA for review and complete those trials successfully.

Our business, financial condition and results of operations are critically dependent on receiving FDA approval of PolyHeme. A significant delay in achieving or failure to achieve FDA approval for commercial sales of PolyHeme would have a material adverse effect on us and could result in the cessation of our business.

There may be limitations in the supply of the starting material for PolyHeme.

We currently purchase donated red blood cells from the American Red Cross and Blood Cente