SPRINKLES....
COMBATING IRON DEFICIENCY ANEMIA IN INFANTS
AND YOUNG CHILDREN

A STATUS REPORT

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Introduction

Dr. Zlotkin’s research group1 at the Hospital for Sick Children, University of Toronto, Canada has been committed to the goal of reducing micronutrient deficiencies including iron deficiency anemia among infants and young children particularly in the developing countries. Iron deficiency is the most widespread, but preventable nutritional deficiency affecting up to 750 million infants and children worldwide. The research group has been engaged to undertake a number of important activities to support the distribution and use of micronutrient Sprinkles in countries and population groups with high prevalence of iron deficiency anemia. These included a wide variety of (i) community-based research studies, (ii) program development for the distribution of Sprinkles and (iii) general support for the manufacturing of Sprinkles.

Community-based research refers to a series of efficacy and effectiveness studies testing the impact of Sprinkles containing iron and other essential micronutrients in treating and preventing anemia. These studies also assessed the acceptability, compliance, and possible side-effects associated with the use of Sprinkles. Program development includes in-country formative research and cost-effectiveness studies to develop country specific strategies and large-scale projects for implementation of strategies to distribute Sprinkles to populations in need of them. Lastly, manufacturing refers to supporting the product development of Sprinkles and transfer of technology to increase the capacity of Sprinkles production worldwide.

The purpose of this report is to illustrate the activities and various outcomes that have been undertaken during the fiscal year 2002-2003. The report is intended to provide a brief description of Sprinkles, a background to many of the research projects, as well as a description of the various activities that are planned for the upcoming year. Also the report summarizes the publications of peer-reviewed articles on Sprinkles that have been published in medical/nutrition journals over the past year.

Background

Micronutrient Sprinkles
The development of Sprinkles was based on observations from industrialized countries where the prevalence of iron deficiency anemia is low. In these countries, acceptance of commercially fortified food is high because the fortificants do not necessarily change the color, texture and taste and their addition do not increase the costs of the food to any significant extent. In 1996, a UNICEF consultation was held to review the existing interventions (i.e. iron drops) to address iron deficiency anemia in toddlers and children. It was observed that these interventions were rarely effective due to many constraints including poor acceptance and adherence to treatment. Therefore, the development of a new fortification approach was put forth; one that would overcome the operational constraints associated with supplementation with iron drops. In response to this new challenge our research group at the Hospital for Sick Children developed a new approach to “home fortification” known as micronutrient Sprinkles. Sprinkles consist of microencapsulated iron and other essential micronutrients to treat and prevent iron and other

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1 Currently the research group consists of 5 full-time staff with diversified background in research and project development and international nutrition. Also, a number of research students are involved with the group.
deficiencies in infants and young children. The encapsulation is a thin lipid (vegetable fat) coating that prevents the iron from dissolving into the weaning food, thus, preventing any change in color, flavor and taste to the food. Sprinkles are packed in single-serving sachets containing a day’s requirement, which are mixed into homemade weaning foods right before feeding to a child. The unique formulation provides the flexibility to mix any other micronutrient with the encapsulated iron granules including vitamins A, C, D, and B vitamins, folic acid, zinc, etc. without increasing cost to any significant extent (Schauer C, Zlotkin S. Home fortification with micronutrient sprinkles – a new approach for prevention and treatment of nutritional anemias. Paediatr Child Health 2003; 8: 87-90).

The problem – iron deficiency and iron deficiency anemia
Despite repeated attempts by the United Nations and bi-lateral and international agencies to set goals and define operational strategies to eradicate iron deficiency, the number of women and children with iron deficiency and anemia continues to increase with time and remains the most prevalent nutrition problem in the developing world today. Anemia during childhood and infancy is known to be linked with impaired mental and cognitive development and learning capacity. It is not an overstatement to suggest that the possible irreversibility of these health effects is a significant threat to the social and economic development of developing countries.

While iron supplementation is an acceptable and widely implemented intervention to treat and prevent iron deficiency anemia in adults, feasible and realistic options for young children remain limited. In a recently published review article, Zlotkin suggested three strategies to address the problem (Zlotkin SH. The role of nutrition in the prevention of iron deficiency anemia in infants, children and adolescents. Can Med Assoc Journal 168:59-62, 2003). The three strategies include, feeding high quality weaning foods that contain some animal products rich in iron and other essential micronutrients (dietary diversification); encouraging the use of industrially processed fortified weaning foods (targeted food fortification); and, supplementation with iron drops (medicinal supplementation). But, these strategies rarely succeed because most of them are expensive, some conflict with the existing food practices and many are associated with low compliance. Small-scale studies demonstrated a low compliance to iron drops in young children because of the metallic taste of iron compounds, strong odor and side effects due to gastric irritation. At a meeting held in Paris in the summer of 2002, sponsored by USAID (and subsequently published in the Journal of Pediatric Gastroenterology and Nutrition ), a number of new fortification strategies were reviewed and to varying degrees, endorsed (Nestel P, Briend A, de Benoist B, et al. Complementary food supplements to achieve micronutrient adequacy for infants and young children. Journal of Pediatric Gastroenterology and Nutrition 2003; 36: 316-28). All of the strategies were intended to increase the micronutrient (particularly iron) quality of weaning foods. The new interventions were referred to as “Complementary Food Supplements”. Complementary food supplements include crushable multiple-micronutrient tablets, micronutrient-containing spreads and Sprinkles.

The inclusion of Sprinkles as one of the three new interventions is a clear affirmation that Sprinkles is now recognized by the international nutrition community as an important potential solution to the stubborn, and most importantly, unsolved problem of iron deficiency. As was stated in the concluding paragraph of the article, “Complementary food supplements are a new
and promising approach for reducing multiple micronutrient deficiencies in infants and young children living in developing countries...”

The challenges....
The challenges associated with the development of a new health-intervention are substantial. At a minimum, they include field trials (efficacy and effectiveness research studies), product development (quality assurance), advocacy (at global, regional and national levels) and other promotional activities including social-marketing at the local level. The research field trials have to demonstrate to the international science-community that Sprinkles are safe and effective in treating and preventing anemia and iron deficiency. We have begun to accomplish this task through a series of community-based studies which have included anemic infants and children 6-24 months of age living under disadvantaged conditions including poverty and the increased burden of infectious diseases. Our studies have spanned the globe from West Africa (Ghana) to Asia (China) to South America (Bolivia). To address our goal of developing sustainable, country-specific programs to distribute Sprinkles we have had to address a number of important and complex operational issues. These included ensuring a sustained reliable supply of Sprinkles, developing in-country infrastructure for assessing operational feasibility, assessing acceptability and coverage particularly in reaching geographically diverse ‘at risk’ population groups, and, finally, evaluating cost-effectiveness. We have begun to accomplish these tasks through a large distribution program in Mongolia (distribution to about 15,000 children) and planned programs in Guyana, Indonesia and Cambodia. The goal of reaching the poorest members of a country is not simple, yet despite the complexity of the task, our research group has made significant inroads into making Sprinkles a widely accepted and available solution to treat and prevent iron deficiency anemia in young children worldwide.

Accomplishments and On-going International Activities

Afghanistan (for relief-aid)
We are actively collaborating with a large French humanitarian relief agency, “Action Contre Le Faim - ACF” (Action Against Hunger) to support their work on famine and malnutrition in regions of Afghanistan where micronutrient deficiencies among children are high including the increased risk of death from scurvy, a vitamin C deficiency. After a productive meeting (in Toronto) with the representatives of ACF, operational research is being planned to evaluate the feasibility of including Sprinkles at supplemental feeding centers where children receive prepared meals to improve their growth and nutritional status. An initial batch of 100,000 Sprinkles is ready for shipment to Afghanistan.

Bangladesh
Developing a cost-effective and sustainable distribution strategy for Sprinkles targeted to the poorest segment of rural populations continues to be a major challenge. Using the experience and strength of Non-Governmental Organizations (NGOs) in reaching the rural-poor is potentially an efficient way of achieving this goal. With this goal in mind, we have initiated a partnership with BRAC, the largest NGO in Bangladesh. The organization spans the entire country and reaches over half of the total population through its development, health and education interventions. As a first phase of the collaboration, formative research is being planned to assess the acceptability and demand for Sprinkles among caregivers and communities.
Based on the results of this formative research, education and motivational materials will be developed for use in a planned distribution of Sprinkles. The formative research is expected to be launched by the third quarter of this year.

**Bolivia**

With funding provided by the Heinz Foundation, Dr. Zlotkin was able to support a pediatric resident to complete a small clinical trial in the altiplano (highland) region of Bolivia that included 62 iron deficient anemic children aged 1-6 years. In this region of Bolivia, the prevalence of anemia is very high at 34%. In the altiplano, the average life expectancy is 62 years. This ranges from as low as 45 years in rural areas, to 75 in industrialized areas. Poverty is a major problem, with 67% of the population living below the poverty line; 36% living in extreme poverty. Infant mortality is 64 per 1000 live births; under 5 yr mortality is 83 per 1000 live births. Malnutrition is a problem for poor families, especially in rural areas, where access to health care is also limited. Potatoes and maize-based products are the staple of their diet.

The aim of the study was to evaluate the efficacy of microencapsulated Sprinkles to treat anemia. At the end of the two-month supplementation trial, a 91% cure rate of anemia was observed. The mean increase in hemoglobin concentration (22 g/L) was found to be highly significant. The 91% cure-rate was greater than expected. All remaining Sprinkles at the end of the study were donated to the villages in the highland, demonstrating the need for widespread distribution of Sprinkles in populations after the research is completed.

**China**

In early 2002, we initiated a research collaboration with the Institute of Nutrition and Food Hygiene of the Chinese Academy of Preventive Medicine, in Beijing, to investigate the use of Sprinkles in school-age Chinese children. Our goals were to determine the optimal number of doses to use per week, and the most appropriate dose of iron for a mixed population of anemic and non-anemic children. The first study was conducted among 600 children in Xin-Shi-dai Kindergarten schools in Baotou city of Neimenggu Autonomous Region, Northern China. Although an iron sufficient population was studied, the study results suggested that a daily dose of 30 mg iron provided through Sprinkles was acceptable and safe. This study was replicated in another Chinese location, Guizhou province, where the prevalence of anemia was believed to be higher. Studying an iron deficient population will allow us to compare the efficacy between daily and weekly doses of Sprinkles in reducing the prevalence of iron deficiency anemia. The field activities were completed earlier this year, and we expect the results to be available in the near future.

In addition to the two projects that were completed in China over the past year with the Institute of Nutrition and Food Hygiene, in collaboration with Heinz China, a study was undertaken to assess the acceptability of Sprinkles amongst Chinese mothers in large urban centers (Guangzhou and Shanghai) and 3 smaller per-urban centers. The study was undertaken to determine the potential acceptance of Sprinkles if Sprinkles were to be widely distributed in China. Using the facilities of the AC Neilson Company, Sprinkles were placed in a total of 1,386 homes of families with children between 6 months to 5 years of age for a period of 1 month. The aim of the project was to assess the acceptance and attitude of mothers towards the use of Sprinkles. After 4 weeks usage, mothers perceived that there was a benefit to using Sprinkles: more than one third of mothers thought that the effect was “good/very good” with another 50%
saying “okay, fine”. The proportion giving a negative comment only accounted for 14%, which was due to perceived changes in stool characteristics during the first week of use, and some effect on the taste of food. Among the positive effects, mothers noted an improvement in their children’s appetite, and positive changes in the behavioral and physical activity. Children were perceived as becoming more active and energetic, and slept better. Our general conclusion was that Sprinkles would be well accepted in terms of both concept appeal and product efficacy.

First Nation/Inuit in Canada

The aim of this study was to evaluate the efficacy of Sprinkles to treat and prevent anemia in First Nation and Inuit infants and young children in Northern Canada. This is an on-going series of clinical trials supported by Health Canada that started in January 2001 and will be completed in June 2003. Three northern communities, Attawapiskat, Fort Albany and Igloolik were chosen.
to participate in the study. The closest community Attawapiskat is more than 1000 km from Toronto.

The study is funded by Health Canada’s First Nations and Inuit Health Branch. It incorporates a longitudinal design, with a 3-month intervention period. In addition, a ‘prevention group’ is being followed for 6 months. This study uses a comparative design, comparing Sprinkles to iron drops. According to preliminary data from this study, 14% - 35% of the children in these communities are anemic. In contrast, only 5-7% of children in Southern Canada are anemic. Anemia is therefore a major public health concern in these communities.

Although we do not as yet have the final biological results from the study, we do have some preliminary information on use and acceptability of sprinkles versus drops. Compliance with the use of Sprinkles averaged 50-100% in 73% (treatment group) and 43% (prevention group) of children respectively. Compliance with drops versus Sprinkles was not significantly different and varied a great deal from visit to visit and between communities. Commonly mentioned side-effects with drops included diarrhea and stomachache (62% and 23% children in the iron drop group suffered from diarrhea and stomachache, respectively). However, none of the children in the Sprinkles group reported these side-effects. In general more children appeared to like the Sprinkles as compared to the drops. These qualitative research findings suggested that the regular consumption of Sprinkles made children more active; walking, talking and in general appearing happier than before the intervention. Some mothers also stated that their children appeared to grow faster. Participants felt that over time they frequently forgot to give the Sprinkles. Memory aids and methods to increase motivation should be considered to increase compliance with long-term interventions. At the end of the study, Health Canada will evaluate the feasibility of placing Sprinkles as an alternative intervention to drops in northern medical clinics as part of the routine care of children in these communities.

Cambodia and Indonesia

In collaboration with Helen Keller Indonesia (a large international NGO) we are planning a large project to distribute Sprinkles to thousands of infants and young children. Sprinkles will be used to improve the nutritional status of children 6 to 59 months, with a focus of vitamin A and iron
deficiency. While HKI Indonesia, an international NGO, is mainly responsible for the implementation of the project, our group is expected to provide necessary technical assistance in producing and distributing Sprinkles. Sprinkles were chosen for this project by HKI because they can be added to any kind of food that a young child eats and might therefore be regarded more as a condiment rather than a medicine. This is thought to be important for a long-lasting intervention aimed at prevention rather than treatment of micronutrient deficiencies. Production facilities for the local packaging of Sprinkles are being established by Heinz ABC, Jakarta. The pilot projects in both Indonesia and Cambodia will require the production of 10 million Sprinkles over the next 2 years.

**Guyana**
The Inter-American Development Bank has offered the government of Guyana a 5 million dollar loan to develop an in-country program to deal with the major problem of micronutrient deficiencies among children and women in that country. IDB, on behalf of the government of Guyana approached the Sprinkles research group to help design the implementation program and plan appropriate outcome measures. In addition, the largest pharmaceutical company in Guyana, New GPC has asked for the rights to package sprinkles in Guyana. Our role is to assist with the transfer of technology to New GPC to manufacture Sprinkles in-country, and to consult with the Ministry of Health on the implementation, monitoring and evaluation of the program. New GPC will manufacture the Sprinkles on a cost-recovery basis. The program will promote proper complementary feeding to infants and young children in addition to providing food vouchers and Sprinkles to disadvantaged populations within the country. A pilot project to deliver Sprinkles to pregnant women through pre-natal clinics will also be explored. The project should commence late summer 2003.

**Ghana**
Over the past year, we have continued our productive and successful collaboration with the Ministry of Health, Health Research Facility in Kintampo, Central Ghana.

The earlier studies in Ghana involving Sprinkles show some promising results. In anemic children aged 6-24 months, iron Sprinkles were found to be more acceptable, compliant and efficacious in treating iron deficiency anemia as compared to the conventional treatment with oral ferrous sulfate drops. Furthermore, since Sprinkles are mixed into complementary weaning foods including homemade foods by the caregiver, its introduction did not conflict with breastfeeding practices (Zlotkin S, Arthur P, Antwi KY, Yeung G. Treatment of anemia with microencapsulated ferrous fumarate plus ascorbic acid supplied as sprinkles to complementary (weaning) foods. American Journal of Clinical Nutrition 2001; 74: 781-5). A second study in a similar setting showed that zinc could successfully be added with the iron sprinkles to improve the hemoglobin concentrations and lowering the anemia prevalence (Zlotkin S, Arthur P, Schauer C, Antwi KY, Yeung G, Piekarz. Home-fortification with iron and zinc sprinkles alone successfully treats anemia in infants and young children. Journal of Nutrition 2003; 133: 1075-1080). Another study carried out in Ghana provided important insight in determining the duration of supplementation that would both treat as well as prevent anemia in infants and young children. The study indicated that treatment of anemia by a daily dose of 80 mg elemental iron provided for two months as sprinkles can be highly effective in preventing anemia at least during 18 months post intervention period (Zlotkin S, Antwi KY, Schauer C, Yeung G. Use of

We have recently completed a large ‘iron absorption’ study and are about to complete an important dose response study. The Toronto staff has traveled to Ghana to train local staff and actively participate in these ongoing studies. Our study, which was completed in the spring and summer of 2002, aimed at determining how well the iron in Sprinkles was absorbed in anemic and non-anemic infants and young children. This question was important because once Sprinkles are used in a country-wide public health program, the recipients will be both anemic as well as non-anemic children. Thus, our goal is to establish a single dose of iron (in Sprinkles packages) that will be adequate for anemic children but not excessive for non-anemic recipients. To determine the absorption of iron, we used sophisticated ‘stable-isotope’ techniques. This method uses non-radioactive isotopes of iron which are perfectly safe for children and pregnant women. A total of 90 children participated. To our knowledge, this is the first study to directly demonstrate how much absorbed iron is used to make new red blood cells in infants and young children. Results from this study (presented at the Experimental Biology meeting in April 2003) demonstrated that infants regulate iron absorption according to their iron needs; thus, anemic children absorb more iron than non-anemic children because of their increased need for iron. Mean iron absorption from Sprinkles was about 5% in non-anemic infants and about 9% in anemic infants. The absorption did not differ between two different doses, i.e., 30 or 45 mg of elemental Fe as $^{57}$Fe-labeled Sprinkles plus vitamin A, added to a maize-based porridge on three consecutive days.

This information has allowed us to accurately determine an acceptable range of iron doses to include in Sprinkles packages. Based on this information, we started a clinical study in May 2003 in Kintampo. The purpose of this study is to use the absorption results to determine an appropriate and safe dose for Sprinkles to be used in program settings. We are testing three different daily doses of iron (12.5 mg, 20 mg and 30 mg) to determine the optimal ‘safe’ dose of iron to treat as well as prevent anemia. Children will receive supplementation for a period of 2 months. Change in hemoglobin from Sprinkles will be compared to a positive control group receiving 12.5 mg Fe from iron drops. The use of drops at this dose is the current WHO and
UNICEF recommendation to treat and prevent anemia in infants and children. This study will be followed by another trial to investigate the optimal duration of supplementation needed to protect children from developing iron deficiency anemia. The preliminary findings of the study show that in anemic children, an iron dose as low as 12.5 mg per day can increase hemoglobin concentration by over 10 g/L in only three weeks period. The complete study results are expected to be published by the end of this year.

**India**

In collaboration with the King Edward Memorial Hospital and Medical Research Institute, in Pune, India our research group has just been awarded (May 2003) a second CIHR research grant to conduct a new study in India which will also examine the most appropriate dose of iron to use in Indian infants and young children. A parallel initiative is also in progress to determine the feasibility of local packaging of Sprinkles in India in anticipation of scaling up of Sprinkles’ activities.

**Mongolia**

Because of economic instability and severe winters, the typical Mongolian diet for young children is deficient in both iron and vitamin D, with potentially very severe consequences for proper child growth and development. In response to these conditions a project aimed at distributing Sprinkles was developed and implemented jointly with the World Vision Mongolia. The goal of this distribution project was to reach over 10,000 children residing within eight districts in urban and rural Mongolia. Sprinkles are being distributed in these areas in an effort to reduce the prevalence of iron deficiency anemia and vitamin D deficiency rickets in children. The two-year program began in September 2001, thus the final impact evaluation will be conducted in September 2003. Members of our research group will travel to Mongolia to supervise and monitor the final surveys. To date, the program has reached over 84% of all eligible children with a high level of compliance; an average of over 75% of the monthly supply of Sprinkles is being consumed by children. Mothers also reported a number of positive effects of Sprinkles on child’s health including higher mental and physical development. Focus group discussions and in-depth interviews with mothers and other care-givers suggested that the acceptability of Sprinkles was high and that it was easy to mix Sprinkles with any weaning food. No cultural barriers were identified that would limit the use of Sprinkles.
Some mothers felt that the duration of intervention was too long and that it was difficult to remind themselves of regular long-term use of Sprinkles. Better communication strategies and messages should be developed to overcome this barrier. Alternatively, the duration of the intervention could be shorter. This project will be completed in September-October of this year.

**Pakistan**

Both zinc supplementation and probiotics have been found to be efficacious in reducing the duration and severity of diarrhea-related mortality in various developing country settings. Our research question in Pakistan was to determine whether zinc combined with probiotics when added to ‘Sprinkles’ would significantly reduce days of diarrhea and associated mortality in Pakistani children. For this clinical trial, a partnership has been developed with the Department of Pediatrics, Aga Khan University Medical Center, Karachi, Pakistan. A pilot project is currently ongoing among 75 infants selected from an urban slum of Karachi. The results of the pilot study will be available by the end of 2003. It is expected that a larger clinical trial will be launched soon after completion of the pilot project and data analysis. If Sprinkles with zinc and probiotics show positive results in preventing diarrhea, the number one cause of death in children under 2 years of age, this could lead to the support of scaling up the intervention in selected areas of Pakistan in the future.

**Viet Nam and Benin**

Cooking foods in iron pots has been suggested as an efficacious strategy to reduce anemia prevalence in a general population. However, concerns remain on the appropriateness of this intervention in terms of the cost-effectiveness and cultural acceptance. Supported by CIDA, we are now working with PATH Canada and CARE Canada to conduct a series of studies to compare the efficacy and effectiveness (including cost and cultural acceptance) of iron pots and Sprinkles in different population groups in rural areas of Benin and Viet Nam. Sprinkles will be used as the gold standard in the efficacy study to treat and prevent anemia in infants and young children, adolescents, and women of reproductive age. The goal of the study is to ultimately reach 100,000 beneficiaries in each country with the most cost-effective combination of interventions. The research proposal has been finalized and approved by appropriate agencies/committees and implementation will begin in the summer of 2003.

**Developing innovative laboratory tools**

In addition to country specific research and program development, we are also working to improve our technical capacity by developing innovative and easy-to-use tools to assess various biomedical markers of micronutrient deficiencies including serum transferrin receptors (sTfR), a specific and sensitive indicator of iron deficiency. Although the sTfR assay requires a very small volume of ‘finger-prick’ blood, a number of practical issues limit its utility in remote or underdeveloped regions, where problems of iron deficiency are most prevalent. If local laboratories are not available, shipping of samples to a central laboratory under controlled temperature is often costly and difficult to manage. As a result, we are developing an alternative method of transporting blood samples and assessing transferrin receptor through the use of a spot of blood on filter paper (a dried spot technique). This research has been funded by a combination of funds from the Foundation and the Centers for Disease Control (CDC-Atlanta).
Mathematical modelling

Another research area we are pursuing in to support Sprinkles is ‘mathematical modeling to predict the response to population-based micronutrient interventions’. It is very time-consuming and expensive to have to repeat the same research study in different countries, yet, this is often the case since one country (e.g. China) might not be willing to accept the results from that same study done in an alternate jurisdiction (e.g. Indonesia). To potentially circumvent this problem we have turned to the technique of mathematical modeling. We are using Markov Chain and Monte Carlo statistical methods to predict outcome measures of two previously conducted trials of iron supplementation provided as Sprinkles. Taking initial parameter input for age, weight and hemoglobin from the respective studies, the final outcomes are predicted by modeling physiological processes that regulate iron metabolism. Predicted results from the two trials were fairly close to the observed ones from real data when compared using summary statistics and quantile-quantile plots. A third trial was simulated to predict the outcomes of the dose response study in Ghana prior to it being launched in the field. The predicted results will be compared to the actual outcomes upon completion of the trial by the end of this year. By using predictive modeling, we hope to convince ministries of health, government agencies, etc, that it is not necessary to repeat Sprinkles studies in each country in which Sprinkles should be used.

Articles published in peer-reviewed journals

Below is a list of articles authored by the members of the Sprinkles research group that were published in scientific or peer-reviewed journals since receiving the HJ Heinz Foundation grant.


In addition to the above scientific publications, four posters based on the research findings on Sprinkles being undertaken in Ghana and Mongolia were presented at the 2003 International Nutritional Anemias Consultative Group (INACG) Symposium in Morocco.

**Articles published about Sprinkles**

Additional scientific articles written by other scientists describing Sprinkles have also been published as below:


**Article in the lay press about Sprinkles and the Sprinkles program**

The University of Toronto Bulletin, June 26, 2002. “Shaken or Stirred – Nutritional sprinkles hold promise in battle against malnutrition” by Jessica Whiteside

Pittsburgh Post-Gazette February 19, 2002. “Pocket full of miracles – anemia may become a thing of the past for children in poor and undeveloped areas, thanks to innovative iron Sprinkles”” by Carole Reinert-Lucas

Inspire, HSC Foundation Magazine, volume 1 fall/winter 2002 (premier issue). “Sprinkles of hope” – reducing childhood anemia...doctors and researchers at the Hospital for Sick Children are constantly searching for ways to improve child health care.


**Our New WEB Site:** We have recently created a website on Supplefer Sprinkles to describe the work of our group. The website is useful for groups that are interested in our research and provides detailed information on our studies and publications. It also has a counter that keeps track of the number of hits we receive. To date, there have been a total of 5100 hits. We are listed on most of the major search engines and are able to keep track of our placement (currently in the top 3 for the major relevant search terms). The website is located at: www.supplefer.com.

**What other people have said about the Sprinkles program:**

Francis Davidson, principal nutritionist at the United States Agency for International development (USAID). USAID is a major funder of the sprinkles research....
“Many people working in development have been pursuing the notion of empowering the mother or caretaker for some time; what Zlotkin has done with the development of the sprinkles is give them a tool to do it.”

“It was a brilliant idea,” says Davidson of how Zlotkin repackaged components already in existence to form a new product that would meet the need he’s identified”. (Edge – University of Toronto Research Magazine. Fall 2002. “Iron man – Stanley Zlotkin aims to eliminate childhood anemia” by Jessica Whiteside).

Where do we go next?

The development and acceptance of new interventions requires a series of quantitative and qualitative research to provide the necessary evidence-based support for future program implementation. As illustrated above, funding support from a number of agencies including the H.J. Heinz Company Foundation, USAID, the Micronutrient Initiative, Health Canada, and CIHR has allowed us to conduct a wide-ranging series of basic and clinical research projects in various countries related to studying the efficacy and effectiveness of Sprinkles. In addition to continuation of many of the previous activities, our major thrust will be to conduct programmatic research in various countries and settings to answer some critical questions linked with delivery and scaling up of the intervention. At the urging of many of our international partners, we will begin to explore the use of Sprinkles in populations beyond the infant and child age range. Many of our partners see the potential of using Sprinkles in other at risk population groups including pregnant women and adolescent girls and in other domains, such as in disaster or war-relief aid.

Another challenge will be to ensure sufficient and timely production and supply of Sprinkles to meet the growing demands globally. The feasibility of initiating country-level manufacturing of sachets will also be explored in order to create distribution models that are cost-effective and sustainable.

Conclusion

In conclusion, since the inception of Sprinkles in 1997-98, our research group has been pursuing a broad range of research activities critical to the development of Sprinkles as an innovative approach to address the problem of iron deficiency anemia in infants and young children. This has greatly accelerated the research and development of Sprinkles from an idea and concept in the laboratory, to clinical trials demonstrating efficacy in the field, to program application in populations in need. Because of this evolution, Sprinkles are becoming closer to a real-world strategy that is both feasible and sustainable. As such, Sprinkles are now recognized by the international nutrition community as an intervention that holds great potential for reducing the prevalence of IDA among children worldwide. Iron deficiency anemia is gaining widespread recognition as a serious public health problem that not only affects the health of women and children, but also the social and economic prosperity of nations undergoing development. With a new goal set by UNICEF for significant reductions in the prevalence of anemia in women and children by the year 2010, we foresee Sprinkles as significantly contributing to the achievement of this goal. We remain committed to the challenges ahead in the following year.