



ARM

Advancement of Research for Myopathies

| www.hibm.org |



“When I realized that I was going to be disabled -- slowly, relentlessly and without reason or justice -- I gained courage. When I met others with the same problem, I learned compassion. When we realized that it could be healed scientifically, we touched hope. ”

Dr. Daniel Darvish, MD
ARM Co-Founder and HIBM Patient

Dr. Babak Darvish, MD

I ARM Co-Founder and HIBM Patient I



"From early on in my pursuit of a career in medicine, I wanted to become a surgeon, never foreseeing that this dream might not be in the cards for me. How heartbreaking to be confronted with a future very different than the one I had worked for so hard!

I first detected something strange was happening to me during my medical training. I loved playing the guitar and I realized that I was having progressively more difficulty plucking the chords. It worried me enough to share with my brother, Daniel, who was also a doctor. He told me that he noticed he was not himself either, that he wasn't running and bouncing on the hospital steps as quickly as usual.

As we began our journey to find an answer, no one could give us a satisfactory explanation or diagnosis. Since we were curious by nature, we started investigating further and searching the medical literature ourselves until we finally found an article that seemed to accurately describe our condition. We learned that Hereditary Inclusion Body Myopathy (HIBM) is a rare disorder that typically presents in one's early 20's or 30's without any advance warning or prior symptoms, gradually weakening the muscles of the limbs and eventually leading to severe disability.

This news, needless to say, shocked and frightened us beyond imagination and it forced me to give up my dream of becoming a surgeon. I switched focus to serve others facing challenges and became a specialist in Physical Medicine & Rehabilitation. My life's purpose, however, would now be defined by a singular quest -- finding a cure for HIBM. This became my passion and my ultimate pursuit.

In 2000, Daniel and I founded the non-profit organization, Advancement of Research for Myopathies (ARM). ARM has raised awareness among the general public, but more importantly among researchers and medical professionals. Thanks to the funding efforts of ARM, researchers worldwide are working towards finding a treatment, and I am very thankful and hopeful that within my lifetime we will be able to help all patients who suffer from HIBM."

"Learn from yesterday, live for today, hope for tomorrow."

~unknown

Photo by Timothymurray.com

"I was 20 years old when I began feeling weak. Now, after almost 20 years, I am bound to a wheelchair. I am struggling to keep my fingers moving and to keep my neck holding my head up. I'm bound physically, yet my spirit never dies -- I will keep fighting, raising awareness, raising funds and doing my part in this race."

Julie, 38 - Research Nurse
HIBM Patient



ARM

Advancement of Research for Myopathies

"Hope is faith holding out its hand in the dark."

~George Iles

Advancement of Research for Myopathies – a Non-Profit Organization

ARM was founded in 2000 with a mission to support and educate patients and their families, to raise funds for research, to encourage researchers to study HIBM and to ultimately find a cure for this rare disorder. The research efforts supported by ARM are focused on three main objectives: to prevent muscle weakness in HIBM patients that have not shown any muscle weakness yet, to stop the muscle wasting process in patients at the point where it is now, and muscle regeneration for patients who have been severely affected.

HIBM, Hereditary Inclusion Body Myopathy, is a disease that causes progressive and debilitating wasting of muscles. Weakness begins most often between the ages of 20 to 40 and, although progression is slow, most patients lose the ability to walk within 10 to 15 years.



Photo by TimothyMurray.com

With very limited resources, ARM has been able to achieve tremendous strides in its mission to arrest, prevent and cure HIBM. Funds raised by ARM were used to find the gene mutation responsible for HIBM, to develop “proof of concept” data for possible treatments and to move research forward towards clinical trials using several different treatment options. Various renowned institutions have received grants and HIBM-specific biomaterials from ARM and ARM supported centers to further research. The National Institutes of Health (NIH) has acknowledged the opportunity to find a cure for HIBM and supports the work of ARM.

Because of the research already completed, the funds needed to test the treatment for HIBM may be less than the amount needed to find treatments for similar disorders. As the knowledge and technology to cure HIBM are advancing, the one bottleneck is limited financial support. *Now that we have reached the stage of clinical trials, funding is needed more than ever!*

“The knowledge and technology to cure HIBM are advancing, but the primary bottleneck is limited financial support.”

As is the case for most very rare disorders, the interest of researchers and biomedical companies is limited, as the costs of research and development of a cure may never be fully recovered since there are very few patients worldwide. However, preliminary scientific data has been very encouraging, as it clearly suggests that HIBM may be easier to treat than many other muscle wasting disorders. One of the goals of ARM is to make funding and resources available to scientists to speed up research and to find a cure for HIBM as soon as possible.

“HIBM patients lose muscle strength with every day that passes. Together we can join forces in our fight against this debilitating disease.”

ARM is a non-profit 501-C-3 organization; all donations are tax deductible.

Industrial Designer

“Like most patients, I lived for years with the uncertainty of what was happening to my body. Because of the rarity of HIBM, doctors were unable to correctly diagnose my condition. Greeted by shrugged shoulders and a lack of information, doctors would immediately point me towards a wheelchair. I was basically told I would never meet another patient like myself and that research on my disease would never take place during my lifetime. However, this was unacceptable to me and I was determined to find people with answers. That is how I found ARM.

Through my interaction with ARM I have had the opportunity to encounter many diverse and inspirational patients. Getting to know the patients as people and hearing their unique stories is truly an honor. There is an immediate familiarity and connection among HIBM patients that is unexplainable. Whenever I am struggling and forced to adapt to the demands of my ever-changing body, I think about all the other patients in the world. My sense of connection and compassion with these patients is deep and truly humbling.

My life has been a transforming journey of experiences and lessons and I am grateful for every moment. However, knowing that HIBM can be cured produces a sense of urgency in me unlike anything I've ever felt. *It is not that I am not willing to accept my disability; it is that I am unwilling to accept that things can't be different in the future.*

I am so honored to be working on ARM's media campaign. I have been inspired by a sense of responsibility towards ARM, HIBM patients and myself. My art flows from my heart, and anytime I need more inspiration I simply look towards other patients like myself. Throughout the creation of ARM's campaign, my focus was to illustrate to the community who we are and what we aspire to be. HIBM patients have tremendous abilities and experience and they have the power to make a real difference in this world.

However, ARM's campaign is about spreading awareness as well as finding a cure -- both to the medical community and general public. As HIBM is affecting more and more people of all races and backgrounds, it is my hope that the stories of these extraordinary patients might inspire everyone to share the message with friends and loved ones.

A cure isn't simply about solving a medical problem. A cure is just one part of the journey. Working together to help others empowers humanity to embrace the best of itself.”



“Working together to help others empowers humanity to embrace the best of itself.”

Photo by Timothymurray.com

Cara, 30

| HIBM Patient |

United Nations Private Sector Specialist



"The journey of HIBM has been frightening -- not only for myself, but for my family and friends as well. Ignorance was torturous; not knowing what was happening to my body or why or how things would develop was anxiety-provoking, and when we finally got some answers, we were unprepared to handle the extent of disability that lay ahead.

Nevertheless, the past five years have made me feel closer to those around me who I need to depend upon. It has brought out my innermost strength and tested my determination, faith and courage. I can honestly say that I am happier today than I have ever been before. *I am fortunate I have learned what is most important and that I have the opportunity to make a real difference.*

Meeting other patients has changed my life. Their courage, knowledge and support have been invaluable. I am forever grateful for their honesty and insight.

"Through ARM we can raise awareness and mobilize resources for this rare disease."

ARM provides opportunities for patients to ask questions, share stories and learn from others who understand living with such a powerful disease. Connecting with patients through their HIBM forum on the web has been an inspiring experience. Through ARM we can raise awareness and mobilize resources for this rare disease.

I am living my dream of working for the United Nations! It is my hope that I can help in some way to send out ARM's message to the leaders of the medical and political communities. Through the strength of ARM's message, these leaders will be inspired to use their resources to help develop a cure for HIBM.

My purpose is to show others that despite having HIBM, I am living my dreams and that I have so much to celebrate! I know the power of a smile, a soft touch, a kind word and saying thank you. No one should ever feel sorry for me because I know everything will be OK!"



Harmony, 30

| HIBM Patient |

Lending Analyst

“At about the age of 26, I started having hip pain and felt that I was walking funny. After a year of trying to figure out why I was having the pain, I decided to refer myself to a neurologist. After many tests and many doctor visits, I finally had a symptomatic diagnosis of HIBM. The doctor then referred me to ARM and HIBM Research Group (HRG) to get a DNA test to confirm the diagnosis. The test came back positive. It was so relieving to finally know what was happening. Thanks to the support of ARM, I was able to get help in my quest to find an answer.

My disease has been a very challenging experience. *It is easy to get depressed when you can't physically do the things you once could, but I have faith that I can make it through this challenge, and although I might have bad days, my good days still outnumber the bad.*

Thanks to ARM I have been able to communicate with other patients and hear their stories, which has been invaluable. I feel a sense of community with other patients, and knowing that I am not going through this alone is a real help during the struggles. It is my hope that with the support of ARM we will find a cure for this debilitating disease. With much hope and prayer, ARM will develop a cure soon enough so that I and others may never lose the ability to walk.”

“With them I know that I am not going through this alone.”

Taylor, 31

I HIBM Patient I

PhD Student

"I was originally diagnosed with a form of muscular dystrophy: they weren't exactly sure what it was and told me that little was known about my prognosis. I tried to convince myself that it wouldn't get any worse, but soon after that I started falling more frequently. I needed leg braces to walk, a cane and then crutches. I still had no idea what was going on as I made periodic trips back to the neurologists for more tests, more consultations and more shrugged shoulders.

I took the first disability studies course ever offered at my college, taught by a professor who had polio as a child. The course helped me become more familiar with the experience of disability and introduced me to the world of American "disability culture" with its politics, its complaints, its sense of justice and even its sense of humor. When I graduated, I went to work for the National Organization on Disability in Washington, D.C., where I gained a strong sense of the dignity and the possibilities that all people with disabilities possess.

"I gained a strong sense of the dignity and the possibilities that all people with disabilities possess."

Still, I didn't know what exactly was going on with my own body until one day I came across the ARM website while surfing the web. Through the site I got in touch with Dr. Daniel Darvish who was able to confirm that I had HIBM.

It was a relief to finally know what was happening to my body. Through ARM I learned not only about the scientific research they were encouraging and organizing around the world, but also about how Drs. Babak and Daniel Darvish lived their lives with HIBM.

Now, at 31 years old, I am a graduate student at UC Santa Barbara, studying the history and sociology of American religion. I have a wonderful wife, Martha and we have a beautiful 7 1/2 month old son named Alexander who crawls and climbs all around my wheelchair and is learning to walk just as I am learning how not to. My greatest joy is my son's smile... nothing else really compares.

I have a great deal of hope about our future, though I'll admit that sometimes it still scares me. *I have hope that soon we'll have a treatment for HIBM, one that will at least help stop the progression I've seen in my own body, for both myself and for all the other people in the world who now face, or will face, the many challenges of this disease."*



Dr. Daniel Darvish, MD

| ARM Co-Founder, Researcher and HIBM Patient |



"When I realized that I was going to be disabled -- slowly, relentlessly, and without reason or justice -- I gained courage. When I met others with the same problem, I learned compassion. When we realized that it could be healed scientifically, we touched hope.

Soon after I started to show symptoms of HIBM, I realized that the only way to speed up the research on this rare disorder was to dedicate my life to doing it myself. Initially, I sought help from renowned scientists in the field of muscle disorders and genetic diseases. In 2004 we founded HIBM Research Group (HRG), a non-profit laboratory dedicated to HIBM research.

Since then we have accomplished much with very limited resources. We have made tests for HIBM available for anyone, we have supported researchers worldwide with reagents, knowledge and research material and so we have moved research to the point of clinical trials. This is an unbelievable accomplishment considering how little funding we had! And funding continues to be our greatest obstacle as we move into this next stage.

When people ask what is most important to me, I smile and wonder why it's not obvious. Without a doubt, the patients are the most important. I feel that every patient is family. They motivate me to increase my knowledge and, if necessary, expand the technology to finding a cure.

HIBM is an enzyme-related disorder that only affects skeletal muscle in most patients, and enzyme related muscle disorders are usually less difficult to cure. From what we have already learned, we fully believe the cure is within reach."

For further scientific details, please contact HIBM Research Group (HRG) at 818-789-1044.

"I believe we may all look back years from now with pride that we have done something great."

Photo by Timothymurray.com

Hope Is Within Reach

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La esperanza esta en nuestro alcance

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2008 Board of Directors



Babak Darvish, MD
President

Babak Darvish is one of the original founders of ARM. Following graduation from Medical School, Dr. Darvish completed his specialty training at the UCLA-Multicampus Physical Medicine and Rehabilitation Program in Los Angeles and works as a physician at the VA Hospital in West-Los Angeles.



Hamid Soleimanian, Esq.

Hamid Soleimanian is an Attorney at Law since 1995. He graduated from the Faculty of Law of National University of Iran in 1979. He has been a member of the Iranian Jewish Student Organization from 1974-1978. Mr. Soleimanian has joined ARM in 2006 as a Board Member.

Rodney Yashouafar, JD

Mr. Yashouafar is senior Property Supervisor for Milbank Real Estate and is a J.D. from Whittier Law School. Mr. Yashouafar has served on the board of Bina Brith Youth Organization, is event director for various non-profit organizations, and is guidance council for low-income families.



Nadia Adhami

Nadia Adhami has been an active member of ARM since the start. She assists in organizing ARM programs and managing funds for grant recipients of HIBM research. Prior to her involvement with ARM, Ms. Adhami has served on the board of several other nonprofit organizations. Ms. Adhami's education includes a Master of Science in Computer Sciences.



Minoo Koutal

Mrs. Minoo Koutal has been with ARM since the beginning. Throughout her life, Mrs. Koutal has served on the board of different nonprofit organizations, and she has had numerous accomplishments in nonprofit activities. Mrs. Koutal is one of the most active members of ARM community awareness programs and committee.

Scientific Advisory Committee

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Therapy Development

An effective therapy for HIBM (or IBM2) muscle disease can be developed using currently available biomedical technologies. The steps required to develop therapies are depicted in the following table.

Pre-Clinical Studies	Clinical Trial Phase I/II	Clinical Trial Phase II/III	New Drug Application	Phase IV & Post-Marketing Surveillance
Testing of therapeutic hypothesis in test tube and animal models for safety, and when possible, for efficacy.	Testing of therapy in patients for safety and measure efficacy.	Further testing of therapy in patients for efficacy and further confirm safety.	Regulatory review process of all the data collected by previous steps.	Monitoring of safety and unusual responses in many patients who use the therapy following approval.

*This process is followed for every therapeutic theory. Every step depends on result of the prior step.

Current treatment theories are in one or more of the following categories:

- Small molecule based therapies:** These theories involve administration of specific sugars that would increase the amount of a molecule known as Sialic, inside muscle cells.
- Gene based therapies:** These theories involve administration of normal or hyperactive forms of the enzyme that is hypoactive in patients. This enzyme is responsible for making Sialic in our bodies.
- Cell based therapies:** These theories involve use of specialized stem cells capable of regenerating muscle and expressing the normal or hyperactive form of GNE/MNK.

Therapeutic Concept	Pre-Clinical	Phase I	Phase II/III	NDA	Phase IV
Small molecule based therapy					
Gene based therapy					
Stem cell based therapy					

* This table is a depiction of virtual pipeline based on current available information. It does not predict when clinical trials will start.

Small molecule based therapy: Investigators at National Institutes of Health (NIH) are actively developing a sugar N-Acetyl-mannosamine (ManNAc) based therapy. Investigators at UCSD and Japan are also active in testing small molecule based therapy.

Gene based therapy: Investigators at Baylor Hospital, Texas, and at University of Wisconsin are working on different approaches for a gene-based therapy.

Stem cell (myoblast) therapy: Investigators at Laval University, Canada, are working on a novel method of stem cell therapy using the patient's own muscle cells. By genetically correcting the patient's own muscle stem cells outside the body, and injected back to the patient, the investigators hope to improve muscle regeneration.

Supported Projects

	Investigator	Institution	Project Description	Amount
1998 - 1999	Dr. Richard Gatti	UCLA	Patient identification and sample collection.	\$ 10,000
	Dr. Zohar Argov	Hadassah, Jerusalem	Genotyping and sequencing efforts.	\$ 59,000
1999 - 2000	Dr. Richard Gatti	UCLA	Patient identification and linkage analysis.	\$ 2,000
	Dr. Zohar Argov	Hadassah, Jerusalem	Genotyping and sequencing efforts.	\$ 52,000
2000 - 2001	Dr. Arastoo Vojdani	Molecular Genetic Lab	Sample collection and genotyping.	\$ 50,000
	Dr. Richard Gatti	UCLA	HIBM, Linkage Analysis.	\$ 44,500
	Dr. Chaim Jacob	USC	Sample collection and genotyping.	\$ 19,826
	Dr. Richard Gatti	UCLA	Linkage analysis, HIBM.	\$ 17,760
2001 - 2002	Dr. Daniel Darvish	HIBM Research Group	Laboratory startup and sequencing.	\$ 30,000
2002 - 2003	Dr. Stella Mitrani-Rosenbaum	Hadassah, Jerusalem	Mechanism of pathogenesis of GNE/MNK in HIBM.	\$ 120,000
	Dr. Hudson Freeze	UCSD	Initial Analysis and Potential Therapy for HIBM.	\$ 55,806
	Dr. Valerie Askanas	USC	H-IBM Research.	\$ 55,000
	Dr. Jianping Zheng	USC	Initial Study of antisense GNE/MNK and Over-Expression of Mutant GNE in Human Skeletal Expression of Mutant GNE in Human Skeletal Muscle Primary Culture System.	\$ 40,535
	Dr. Jacques Tremblay	Laval University, Canada	Transplantation of genetically modified myoblasts from patients with IBM2.	\$ 73,000
2003 - 2004	Dr. Daniel Darvish	HIBM Research Group	Establishment of Cell Culture & Distribution Center for HIBM Research Samples and Reagents.	\$ 21,603
	Dr. Kevin Yarema	Johns Hopkins University	Probing the Role of GNE/MNK Mutations in HIBM.	\$ 77,159
2004 - 2005	Dr. Jacques Tremblay	Laval University, Canada	Preparation of a clinical trial of transplantation of genetically modified myoblasts to HIBM patients.	\$ 92,100
	Dr. Daniel Darvish	HIBM Research Group	Laboratory costs, HIBM testing, providing reagents and samples.	\$ 141,959
2005 - 2006	Dr. Kevin Yarema	Johns Hopkins University	Probing the Role of GNE/MNK Mutations in HIBM (renewal).	\$ 111,872
	Dr. Jacques Tremblay	Laval University, Canada	Preparation of a clinical trial of transplantation of genetically modified myoblasts to HIBM patients.	\$ 77,159
	Dr. Jon Wolff	University of Wisconsin	Preliminary Vector Construction and Validation for HIBM Gene Therapy.	\$ 15,000
	Dr. John Neumanitis	Mary Crowley Research Center, Dallas, TX	Developing Gene Therapy for HIBM, in collaboration with Murex Pharmaceuticals.	\$ 0
	Dr. Ichizo Nishino	National Institutes of Neurology, Japan	Distal Myopathy with Rimmed Vacuoles (DMRV) & HIBM, mouse models.	\$ 0
	Dr. Masashi Kitazawa	UCI	Impact of Amyloid-beta (A β) overproduction on a mouse model of Hereditary IBM; Generation of Amyloid Precursor Protein (APP) & GNE double transgenic model.	\$ 45,000
	Dr. Daniel Darvish	HIBM Research Group	Laboratory costs, HIBM testing, maintaining/expanding HIBM mouse colony, supporting researchers with samples and reagents.	\$ 203,865
2006 - 2007	Dr. Stella Mitrani-Rosenbaum	Hadassah, Jerusalem	Establishment of in-vitro and in-vivo experimental systems for HIBM.	\$ 150,000
	Dr. Ajit Varki	UCSD	Engineering Human-Like Sialic Acids in Mice with HIBM	\$ 82,201
	Dr. Jon Wolff	University of Wisconsin	Gene Therapy for Inclusion Body Myopathy Type II (IBM2)	\$ 100,000
	Dr. Daniel Darvish	HIBM Research Group	Laboratory costs, HIBM testing, maintaining/expanding HIBM mouse colony, supporting researchers with samples and reagents.	\$ 154,005