



Boston Cure Project Cure Map Overview

<http://www.bostoncure.org>

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To cure Multiple Sclerosis, we must first learn what causes it

The mission of the Boston Cure Project is to cure Multiple Sclerosis. We believe that the fastest route to a cure will come from determining the cause or causes of Multiple Sclerosis (MS), because then we will know exactly where to focus our therapeutic research. We further believe that a clearly defined, comprehensive plan of research is vital to finding the causes of MS in the shortest time. The development and implementation of this plan, which we call the Cure Map, is the main program at the Boston Cure Project.

Multiple Sclerosis is a complex disease with multiple apparent root causes

All diseases are caused by one or more root causes. These primary causal factors can be grouped into five categories:

1. Genetic - dysfunction caused by abnormal genes or genetic function
2. Pathogens - bacteria, viruses, and other infectious agents
3. Toxins - poisonous substances
4. Nutrition - improper balance of necessary nutrients
5. Trauma - physical injury or mental stress

Many diseases are caused by a single, often obvious, factor such as a single defective gene, a particular type of bacterium, a polluting poison, lack of a certain nutrient, or an explicit injury. The causes of these diseases are usually identified relatively easily and the development of a cure can progress in a straightforward manner.

However, Multiple Sclerosis appears to be one of the many complex diseases that has multiple causal factors acting in concert. Standard methods to isolate an individual root cause have been tried with no conclusive results. Instead, it appears that both a genetic pre-disposition and a triggering or aggravating environmental component are necessary to cause symptoms. The fact that the

causes of MS are complex and therefore take longer to discover makes it all the more critical for research to proceed according to a logical and comprehensive strategy.

The Cure Map strategy is based on systematically listing and investigating all possible causes of Multiple Sclerosis

In order to determine the causes of a complex disease, it would be ideal if we had a comprehensive list of all possible causes of disease, along with a protocol to determine if that cause was playing a role in a disease. It would then be possible to systematically test the role of each possible cause for a given disease and include or exclude it as a contributing factor. After testing every possible cause (or at least enough of them to be able to definitively explain the disease), the causes would be known and methods of prevention, repair, and treatment could be developed.

Obviously, such a list does not exist. The number of possible disease causes is enormous and not all of them are known, so to list them all individually would be a practical impossibility. Also, the means of determining the roles of the causes we do know about are often technically difficult, resource intensive, or not possible for ethical reasons.

Despite these limitations, this basic approach of listing and then checking each possible cause is still the soundest way we currently know to systematically determine the causes of a complex disease. Our plan is to categorize the known root causes of disease and then analyze previous MS research results to determine what is already known about each of them as a possible cause for MS. From there we will develop a strategy for further research in the most promising areas based on where we notice encouraging patterns and relationships as well as holes in our knowledge that need to be filled.

This methodology has been successful in similar situations

This methodology is common in science and other endeavors. For instance, the construction of the periodic table of elements was accomplished through a systematic understanding of the nature of elements and the structure of the atom - even though many elements were unknown at the time. This systematic analysis of basic physical knowledge not only helped explain the properties of elements and the relationships between them, but it identified which elements were yet to be discovered and suggested means of detecting them based on the properties they should have. In a similar way, by systematically analyzing what we currently know about the cause of disease as applied to MS, we hope to gain a comprehensive overview of the disease that will lead more quickly to identification of the cause.

The Cure Map executes this methodology in four phases

The Boston Cure Project Cure Map will be developed and executed in five tracks - one for each root cause: genetics, pathogens, toxins, nutrition, and trauma. Each track is implemented in four phases:

Phase 1: Develop a systematic description of each root cause category

Phase 2: Review the MS literature as it applies to the systems developed in Phase 1

Phase 3: Determine promising areas of research and how to address them

Phase 4: Execute experiments to include/exclude specific causes

The process described is not specific to Multiple Sclerosis and can be applied to any disease with unknown causes. Because the focus of the Boston Cure Project is MS, we will target the causes of MS in our efforts. However, the work we do in Phase 1 and in developing our methodology can be used for any disorder.

Phase 1: Develop a systematic description of each root cause category

For each of the five primary cause areas, we are creating a systematic way to list and describe root causes of disease. This phase is non-specific to MS and is a basis for classifying all known disease causes. It is this system that will stand in the place of the "ideal comprehensive list" of root causes.

Each area will be broken down into a set of independent variables that can be used to describe the cause of a disease for that track. These variables must be independent of each other and both necessary (individually) and sufficient (as a group) to describe a given causal factor for a disease. Each identified variable has a number of attributes to describe it, which we will group into classes and subclasses.

For example, to describe genetic diseases we have identified seven independent variables, each broken down into classes and subclasses of allowable values for the variables. One variable is "Location of the defect" which can be broken down into the classes of autosomal chromosomes, X chromosome, Y chromosome, and mitochondrial DNA.

The systems should have the properties that all known diseases can be uniquely classified by our selected variables and that any new diseases will fit in without modification to the system. There may be more than one way to categorize an area, much as there are different ways to categorize coordinates in space (e.g. Cartesian or spherical coordinates), so we may have multiple systems for a single track.

Additionally, for each subclass of each root cause we will investigate the following points:

- How does this subclass lead to disease?
- What characteristics (always present or absent) are there that indicate this subclass may be the cause?
- What disorders are known to be due to this subclass?
- How were causes of these disorders discovered?
- What are the diagnostic procedures for these disorders?
- What is the prevalence of these disorders?
- What are the treatments for these disorders?
- What flaws in methodologies for discovery, diagnosis, and treatment might there be, and how have they happened in the past?
- What ideally could be done to prove/disprove that this subclass is the cause of a particular disease, assuming no significant obstacles?
- What can be done/is done in a non-ideal situation?
- Why are these differences from the ideal necessary and what are the flaws with these methodologies?

Phase 2: Review past MS research as it applies to the system developed in Phase 1

With a basic system of cause in place for a given track, we will review the MS literature relevant to each class and sub-class of that cause, indicating what areas have been investigated and which have not. Then, with our Scientific Advisory Board, we will review which results are definitive (positive or negative), which ones are promising, and which need more research.

Phase 3: Determine promising areas of research and how to address them

Once the cumulative results of published research are reviewed with respect to the Cure Map system of causes, we will have our Scientific Advisory Board evaluate which areas for further research look most promising or necessary based on information already collected. We are also interested in identifying causes that can be definitively ruled out as possibilities with simple experiments in order to remove them from future consideration.

For these promising areas of research the Scientific Advisory Board will spell out experiments that could determine if that cause is a factor in MS. Sometimes the information necessary may be difficult or impossible to obtain at the time due to technical or ethical issues. But by documenting what we need to be able to do and the obstacles to doing it, we can be vigilant in watching for developments in technology, legal developments, or methods that will allow us to proceed.

Phase 4: Execute experiments to include/exclude specific causes

After identifying the experiments that need to be conducted, we will initiate as many as possible. How they are undertaken will depend on the nature of the experiment. In areas where critical work is already being done, we can help raise funds to support and accelerate the research. For areas not being addressed, we can locate the people to do the research and help find funding to make it happen. Some work can be accomplished by designing the experiments ourselves and hiring biotech companies to conduct them. We will also promote our plans and make them freely available so that other funding agencies can incorporate our strategy into their granting process. For efforts that are beyond the scope or scale of current research labs, we may create an organization to take on those efforts or do them within our organization. It may even turn out that certain research is best done in another country due to access to medical records or higher concentrations of individuals with MS.

This is a big task, but it can be done piece by piece

The Boston Cure Project is taking on a big task. This task can be accomplished by structuring the solution correctly. The key is to be driven by a clearly defined goal: to cure MS through determining the cause. This is motivated by the personal desire of the founders - one who has MS and one whose brother has MS - and the personal desires of our many volunteers who are affected by MS directly or through a loved one. It is backed by the help of many people, with and without a direct connection to MS, who are inspired by the cause and our directed methodology.

By having a systematic approach to the solution we have a natural measure of progress. By always moving towards our goal we are made to deal with obstacles and to get past them rather than avoid them. We derive inspiration from other similarly goal-based efforts that have accomplished tasks considered impossible when they were first considered: the Apollo Program, the Manhattan Project, and the Human Genome Project, to name a few. They all share the characteristic of having a specific goal to be achieved, in spite of that goal's difficulty.

In tackling the problem of determining the causes of MS, we will lay the groundwork for determining the causes of many other diseases. Our processes, methodologies, and infrastructure can be used by other efforts to determine the causes of other diseases and we will make our research, expertise, technology, and results available to anyone working on curing disease.