

Written Comments on Genetic Diagnostic Testing Study

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INTRODUCTION

Thank you for this opportunity to offer the perspective of the end user of genetic tests. We are truly grateful, as until the past few years, we, with Lynch syndrome, have quietly sat within the shadows and had no voice. We believe Congress is heading the right way in exploring genetic testing and the barriers which exist to individuals affected by genetic defects. We believe there is so very much more which can be done as genetics and genetic testing is the future of medicine.

About Lynch Syndrome International

Lynch Syndrome International (LSI) is an all volunteer, not for profit, global organization headquartered in Vacaville, California. We were the first and only advocacy organization we know of, within the United States, solely dedicated toward the advocacy of Lynch syndrome (LS) and its cancers. The mission of the organization is four fold:

1. To provide support services and resource information for individuals and families who are at high risk for LS hereditary cancers;
2. To provide public awareness of the hereditary cancers of LS to the general public;
3. To provide education to health care professionals of Lynch syndrome;
4. To support LS related research endeavors.

This mission was necessary as those with Lynch syndrome had no recognizable voice and our families faced incredible challenges. Tragically, many contracted cancers were diagnosed at a late stage and people died, particularly our young.

Our Board of Directors is comprised of survivors and previvors of Lynch syndrome, caretakers, family members, and genetic, medical and psychological professionals who have a specific expertise with LS. No person receives any personal compensation for their efforts.

LSI is primarily financed by survivors (those who have contracted a cancer) and previvors (those diagnosed with the defect however who have not contracted a cancer) who contribute approximately eighty-three and one half percent (83.5%) of our funding base. Corporate and business donations account for approximately eleven and one half percent (11.5%) of funding. The rest is obtained as a result of fundraising efforts. Our organization does not endorse any specific genetic testing company. We do not believe we hold any conflict of interest in this issue. Our one board member who is employed by Ambry Genetics has recused herself from all discussion or action concerning this issue to avoid any conflict of interest.

We have personally interacted, served and/or worked with over four thousand (4,000) families, representing their twenty thousand family members affected by LS and tens of thousands of medical professionals since our inception on July 1, 2009, three years ago. We believe we have a clear understanding, from the end user's view, of the issues and barriers which affect the diagnosis of LS as well as the care and management of those diagnosed and can contribute a different perspective from the lawyers and the medical professionals into the questions: "Is there a need for confirmatory genetic testing" as well as the issues surrounding health insurance coverage.

We are the only organization which solely advocates for LS in the U.S., and we strongly advocate for genetic testing. We believe it to be absolutely essential to the very existence of our Lynch syndrome families. It opens the door for ongoing, regular cancer screenings which

can remove growths, polyps and tumors before they become cancerous and provide early detection so cancers can be removed or treated before becoming life threatening. Without genetic testing and early cancer diagnosis through the use of ongoing screenings, many members of our families die.

About Lynch Syndrome

Lynch syndrome is a hereditary condition created by a defective mismatch repair gene. The purpose of this gene is to repair errors in DNA duplication. Due to its inability to make such repairs, errors stack upon errors and tumors form, therefore, individuals with Lynch syndrome are predisposed at a very high risk of contracting a litany of primary cancers during their lifetime.

Population prevalence of LS is projected to be one in every three hundred and seventy persons (1:370)¹ to one in every four hundred and forty persons (1/440.)² It is believed 600,000 to 1,000,000 persons are affected by LS and less than ten percent (10%) are currently diagnosed. The exact extent of those who have been positively tested is unknown due to protected proprietary information held by the many different testing companies in existence.

No current gene therapy exists to reverse the effects of the defective gene nor is there any certain known treatment for Lynch cancers. Research is ongoing.

Four primary mismatch repair genes of are affected, MLH1, MSH2, PMS2 , MSH6 and EPCAM which disrupts the mismatch repair gene pathway. Though EPCAM is not a mismatch repair

¹ The Search for the Unaffected Individuals With Lynch Syndrome [Cancer Prev Res \(Phila\). 2011 January; 4\(1\): 1–5](#).doi: [10.1158/1940-6207.CAPR-10-0345](#)

² Chen S, Wang W, Lee S, Nafa K, Lee J, Romans K, Watson P, Gruber SB, Euhus D, Kinzler KW, Jass J, Gallinger S, Lindor NM, Casey G, Ellis N, Giardiello FM, Offit K, Parmigiani G. Colon Cancer Family Registry. Prediction of germline mutations and cancer risk in the Lynch syndrome. JAMA. 2006;296:1479–87. [[PMC free article](#)] [[PubMed](#)]

gene, deletions silence the MSH2 gene by hypermethylation. Each of these genes are continuing to be researched as well as the over 11,000 defects of variants of these genes.³ Lynch syndrome research is still pioneering and more is desperately needed.

Cancer Risks in Lynch Syndrome Patients Age ≤70 Years Compared to the General Population

Cancer Type	General Population Risk	Lynch Syndrome (<i>MLH1</i> and <i>MSH2</i> heterozygotes)	
		Risk	Mean Age of Onset
Colon	5.5%	52%-82%	44-61 years
Endometrium	2.7%	25%-60%	48-62 years
Stomach	<1%	6%-13%	56 years
Ovary	1.6%	4%-12%	42.5 years
Hepatobiliary tract	<1%	1.4%-4% %	Not reported
Urinary tract	<1%	1%-12%	~55 years
Small bowel	<1%	3%-6%	49 years
Brain/central nervous system	<1%	1%-3%	~50 years
Sebaceous neoplasms	<1%	1%-9%	Not reported

[Aarnio et al \[1999\]](#), [Vasen et al \[2001\]](#), [American Cancer Society \[2002\]](#), [Hampel et al \[2005\]](#), [Ponti et al \[2006\]](#), [South et al \[2008\]](#), [Watson et al \[2008\]](#), [Barrow et al \[2009\]](#), [Stoffel et al \[2009\]](#) Aarnio 2012

In the past year, a higher risk of bladder cancer has been found (actual numbers reflected above).⁴ Discovered this year and requiring more research is a certain subset of Lynch syndrome that predisposes individuals to an extremely high risk of breast cancer.⁵ Other

³ Kohlman, Gruber, Lynch Syndrome, 9/20/2012 GeneReviews™ [Internet]. Pagon RA, Bird TD, Dolan CR, et al., editors. Seattle (WA): University of Washington, Seattle; 1993-. <http://www.ncbi.nlm.nih.gov/books/NBK1211/>

⁴ Markku Aarnio “Clinicopathological Features and Management of Cancers in Lynch Syndrome,” Pathology Research International, vol. 2012, Article ID 350309, 6 pages, 2012 doi: 10.1155/2012/350309

⁵ <http://www.cancer.gov/ncicancerbulletin/022112/page3>

extracolonic cancers of LS include liver cancer, pancreatic cancer, gall bladder duct cancer, prostate cancer, sarcomas, thyroid cancer and others.⁶

Persons with LS face a high risk, following their first cancer, in contracting a second primary or extracolonic cancer.⁷ Each year, we develop an accumulated risk of approximately three percent 3% of acquiring another cancer. Our cancers progress far more rapidly than those of sporadic cancers, in 1-3 years, compared to 8-10 years. It is absolutely essential our cancers are detected early. Children of those with LS face a 50% risk of contracting the defective gene.

Diagnosis of Lynch Syndrome

The first step toward diagnosis of Lynch syndrome is a two-fold approach. In order to assure preventative measures so families will not contract Lynch cancers, the first intervention is ordinarily through a “gateway physician,” a general practitioner, family practitioner or OB-GYN, who provides regular basic care and maintains family history documentation within the patient file. That physician ordinarily makes referrals to specialists.

If the family history meets a standard known as the Amsterdam Criteria II, (3-2-1 Rule,) then they qualify for genetic counseling/ testing. It calls for *three* relatives with a Lynch syndrome associated cancer (cancer of the colorectum, endometrium, small bowel, ureter or renal pelvis, *two* of which are directly related to the third and *one* diagnosed before the age of 50. Less than 50% of individuals with Lynch syndrome meet the Amsterdam criteria for genetic testing.⁸

⁶ Risks of Primary Extracolonic Cancers Following Colorectal Cancer In The Lynch Syndrome, Win et.al. J. Natl Cancer Inst. 2012;104(18):1363-1372

⁷ Centre for Molecular, Environmental, Genetic and Analytic Epidemiology, Melbourne School of Population Health, Level 3, 207 Bouverie Street, The University of Melbourne, VIC 3010, Australia. Risks of Primary Extracolonic Cancers Following Colorectal Cancer In Lynch Syndrome, [J Natl Cancer Inst.](#) 2012 Sep 19;104(18):1363-72. Epub 2012 Aug 28 Win, AK, et.al.

⁸ Improving Identification Of Lynch Syndrome Patients: A Comparison of Research Data With Clinical Records, YY Tan, et al. [Int J Cancer.](#) 2012 Dec 6. doi: 10.1002/ijc.27978

Today, as a result of the different tests available to physicians, there are several methods for testing. Physicians most often order full sequencing for those with a family history of Lynch syndrome or order a specific mutation test for those with a known family defect.

Genetic counselors often order a specific test or panel, to determine if a specific gene is involved. This reduces costs but is complicated and consuming. It sometimes requires multiple tests and a considerable amount of time to process the test, creating anxiety for the patient which may require medical and psychological or medical intervention. It is less expensive.

Though standards exist for opening the door for genetic testing through the Amsterdam Criteria II, a barrier to this approach is many physicians are not taking family histories, despite being a basic standard of care, taught in all medical schools. A second barrier is even if the family history is taken, many physicians are not knowledgeable or comfortable prescribe genetic testing and/or whether or not to refer an individual to a genetic counselor. This is a direct result of too many patents and licensing which has resulted in no holder having enough of a market share to justify the expense of public awareness and physician education, as well as aggressive marketing the medical device. If there is no actual significant market share, as what exists within Lynch syndrome, physicians are not going to be educated, public awareness of the condition will not occur and people will die, as we have seen occur with the Lynch syndrome.

The second process is referred to as “universal testing,” recommended by the EGAPP Committee of the Center for Disease Control (CDC) resolves the reluctance of physicians to take family histories. It calls for immunohistochemistry (IHC) testing or MSI (microsatellite instability) testing of all colorectal tumors for characteristics of Lynch syndrome. This requires an individual within a family to have contracted a Lynch syndrome cancer first before being

allowed genetic testing. If the tumor tests with characteristics of Lynch syndrome, then genetic testing is in order. This method significantly decreases costs of diagnosis of the Lynch syndrome and is being more commonly used than genetic testing.⁹ It has recently been advocated universal testing of all endometrial tumors be conducted as well due to the high risk to women for women's cancers for which there is no reasonably reliable test for cancer.¹⁰ Women with endometrial cancers often receive prophylactic surgeries and removal of female organs following child bearing years to deter mid aged cancers.

Barriers to Genetic Testing

1. The first and major barrier is lack of public awareness.

Lynch syndrome was founded in late 1895, when it was researched by Aldred Warthin.¹¹ His research ceased following his death during the Great Depression and wasn't resumed until Henry Lynch continued research on what was known as Family G (a family with a prolific history of endometrial, rectal and colorectal cancers) in the mid 1960s. Dr. Lynch spent decades trying to convince the research community cancer was hereditary.¹²

It was the environmental age, when it was believed all cancer was a result of environmental factors. Finally, after determined, dogged efforts by several passionate researchers, Lynch syndrome was realized, though the community faced concerns about notifying a public as they

⁹ JAMA, The Identification of Lynch Syndrome Among Patients With Colorectal Cancer, The Journal of the American Medical Association, *JAMA*. 2012;308(15):1555-1565. doi:10.1001/jama.2012.13088 10/17/2012

¹⁰ Family History: Still Relevant In The Genomics Era Cleveland Clinic Journal of Medicine May 2012

¹¹ The History of Cancer, An Annotated Biography, James Stuart Olson, ABC-CLIO, 1989, Health & Fitness

¹² The Frustration of Families, Henry Lynch, Heredity and Cancer Control 1962-1975 David Cantor, Cambridge Journals, *Med Hist*. 2006 July 1; 50(3): 279–302.

felt there may be fatalistic reactions. Finally, in December of 1993, mutations were discovered and a subsequent test was founded and patented, by several institutions.¹³

- Researchers are passionate scientists. They study disease with the intent to save lives, and publish their results. Research scientists are not marketing experts, nor should they have to be. Many of these patents were issued to research institutions which do not conduct aggressive marketing of the tests they sell.
- Studies involving Lynch syndrome, often produced for the public good with public funding, have been locked behind walls and not available without payment of a fee. As a result, information is seldom disseminated to the public. Many of the public did not and still do not realize cancer can be hereditary. They don't know to check their family histories of cancer and report it to their physician. When they did, most often, the physician did not/does not know what to do with the information. The unfolding tragedies are people contract cancers, detected at a later stage and often die.
- The NIH has the responsibility to oversee approximately 6800 rare diseases in the U.S.¹⁴ Efforts to promote public awareness of Lynch syndrome have been minimal, however the NIH has financed a moderate amount of research into it. There is a need for far more.
- Due to the number of companies which genetically test for Lynch syndrome, there is no significant company which has enough market share to justify the costs of creating public awareness of Lynch syndrome.

2. The second barrier is lack of physician education.

¹³ An Update of HNPCC Lynch Syndrome HT Lynch, Jane Lynch, Thomas Smyrk, Elsevier Science Inc. 1997

¹⁴ <http://www.genome.gov/27531963>

- Information regarding genetic cancers has not been taught in medical schools until the past few years. The few currently practicing physicians who have knowledge of Lynch syndrome has received its education on genetic cancers directly from pharmaceutical and genetic diagnostics representatives, information gleaned from internet medical sites, obtained by participating in continuing medical education classes sponsored by pharmaceutical and genetic testing companies or from the grassroots efforts of our advocacy organization. It is not unusual to encounter a physician at a medical conference who has little or no knowledge of hereditary cancers. This is exemplified by an experience while exhibiting at a medical exhibition in 2010. We personally spoke with 2000 general practice physicians. Of the 2,000, a handful knew about Lynch syndrome and only two knew how to diagnose and manage it. By 2012, however, in speaking with physicians from the same organization, approximately forty percent (40%) had basic knowledge of Lynch syndrome.
- Many medical professionals are overwhelmed and confused about genetic testing as a result of the various tests available. This is especially true of OB-GYNs who are comfortable within their own realm with women's cancers, however are reluctant to genetically test for Lynch syndrome, or even conduct risk assessment involving cancers which are outside the realm of women's cancers. Testing is easier for BRCA as there is one process and one specific test which are under one patent. There is no confusing information. As a result our women who face the Lynch syndrome women's cancers are not receiving the appropriate care.

3. Physicians have very little time to see patients, averaging fifteen (15) minutes per examination. Due to this, many are not taking family histories or even considering genetic defect or disease as a root cause of patient complaint.

4. *Too Many Testing Companies and Not Enough Market Share*

Today, there are many tests for Lynch syndrome on the market, with very few companies aggressively marketing the tests in the manner seen with the tests for BRCA.¹⁵ Traditionally pharmaceutical and device companies relay the information on new technology direct from the researcher's benches to the medical community and the public. On television, nightly, pharmaceutical companies are advertising their products. Exhibit Halls at medical conferences are crowded with companies educating physicians about the new technology in medical diagnostics. For Lynch syndrome, there are no television ads and little advertising besides slapping up a website. Lynch syndrome testing is simply just another addition to menu of tests and placed upon shelves. There are no ladies dressed in pink dancing upon city streets en masse and demanding medical care and public awareness. There are no major organizations standing up for Lynch syndrome. There is simply our organization of everyday families facing incredible daily challenges and who are now, in a grass roots effort, taking on the responsibilities which belong to the corporations, the institutions and the Government to keep their families alive.

There is no central repository or responsible party to market Lynch syndrome and educate the public as occurs with BRCA. The government has not filled the gaps, and in actuality, they are

¹⁵ Impact of Gene Patents and Licensing Practices On Access To Genetic Testing for Inherited Susceptibility to Cancer; Comparing Breast and Ovarian Cancers to Colon Cancers [Genet Med. 2010 April; 12\(4 Suppl\): S15-S38](#).doi: [10.1097/GIM.0b013e3181d5a67b](#)

not good marketers, either. Often information disseminated by them is written in esoteric terms, as indicated by the testimony given the PTO Roundtable. New tests crop up all the time and there is no readily available database comparing and rating tests, test companies and test results for consumers. This creates the possibility a confirmatory test may be impossible at the worst and highly reliable at the best, to even identify, without the costly assistance of a genetics professional to assess the market, assess the tests and find one test which would be more effective than the original test given.

Though Lynch syndrome is far from rare, it is severely under diagnosed. At a meeting last year, a genetic researcher lamented, "Lynch syndrome is the medical profession's greatest failure."

No diagnostic test is equal. They are all different. There are tests for full sequencing and partial sequencing, single gene mutations as well as panels and MSI (micro satellite instability) and IHC (immunohistochemistry testing) testing of tumor tissue. The market is flooded with blood tests and saliva tests from over thirty two (32) different testing companies, each with their own capabilities. There are complicated tests and easy tests. Some don't test for rearrangements.¹⁶

Some provide only sequence analysis or duplication/deletion analysis of MLH1, which don't detect the constitutional inactivation of MLH1 by methylation, along with somatic loss of heterozygosity of the functional allele, which is a rare cause of the Lynch syndrome. Some testing companies test for only a few genes, some test for all the mismatch repair genes and some test for the EPCAM deletion. Some tests have more capabilities than other tests. Some companies have more variants that cannot be identified by other companies. The genes and methods included in multi gene panels vary by laboratory and a panel may not include a

¹⁶ [\[Wijnen et al 1998, Charbonnier et al 2000, Wagner et al 2003, Plaschke et al 2004, Senter et al 2008\]](#).

specific gene. The many different testing methods are confusing to physicians. No test is equal...some are superior, some are inferior and “Consumer Beware.”

We experienced a situation last spring whereupon we assisted in acquiring the genetic testing for two individuals, following the death of a family member from Lynch syndrome. We chose a lessor expensive company and after two months, we received information they were unable to identify the variant and confirm the test. We received a request for \$4,000 for each test to “run a full sequence testing” of the samples. We determined to have the single mutation tests run through the initial company which identified the mutation in the family member. It was effective. One was positive and one was negative.

In order to obtain a second confirmatory test in many cases, one would require the costly services of a genetic professional in order to interpret the capabilities of each test and to find the most effective test for a second opinion. Genetic testing, in this case, has become far too imposing significant cost to the end user as well as the insurance company as well as emotionally charged delays in processing the tests.

The issue is really whether or not need exists. We have never seen the need for a confirmatory test for positive results of Lynch syndrome. The process for genetic laboratories is to run a positive test through the system once again, blindly, to insure the test results remain the same. If a second opinion were to be offered or required, the demand would be high. It would double the costs of genetic testing, require the services of a genetic counselor and make genetic testing cost prohibitive.

The Third Barrier Is Cost

There is a common misconception if competition exists, price will reduce. This has not been indicated with Lynch syndrome testing. The cost of full sequencing is between \$3,000 to \$5,000, approximately the same cost of an MRI (which is prescribed all the time). It is a bit more expensive than BRCA genetic testing.¹⁷ The cost of a genetic test for full sequencing for LS is ordinarily more expensive than that of the average BRCA test.

Currently, some institutional tests for LS cost more than commercial tests.¹⁸ Though prices have dropped, it isn't because of competition. The reason is due to demand and quantity, brought about by advocacy efforts. With quantity, prices would have dropped as the technology became more recognized and the companies and institutions achieved a better financial stability. Genetic testing IS costly for the initial full sequencing. However, once a mutation is identified, the cost reduces dramatically for the other family members who share the same mutation. Additional hidden expenses of genetic testing exist for the end user, regardless of whether the test is full sequencing or of a single mutation, which include the requirement the cost or co-pays for a physician to prescribe the test, the services of a genetic counselor, the services of a laboratory if blood is drawn, the cost of time off work for two to three medical appointments for examination and diagnostic testing and perhaps a fourth for the results of the diagnostic testing, cost of travel, parking, daycare, etc. The hidden costs of genetic testing can cost more than the testing for a single known mutation due to the number

¹⁷ <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3047448/table/T2/>

¹⁸ Impact of Gene Patents And Licensing Practices On Access To Genetic Testing For Inherited Susceptibility To Cancer: Comparing Breast and Ovarian Cancer to Colon Cancers Genet Med. Author manuscript; available in PMC 2011 April 1. Published in final edited form as: [Genet Med. 2010 April; 12\(4 Suppl\): S15–S38](#).doi: [10.1097/GIM.0b013e3181d5a67b](https://doi.org/10.1097/GIM.0b013e3181d5a67b)

of visits required and mandates of insurance companies. which would also be increased with confirmatory tests?

Insurance companies ordinarily cover significant portions of the cost of the test and service providers, however, federal government insurances, such as Social Security Medicare, Medicaid, Tricare, VA and other insurances which rely upon federal government underwriting procedures, cover genetic testing only those individuals who have been affected by a cancer and do not practice the preventative, cost effective, lifesaving measures of genetic testing for those who meet a criteria for the Lynch syndrome. As a result, the lower social economic families and the underserved are not being identified with Lynch syndrome and they and their families are not being protected. The tragedy is they are vulnerable and they are dying. Finally, the Healthcare Affordability Act defined a difference between preventative and diagnostic test costs, increasing the cost for those with hereditary cancer genes by imposing copays upon individuals who underwent colonoscopies and had polyps removed. The purpose of annual screening tests is for prevention and to remove polyps, however our families now have to “stretch” the time period of their annual tests in order to afford to take them, playing Russian roulette with their lives, as a result.

Insurance Companies as a Barrier

Though most insurance companies cover Lynch syndrome genetic testing, no two insurance companies are the same. Some place restrictions and conditions upon getting the test, mandating genetic counseling as a prerequisite. Some cover the cost of the test and not genetic counseling. This is primarily due to the high costs for basic full sequence genetic testing. To save costs, some insurance companies want to make certain “the right test” (less expensive

panel or test for specific mutations) is ordered. Genetic counselors predict the “right test.” If they are wrong, they simply perform another one. The process is lengthy and wears an emotional toll on the patient and the family. It is not unusual to hear of individuals having to go months through the genetic testing process, as a result.

We believe genetic counseling is an important service and our organization supports the efforts of genetic counselors, however we do not believe individuals should be required to participate in genetic counseling. We believe it should be a choice and no person should be denied a potentially lifesaving diagnostic test because they are unable or unwilling to undergo mandatory counseling as a prerequisite. We believe in the premise of “Do No Harm,” and the patient needs should be considered first, above all.

There is no other medical condition we know of, other than genetic conditions, in which individuals are required to submit to counseling. This increases the diagnostic process to two to three days and more wait times to get diagnosed and dramatically increases the costs.

An example...Joe is a construction worker in Elko, Nevada, has a home, a wife and a young family of four. His sister calls, advising she has Lynch syndrome and provides him with information of the specific mutation. Joe works for a private company and doesn't have sick leave, vacation leaves or holidays. He is paid for actual hours worked. His total salary is \$900 a week, but after taxes and costs of health insurance for him and his family, Joe makes about \$700 a week to support a family of six.

He takes time off work, at his own expense, to visit his family doctor and obtain genetic testing following a three week wait for an appointment to see his doctor. Joe makes \$17.50 an hour. The visit cost him \$70 in lost wages and a \$30 co-pay. To him, it was worth it to find what

disease had killed his mother and members of his family. His doctor reviews Joe's insurance and finds Joe is required to participate in genetic counseling, prior to being allowed the lab test. The nearest place where genetic counseling is allowed is Reno, Nevada, four and one half hours drive time or 290 miles from his home. Joe figures if he drives his economy car, gas costs will be around \$100.00 and he may need to stay overnight, costing him another \$100, as his appointment is at 9:00 a.m. The cost of traveling to the counselor will be \$340 to \$480. Joe has also been told the results of the tests will take two to three weeks and he will have come back for a follow up consultation to receive the results, for a cost of another \$100 in gas, \$140 to \$280 in lost wages and most likely the cost of another night of lodging. An appointment is made with the genetic counselor with a two week wait time. Costs of traveling to the appointment will be \$340 to \$480.

He is fortunate. Some genetic counselors are backlogged as far as six months. Fortunately, Joe is not pending a surgery. If he was, he would need to make a surgical decision of whether or not to remove certain body organs without the benefit of being able to be diagnosed for the life threatening condition. By the time Joe gets to the genetic counselor, he will have had to face five weeks of uncertainty and waiting to take the diagnostic test and another three weeks to get the results.

Joe is responsible for a co-pay of 50% for lab tests. Lab costs and testing will cost \$450 for the test, including the cost of the lab, with Joe's share being \$225.00. The genetic counselor costs \$200, with Joe's share being \$100.00. His testing will cost him \$325.00.

His total costs of the getting diagnosed with LS will cost Joe \$1205 in lost wages; almost two weeks pay (9 days of wages.) Had he been able to get diagnosed through his physician, the cost

to Joe would have been \$425. Insurance mandates almost tripled the cost of a genetic test which is necessary to determine if Joe (and eventually his children) faces a life threatening condition.

Joe's insurance company doesn't offer the services of a telephonic genetic counselor and Joe is frustrated that he is required to "go to counseling" to find out if he has the same disease that killed his mother, his aunts and uncles and grandparents. Joe is worried about his family and as time elapses, doesn't know if he can handle the guilt of possibly passing it to them. He is worried he won't be able to get life insurance, when he is able to afford it. He is concerned about the costs of getting ill, especially if testing costs this much. Joe already has bills he cannot pay.

While waiting for the appointment, Joe is frustrated and anxiety builds. He vividly remembers the death of his mother and the fears of inherited cancers. He has trouble sleeping. He is edgy and his physician has recommended antidepressants. His wife is frightened. Does he have the genetic defect that killed his mother and most of her family members? What about the kids? During the following weeks, he thinks and rethinks it. How will he be able to care for his family if he gets a cancer? How can he afford to stay well? How can he keep his job? Joe decides not to go to get the genetic test, and is part of the 1 of every twenty people who are referred to genetic counseling and eventually, he calls us. We helped Joe get tested by a physician and protect himself and save the lives of his family. Like many others he decided to get his own test and pay cash for it.

When enormous gaps occur behind the first appointment with the physician and the genetic counseling appointment, anxiety builds. It has been found, with women, the costs of the care,

along with the anxiety is a major factor individuals do not attend genetic counseling.¹⁹ With men, it is the stigma which deters them from attending the appointments, the fear of discrimination, having to undergo a colectomy and not being able to care for their families or continue an active lifestyle. Many view mandated genetic testing to be similar to court appointed counseling. With the young, it is denial, an inability to pay for genetic testing and youthful bravado that nothing will happen to them. For all, it is a fear of not being able to get affordable medical insurance or health care for testing, following a positive test, or being faced with violations of privacy or acts of discrimination.

Recently, we are finding a backlog of genetic counseling services following the positive pathological testing of tumors for the characteristics of Lynch syndrome, conducted on individuals with colorectal cancer and who are pending surgeries.

Some of these delays have been up to six months. A woman called our office this year, stating she was diagnosed with colorectal cancer on December 27, 2012. She was unable to get a genetic counseling appointment until January 21st. This appointment was required by her insurance company prior to genetic testing and if she didn't attend, she would have to pay thousands of dollars for full sequencing.

Her surgery was pending and she had to make a determination of subtotal colectomy (all but approximately 7" of the colon removed) or a partial resection. It was dependent upon the test results. She was frightened and anxious, knowing Lynch cancers can metastasize quickly as well as well as realizing it would take approximately seven weeks for the entire process to be

¹⁹ Endometrial Cancer Patients and Compliance With Genetic Counseling: Room For Improvement, Backes, FJ and Mitchell, E and Hampel, H and Cohn, DE, Gynecol Oncol, 123, 3, 532-6, 2011

completed before she could make a determination. The genetic counselor was on vacation and there was no backup. Other genetic counselors in the area were equally backed up, as long. The patient was put on antidepressants and we were able to assist with intervention and find some effective genetic counseling for her on a more immediate basis. Again, in this case, there was no reason why her clinical oncologist couldn't perform the risk assessment and administered the genetic test for full sequencing. If the physicians are incapable of explaining LS and giving informed consent, there was no reason why an immediate genetic counseling appointment couldn't be offered, even telephonically, in the presence of the physician.

Bottom line, if one has to wait for appointments and tests, they most likely will not go. If one has to live through weeks of uncertainty, and feels it may be their future, one will not go. If one is dependent upon others, then one will often not go. And if one has experienced the death of a loved one by cancer, often, it takes much longer for them to test, than not.

Insurance companies are not offering triage or immediate genetic risk assessment, which is the answer to these problems if physicians cannot get trained to assess individuals for genetic conditions due to multi patent and licensing.

Fear of Genetic Discrimination

A number of individuals, particularly men, have intense fear of genetic discrimination and extreme concern regarding privacy of medical records. Despite GINA legislation, there are some justifiable fears, though, for many, when considering the options and the big picture, most will resort to genetic testing.

The biggest fear expressed is the inability to get life insurance. It is available, but at a high cost.

Under federal and many state laws, life insurance companies are entitled to discriminate against those with hereditary conditions. According to one underwriter, the cost of life

insurance for any individual, once diagnosed with LS, is four times the cost to someone who does not have Lynch syndrome. Asked how the insurance companies would know which mutation constituted a very high risk to cancers, he stated, “Believe me, they have the numbers.”

That same underwriter advised life insurance companies have the ability to access the Medical Information Bureau, served by over 500 health and life insurance companies, and stated, “We know if someone has a hereditary disease.”²⁰

As a result of genetic testing and annual cancer screenings, our current generation is living longer than those before us. Hope increases with each generation with early detection of cancers and treatment options. Most Lynch cancers are preventable. Studies show those who are genetically tested have a lower risk of cancer and a higher mortality rate. However, some life insurance companies are not taking this into consideration and concerns of privacy and discrimination in respect to life insurance, disability and long termed care insurances exist.²¹

The next biggest fear is of discrimination is from employers and the necessity of taking time off work for screening tests. Efforts are being made to educate health care facilities and physicians of the importance to integrate the management and screening tests of those affected by LS, from one that takes five to seven days per year, down to a few or less. MD Anderson, University of Indiana and University of Southern California, Norris Cancer Center have excellent programs which significantly reduce the amount of time required from daily active living for screening protocols, as well as reduces the level of anxiety.

²⁰ The Medical Information Bureau May Have A File On You
<http://patients.about.com/od/yourmedicalrecords/a/mib.htm>

²¹ Bonis P, Trikalinos T, Chung M, et al. Hereditary nonpolyposis colorectal cancer: Diagnostic strategies and their implications. Evidence report/technology assessment No. 150 Prepared by Tufts-New England Medical Center Evidence-based Practice Center under Contract No. 290-02-0022. 2007 May; [Ref list]

Most genetic testing is paid for by the insurance companies and reported to insurance databases. To insure privacy, many individuals pay cash for the test and for the counseling expenses.

IN CLOSING

We have never experienced a situation whereupon a person has requested or desired a confirmatory test. Our belief is it may create more barriers toward diagnosis. There are very few concerns, if any regarding a positive test. Concern does exist in regard to a false negative test. The issue is in confirming false negative tests, especially due to the number of testing companies in existence. It is costly and difficult.

Insurance companies impose a major barrier to individuals with LS by mandating requirements of genetic counseling, imposing difficult hurdles in obtaining approvals for large numbers of screening tests, taking advantage of new co-pay definitions, subjecting the insured to long wait times to get approvals for screenings, etc. Some of these actions are becoming strongly suggestive of discrimination against those with hereditary conditions as no other medical condition diagnosing a life threatening natural condition requires “counseling” and very few require as much ongoing screening and intervention measures to insure mortality.

The severe lack of federally covered insurances for individuals who are underserved is an extremely serious condition. Genetics is the future of medicine. It is disconcerting the Government lags behind the standards of the majority of state and local public populations. Research funding is desperately needed in order define variants of an uncertain significance in order to increase the number of individuals diagnosed, to alleviate the uncertainty and assist them in moving forward onto a lifetime management plan. It is needed for our major cancer

institutions and educational facilities in order to find new genes determine the spectrum cancers of Lynch syndrome, determine the risks of each mutated gene and variant and to personalize the management plan for the patients.

It is our belief, had there been a single patent for Lynch syndrome, public awareness would be far more enhanced. More physicians would have knowledge of the condition in order to diagnose affected persons. Tests would be improved and confusion over the testing process would alleviate with one central repository. Many more lives would have been saved. Many of our families wish there would have been one central company, with a patent and believe it could have saved the lives of our families.

This perspective has been written and reviewed by individuals who are personally affected by Lynch syndrome. In my own family, everyone tested has been diagnosed with Lynch syndrome and through our generation, all have sustained cancers. Today we live, much longer than the generations before us, as a result of genetic testing and annual screenings. For that, we are grateful. Hopefully, our children will never face a life threatening cancer, with their early diagnoses and annual screenings.

The road to where we are has been long and often tragic with many contracting cancers and late diagnoses of cancers. Our lives are engaged in consistent never ending battle for our own lives, the lives of our loved ones, for effective follow-up care, for knowledgeable physicians and to stay above water so we can afford to stay alive and to help others live.

Our biggest fear is for our children. We are concerned if a gene therapy is founded, and there were open patents, we would again face what we've faced with LS. We fear this legislation may

lead others with genetic conditions into the same situation as us. Right now, we have the closest thing to a cure for cancer, with preventative measures, and we aren't getting diagnosed. We urge Congress to use prudence and exercise caution with any determinations which can affect genetic testing. Technology changes rapidly. Legislation can become antiquated in a day, a week, or a month.

Lynch syndrome is evolving. Every day new variants are found, new cancers are explored, and new testing procedures are developed, primarily with globally collaborated research and research from Europe and Australia. The technology is moving faster than the education of medical professionals. The U.S. medical profession and our government health care are falling behind that of many other countries in education of medical professionals in the arena of genetics.

We urge the PTO and Congress to solicit the views of the many different advocacy organizations whose base relies upon genetic testing, public awareness and physician knowledge and education to stay alive as well as the views of the lawyers, the medical professionals and the corporations. That viewpoint is equally as important, especially in matters of insurance issues, delayed services and the unavailability of resources to obtain services. Please remember genetics is not just about medicine and law but it is about people, as well.