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ELLIOTT P. JOSLIN, MD:
A CENTENNIAL PORTRAIT

BY DONALD M. BARNETT, MD



**Joslin Diabetes
Center**

ELLIOTT P. JOSLIN, MD:
A CENTENNIAL PORTRAIT

AN ILLUSTRATED HISTORY OF THE CAREER OF
DR. ELLIOTT P. JOSLIN: 1898-1962



BY DONALD M. BARNETT, MD

About the Author

Donald M. Barnett, M.D. was a staff physician at the Joslin Clinic for 35 years. Dr. Barnett was associated with Dr. Elliott P. Joslin from 1960-1962. From 1989-2000 he chaired the Joslin Historical Commission, and since 2000 he has stayed at Joslin as a consultant, historian, and curator.

Currently, he is engaged in writing the definitive biography on Dr. Joslin, for which he has secured a grant. The biography is tentatively titled, *Dr. Diabetes—The Life and Times of Elliott P. Joslin of Boston, America's First Diabetologist*. This first-time biography, to be published in 2016, is long overdue and builds on the essay, *A Centennial Portrait*, and includes additional material about Dr. Joslin's "roots."

All inquiries about the upcoming biography of Dr. Joslin should be referred to the Archivist and Assistant Curator of the Joslin Diabetes Center:

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INTRODUCTION

Dr. Joslin died over a generation ago, but his legacy remains a vital one for the person with diabetes. His vision, dedication and determination single-handedly focused the English-speaking medical community on diabetes and led the way toward improved treatment and longer and healthier lives for diabetes patients.

To imagine Dr. Joslin's death as recent may help orient those readers unfamiliar with his life and times. (The obituary is after all a form of biography, despite its tendency to marked brevity and lack of perspective.) The essay that follows this reconstructed obituary will expand on significant aspects of his life and career.

Monday, January 30, 1962

Obituary: "Dr. Elliott P. Joslin, dead at 92."

Elliott Proctor Joslin, pioneer medical specialist in diabetes mellitus, died in his sleep on January 29 at his Longwood Towers home. He had attended church services at Old South Church, Copley Square that morning, returning by subway as was his custom, despite the cold weather.

Dr. Joslin was one of the best known physicians in this city, having practiced medicine for sixty-four years. For fifty years he had maintained a medical group practice of internal medicine in his townhouse at 81 Bay State Road, adjacent to Kenmore Square. Over the years, this team evolved into the Joslin Clinic. In 1922 Dr. Joslin and his principal assistant, Dr. Howard Root, were the first physicians in America to administer the standard commercial insulin.

In 1956, Dr. Joslin moved his clinic of fifty employees to a modern facility on Pilgrim Road next to the New England Deaconess Hospital. Joslin Park and Joslin Road in this area were both named by the City in his honor.

From the start of his practice, he promoted dual careers for himself and his associates that combined the practice of medicine with an emphasis on investigating and reporting on many aspects of the disease diabetes mellitus. Dr. Joslin was a leading fundraiser for the Deaconess Hospital, Harvard Medical School and his own Diabetes Foundation, Inc., founded in 1953.

Joslin was best known for his inauguration of education for the diabetic patient. He emphasized the early detection and treatment of the disease as well as the prevention of vascular complications and diabetic acidosis. His name became synonymous with the need for detail in dietary compliance, insulin adjustment and general preventive medicine. Joslin's studies on the problems of diabetes in the population with emphasis on "outcome" statistics for people with the disease (epidemiology) were respected worldwide.

*In 1934, he established the Baker Clinic of the New England Deaconess Hospital that housed a research laboratory devoted to diabetes. His message on diabetes was enhanced by his widely read textbook titled *The Treatment of Diabetes for physicians* and its popular companion *Diabetic Manual for patients*. Both publications went through ten editions.*

Joslin is survived by his wife of 60 years, Elizabeth Denny Joslin, and his three children: Mary Otto of New York, Dr. Allen Joslin of Newton, Massachusetts and Elliott P. Joslin, Jr. of Rhode Island. He is also survived by his principal associates: Drs. Howard Root, Priscilla White, Alexander Marble, Robert Bradley, Leo Krall and the Swiss researcher Albert Renold, the director of the Baker Research Laboratory. The laboratory is slated to move in the near future to the recently built Joslin facility near Longwood and Brookline Avenues.

Varying versions of this obituary appeared in newspapers and medical journals around the world after EPJ's funeral (the acronym EPJ stands for the initials of his name and was used among his colleagues as it is in this text). His office was dismantled and his rolltop desk, a turn of the

century typically "Freudian" black leather couch and a short wooden, three-legged stool used in his examining rooms were dispersed. The many framed pictures of all sizes that covered his walls and immediate corridors were taken down. Likewise, his large personal library with volumes in English, German and French, inscribed with his notes in the same language as the particular text, were packed away to make room for an ever enlarging patient area.

Of all the EPJ memorabilia that has emerged in the past decade, his wall "icons" are the most significant. The pictures he chose to display comment meaningfully on what EPJ believed reflected his favorite people and important stations in his life. It is wise for the storyteller to take note of this evidence from the past.

From Oxford to Boston to Europe

Three locations figure heavily in shaping the life and times of Elliott Proctor Joslin (1869-1962). The town of Oxford, the City of Boston, and Europe, particularly Germany before the "Great War," framed his biography.

The first location was EPJ's birthplace in Oxford, Massachusetts, 40 miles west of Boston. A small agricultural and manufacturing village, Oxford gave him his most cherished roots in family and friends as well as a mine of agrarian metaphors that informed his writing. There he maintained a 300-acre working farm and stables from 1909 onward called "Buffalo Hill Farm." He was born four years after the Civil War and was buried there nearly a century later, just before America's engagement in Vietnam.

The second location in Joslin's life story was Boston. Certain addresses mark the places where he perfected his mission to "study diabetes" and "care for those persons" with the disease. He started his practice in his parents' townhouse near today's busy corner of Massachusetts Avenue and Beacon Street just short of the Harvard Bridge that leads to Cambridge. The specific addresses that best highlight his career efforts are focal points in this essay.

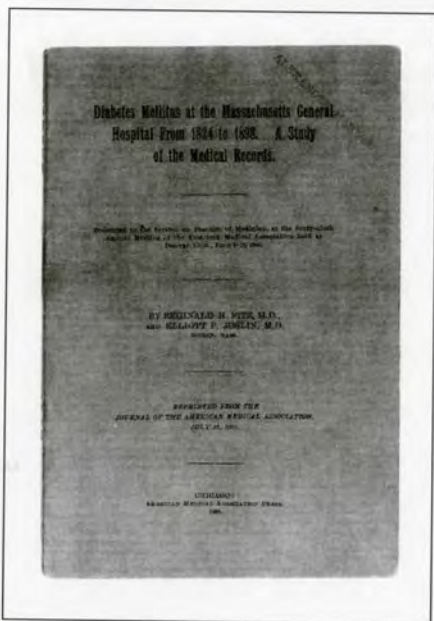
The third location in Dr. Joslin's universe was Europe, or "the continent" as it was called a century ago. He originally traveled there in style with his family, first in 1888 as a junior at Yale College and later as a Harvard medical student. Joslin met his future wife, an American woman from Brookline, Massachusetts, on a hiking trip in Switzerland



Fig. 1 Buffalo Hill



a.



b.

Fig. 2 a. EPJ (on far left) with House Officers (House Pupils) – 1897-98.
b. First Survey on Diabetes written that year.

when he was 28 years of age. They married four years later. All told, EPJ visited Europe approximately twenty times in his lifetime. Austro-German medicine supplied much of his postgraduate inspiration and this area also became a favorite place for his vacations. However, he always combined a professional trip with these sojourns. In later years, he let it be known that he did not favor the use of the term "vacation" on the physicians' on-call roster at the Joslin Clinic. The euphemism *arbeit* ("work" in German) was used to denote any time taken from medical practice by an associate or post-graduate student.

Europe inspired not only EPJ, but also many of the future leaders of American medicine of his generation, just as it had inspired the generation before them. They all visited key cities like Strassburg and Munich, where they observed the classic three-pronged clinics. Each of the ranking medical centers of a century ago contained first a regional outpatient consulting area, second a university hospital area where patients difficult to diagnose and treat were referred by local physicians, and third a contiguous laboratory center used to study the cause and treatment of disease. Faculty and young professors in training were expected to investigate disease process and to improve patient treatment simultaneously. This mandate to bring "science to the bedside" was the greatest contribution made by 19th century German science to the colossal rise of 20th century medicine. The design of these institutes was not lost on the young Elliott P. Joslin.

Although six of the seven persons, all head of families...living in [three] adjoining houses...on [a] peaceful, elm-lined...street...in a country town in New England...succumbed to diabetes...no one spoke of an epidemic...Consider the measure which would have been adopted to discover the source of the outbreak to prevent a recurrence...[as it would]...if these deaths had occurred from scarlet fever, typhoid fever or tuberculosis...Because the disease was diabetes, and because the deaths occurred over a considerable interval of time, the fatalities passed unnoticed.

Elliott P. Joslin — 1921

Part I: 1906 – The First Address: 81 Bay State Road Boston

*"Though I am in haste, I am never in a hurry."
(John Wesley, Selected letters [1777]).*

1906 was the busiest of times for the young Dr. Joslin. He was 37 years old, had been in practice for eight years and had two children. That year might be thought of as the year his career was launched. During this time Dr. Joslin, his wife Elizabeth, and their first child, Mary, moved from their nearby Marlborough Street apartment to their new townhouse-office on Bay State Road. (See Figures 3 and 4). Funded in part by his wife's legacy, this resplendent home had been built in the years of 1904 to 1906.

Bay State Road, where Elliott P. Joslin was to reside for fifty years, sat at the very end of classically beautiful 19th century Back Bay Boston. Today it is largely the inner campus of Boston University, marked by residences and fraternity houses (81 Bay State Road is currently Joslin Hall, a graduate dormitory). At the time EPJ first moved there, it was the entry point to a "Harley Street" of London-type addresses for many doctors. Further along this street stood some of the most magnificent mansions in the area, particularly the dwellings facing the Charles River, which rivaled those on Commonwealth Avenue. The Back Bay section of Boston is a one-mile long, six street-wide area that runs west of the Boston Common. It ends in the area of the current Kenmore Square, the turn-of-the-century Olmstead park and riverway system in EPJ's day. Dr. Joslin's professional activities centered in the two square mile area of this part of Boston.

Figure 5 shows several interior areas of his deceptively large residence taken fifty years later when Dr. Joslin and his medical staff were preparing to move to the present area of the Joslin Diabetes Center.

Dr. Joslin's Office

Dr. Joslin's office was in the front left part of the second floor. This was the hub of his activities for most of his life. In a sense, it was his laboratory, which he occupied six-and-a-half days a week when he was in town. The combination of a gracious residence and a matter-of-fact office is still apparent to the observer today.



Fig. 3 81 Bay State Road – exterior view – circa 1912.

Fig. 4 EPJ, wife and daughter, Mary, 1905.



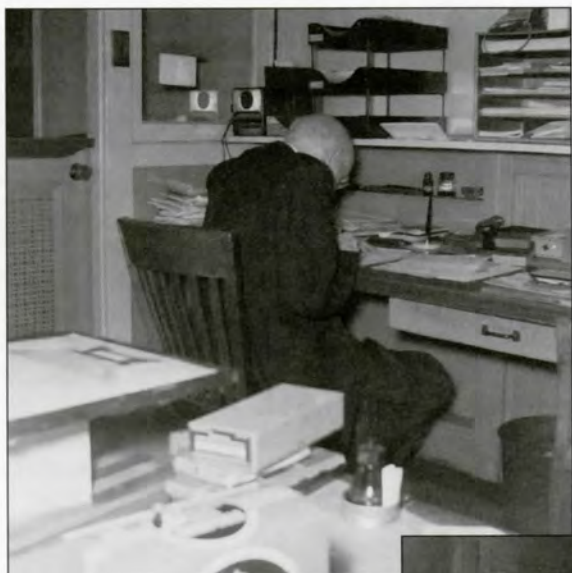
The dining room was also located on the second floor. It was a large room facing the Charles River with a view of M.I.T. Over time, as the clinic engulfed all areas of the private residence, this room evolved into a multi-purpose area used to compile publications and by the nurses to instruct patients. However, this room – with a table that easily could accommodate twenty people – remained primarily EPJ's amphitheater for entertaining. Friends, members of professional societies and, occasionally, patients would be asked to join him for formal lunches. Also, foreign visitors increased greatly after World War II.

If one were to enter his office those many years ago, three items in this large room would command particular attention. First, a medical textbook by Sir William Osler was prominent in his bookcase. A brown, legal-sized folder with a flap and tie strings containing medical reprints and long-hand accounts of articles "in progress" would be evident on the top of his desk. A large ledger 14 x 11 inches in size, similar to the black, bound, hard-covered accounting books used in most department stores at that time, would also be apparent.

The Osler Text

The Osler text was the principal medical resource for most young physicians at the turn of the century. Written by Sir William Osler, the leading medical teacher of the time, it was first published in 1892 to rave reviews and went through many subsequent editions. The 1905 edition devoted only 10 of its 688 pages to the disease diabetes, in a section subtitled "Constitutional Illnesses," i.e., those that were probably hereditary but of unknown cause. (In 1905, Osler himself had honored EPJ and four other young professors from Boston, along with similarly sized groups from Baltimore, New York and Philadelphia, with membership in a new society, the Interurban Clinical Club. To be chosen as a promising talent by the "high priest" of medicine was a special type of honor. Membership in the society fostered EPJ's interests in the advancement of medical science and greatly enhanced Osler's ideals for him.)

Osler's text mentioned that diabetes was a disorder of nutrition, that heredity played a major role and that "subjects had been excessively fat at the beginning or prior to the onset of the disease." Additionally, a "functional organic disease of the islets of Langerhans in the pancreas" was thought to be important. "These islands of cells probably produce a glycolytic ferment. This substance seems necessary for the proper burning up of carbohydrates." It was thought that the observations of



a.

b.

Fig. 5 Interior Scenes – Bay State Road home/office of Joslin Clinic circa 1955.

a. EPJ at corridor station

b. Nurse instructing patient in EPJ's dining room

c. laboratory technicians in converted 4th floor bedroom



c.

Opie from Dr. Welch's laboratory [at the new Johns Hopkins Medical School] might "give a key to the problem." Investigators had shown that "the glycolytic substance produced by the pancreas is not a true ferment, but a body closely related in its characteristics with other well-known constituents of internal secretions as adrenalin and iodothyrim."

This short section in Osler's text went on to say "that the onset of disease is gradual and either frequent micturition or inordinate thirst first attract attention." The chapter mentioned the polaroscope test as a definitive diagnostic tool and beta oxybutyric acid as a sign of extreme hyperglycemia. Complications of diabetes included boils and carbuncles. Patients were frequently "carried off" by acute pneumonia. In children, the disease "rapidly progressed" and proved fatal in a few days. The coma was an almost hopeless complication. It was apparent that treatments were not effective. The recommended diet in this edition emphasized mostly protein foods combined with severely limited carbohydrate portions.

Dr. Joslin's Early Papers: 1898-1906

Dr. Joslin published seventeen papers in the eight years from his entry into practice in 1898 to 1906. The first paper that he wrote as a practicing physician was entitled, "Has the Treatment of Diabetes Mellitus Improved?" It is of interest to quote from the discussion section of this paper:

...textbooks [state] so frequently that diabetes is incurable that the practitioner loses all his enthusiasm the moment a patient with the disease presents himself.

In contrast to this gloomy picture is the hopeful view [of] Naunyn [a German professor greatly respected by EP]...in the following quotation, 'that cases apparently severe at the onset when subjected to a vigorous treatment, take a proportionally favorable course while others running a severe course are, as a rule, those subjected late or not at all to careful treatment...in my opinion a broader, more definitive purpose should be put into treatment, namely the strengthening of the deranged bodily function, at least the checking of further disintegration of the same'. This change of view is our first step towards an improved treatment of diabetes.

This quotation reveals both Dr. Joslin's admiration for the work of the Strassburg professor and a need to bring optimism to the treatment of patients with this disorder.

Dr. Joslin's Ledger

Professor physicians in the first decades of this century worked with a "case-oriented" approach to the investigation of disease. Osler had stated that it was necessary to identify the natural sequences of medical entities. In addition, these investigators were to clarify the pathogenesis of disease through a careful "follow-up" of their collection of cases.

A ledger listing a dozen or more characteristics of a disease's "presentation" at diagnosis and important clinical matters during its course would aid immeasurably in reaching these goals. The medical record as a whole was under scrutiny in the first decade of the 20th century. Scribbled and incomprehensible descriptions of individual cases earned condemnation from the professors of that age. A surgeon who was a contemporary of Dr. Joslin had spoken out forcefully on reshaping the order and accuracy of the medical chart. Dr. Joslin had an ongoing interest in improving the medical chronicle. He perceived the need to enter laboratory values correctly in a flow sheet format. His principal academic interest at this juncture was in laboratory measurement that enhanced the diagnosis of gastrointestinal disease.

The ledger format became the backbone of EPJ's private collection of cases (See Fig. 6). EPJ and his associates kept a separate entry system for persons without diabetes. Until the emergence of insulin in 1922, the cases of diabetes that came to EPJ's practice were seen almost exclusively by him. One of his early assistants wrote that he himself rarely saw any patients with diabetes in those years (circa 1915), as they were all attended by Dr. Joslin. These assistants, hired when he moved to the Bay State Road address, were needed to help with diagnostic tests and consult on a whole range of diagnostic problems. Joslin's reputation as a diagnostician was apparent from the time he graduated in 1895 from Harvard Medical School as valedictorian. At the time of the dedication of Harvard's elaborate new medical facility in 1906, he was a respected member of the faculty of that school, listed in the top forty for all medical and surgical as well as basic science disciplines.

In summary, while the cases of diabetes were earmarked for his "consultation practice" and were of special interest, diabetes was not necessarily declared as his specialty at that time. Specialty practices devoted to one particular disease were severely frowned upon in those years. It was this mindset that later influenced the American College of Physicians to request internists to be practicing physiologists and consultants on a range of diseases rather than being narrow specialists. Given its character as a most varied syndrome, diabetes was made to order for the doctor

No.	FIRST VISIT			NAME	ADDRESS	ONSET		DIAGNOSED		DEATH		DURA
	Yr.	Mo.	Day			AGE	DATE	DATE	DATE	Yr.	Mo.	
1	1893	III	2	Higgins: Mary	257 Medford St Somerville, Mass.	26	1892 III					11/10/92
2	1897	VIII	29	Torlin s O. F.	Oxford, Mass.	54	1896 III			1897	III	9
3	1898	IX	13	Lowell s S. B.	156 Bay State St Jamaica Plain Mass.	63	1896 II			1897	I	2
4	1898	III	16	Wilbur n Alton	21 Norwich St Boston, Mass.	✓ 15	1897 XII			1900	X	3
5	1898	IX	8	Sullivan s	Ocean Spray Massachusetts	52	1896 VII					11/10/92
6	1898	IX	17	Neale n Otis	✓ 29	1893			1898			25
7	1898	X	25	Harmon n Wm. F. Mrs. A. G.	Lomsworick New Hampshire	52	9	1898 IX		1897		I
8	1899	III	31	Torlin s Sarah P.	Oxford Mass	60		1899 II		1913	II	14
4	1899	IX	6	Edwards s	109 Mt. Vernon St Boston, Mass.	43				1900		I
10	1899	X	4	Bliss n Edward D.	57 Meigs St Roslindale Mass	38	+			1900		X
11	1899	XII	18	Cheney s	264 Commonwealth Ave Boston Mass.	56		1899		1901	IX	18
12	1900	I	29	Kimley n Howard D.	65 Rutland Sq. Boston, Mass.	32		1898 I		1902	III	5
13	1900	III	20	Holt n J. F.	65 Juniper St Faneuil-Boston	46		1899 I		1901		I
14	1900	III	31	McFadden n O.	140 Maple Road Brookline Mass	34		1898		1901	III	2
15	1900	IX	18	Murphy s	E. Dedham St Boston Mass.	47		1899				11/10/92
16	1900	I	2	Swift n Elijah	Eastland Wisconsin	45		1899		1906	III	8
17	1900	VIII	8	Baucroft n Dr. C. F. P.	Andover Academy Andover, Mass	56		1898		1901	X	3
18	1900	VIII	9	Higgins s James A.	130 State St Newburyport Mass	35				1901		11/10/92
19	1900	II	9	Trattings i Nate	517 Beacon St Boston Mass	47		1899		1907	II	9
20	1901	IV	20	W. R. Kurod's	63 Union St Boston	11		1900		1903		3

Fig. 6 EPJ's Diabetes Ledger - page 1.

with broad interests. A physician or nurse who undertook the care of a group of diabetics after 1920 would need, at minimum, an appreciation of surgery, cardiology and nutrition as well as a thorough understanding of the endocrine (insulin need) environment.

Dr. Joslin and his associates used the diabetic ledger in a double fashion as the decades proceeded. First, it acted as the central registry of diabetes, the first such system for recording patient diabetes data outside Europe. Second, it served as a reference index for patient outcome data relating to morbidity problems and mortality statistics. The ledger format extended to eighty volumes by the time it was discontinued after Dr. Joslin's death. The numbering method of this registry remains today as the basis for Joslin Clinic's medical records system, with new patient entries currently exceeding the 208,000 mark.

The First Entry: Mary Higgins

The first entry in Dr. Joslin's ledger was Mary Higgins. A picture remains of this waif-like working girl of Irish ancestry who stares out of a 3 x 6 inch sepia cardboard-type photograph in the archives. EPJ encountered her as a second-year student at Massachusetts General Hospital and something in him clicked with this woman's new diagnosis of diabetes. This case showed him the need for detail in describing the course of her disease, particularly as it was measured by urine testing, weight and other parameters of illness. Dr. Joslin's interest in diabetes developed from this point onwards. Accordingly, EPJ chose Mary Higgins to be the first case in his registry when he started his ledger six years later.

Diabetes was a good disease to study for those young practitioners interested in the new clinical laboratory medicine. Physiological chemistry (the study and measurement of the body's response in health and disease as reflected in the "extracellular" system of electrolytes and other measurable blood products) had been Joslin's subject of concentration two years earlier. He had delayed entrance into medical school to study at Yale's Sheffield School of Science. This fledgling graduate school, still distinct from Yale College, is a prime example of the way science was introduced into America. Land grant "agricultural schools" were set up in the 1860s by Congress to foster better farming practices and they became a primary means of introducing many traditional gentlemen's college seminaries to science and technology.

Mary Higgins' disease became the basis for EPJ's Honor Society paper, published in 1894 as "The Pathology of Diabetes Mellitus." During this period, EPJ's well-traveled maternal aunt translated from German the sensational work of Minkowski and von Mering, doctors who had drawn conclusions about "pancreatic diabetes" based on the surgical removal of a dog's pancreas at the German university of Strassburg. In her 1901 will, this same aunt provided Harvard with a generous bequest, named the Proctor Fund by Harvard, to be used for medical investigation.

The Continuing Education of Dr. Joslin: 1910-1930

Case studies best illustrate the phases of EPJ's career and can serve as markers for the reader. In particular, cases from the critically important years of 1910 to 1930 show the impact of this disease on both patient and physician. In a sense, Dr. Joslin's own education was at its height during these two decades.

The classification and description of diabetes as we know it today was surprisingly well-developed at the time EPJ began his practice, as the quotes from Dr. Osler's textbook indicate. Although the terms used were different, the adult and juvenile forms of the disease (i.e., type 2 and type 1-insulin dependent) were well-documented from 1880 onwards. The French first named these two categories *Diabete gros* (big) and *Diabete maigre* (lean). The problem was not failure to recognize the manifestations of diabetes, but rather a lack of effective treatment.

Two Back Bay Women

Case #8 and Case #596 in Dr. Joslin's ledger were both women. Both had diabetes. Both died in 1913. Both of these women, one a grandmother and the other an adolescent, were townhouse-dwelling neighbors in the Back Bay district, one living at 517 Beacon Street and the other at 106 Marlborough Street.

-- Case #8: Dr. Joslin's Mother

The first was 73 years old and was Dr. Joslin's mother. The second was 16 years old and the youngest daughter of Dr. James Jackson Putnam, who had been Dr. Joslin's principal mentor in the first year of his practice and his teacher in the medical school. Dr. Putnam was the austere, brilliant and path-finding neurologist whose name is now inscribed on the chair in Neurology at the Harvard Medical School.

It is said that Dr. Joslin specialized in diabetes to help his mother with her disease. While this is not correct, he certainly remained highly interested in her progress as well as in her type of diabetes. He proudly noted in his later writing that a remission or two occurred in her diabetes when she carefully followed the restraints of a good meal plan.

In the first edition of his textbook on diabetes, published in 1916, EPJ described his mother's case, thinly disguised under the topic "Is the tendency of the diabetic glycosuria to increase?"

A woman showed the first symptoms of diabetes in the spring of 1899 at 60 years of age and 5% of sugar was found in June. She had gradually lost during the preceding fifteen years, twenty pounds and weighed 165 pounds when the diagnosis was made. Under rigid diet, the urine promptly became sugar-free, the tolerance rose to 130 grams and safe for very brief intervals and remained so for nine years until 1908. In 1909, a carbuncle appeared. With prompt surgical care, vaccines, the restriction of carbohydrates and the temporary utilization of an oatmeal diet, the sugar disappeared and the carbuncle healed promptly, but the urine did not remain permanently sugar-free, although only about 30 grams of sugar was excreted. Residence in the hospital for a few days in September of 1912, in order to have a few teeth removed, lowered the sugar to 0.8%.

Except for brief periods of illness due to the carbuncle and pneumonia, the patient remained well during all these years and was unusually strong and vigorous for a woman of 73 until she finally succumbed to a lingering illness subsequent to a hemiplegia and death finally occurred due to a terminal pneumonia in 1913.

With his mother's case, Dr. Joslin described the most common presentation of diabetes. When she was diagnosed with diabetes, she was overweight and probably inactive. Had she been born a decade later, Mrs. Joslin might have enjoyed a life lengthened by the use of insulin in the 1920s and antibiotics in the 1930s.

As an aside: Dr. Joslin's inheritance from his mother, Sara Proctor Joslin, left Dr. Joslin a millionaire several times over by today's standards. Sara Proctor, her sisters and one brother were the heirs to a very large fortune derived from their father Abel's leather tanning trade. Sara Proctor became the second wife of Dr. Joslin's father Allen, who was a shoe man-

ufacturer in the town of Oxford. This connection with the Proctor leather tanning business guaranteed the success of the Joslin shoe factory. EPJ was fond of noting that he was a direct descendant of John Proctor of Salem, who had been hanged for defending his principles in the witch trials of 1692.

EPJ's lifestyle, in line with his upbringing and religion, always understated his affluence. However, it afforded him the means to aid family and associates with education and travel, as well as the ability to acquire the property needed to gradually expand his clinic. He underwrote Priscilla White's training in 1928 at the leading pediatric center in Vienna, a typical act of generosity to his co-workers.

– *Case #596: Frances Cabot Putnam*

The second case, #596, more poignantly illustrates the tragedy of the pre-insulin era. Frances Cabot Putnam, the daughter of Dr. James Jackson Putnam, was born on October 20, 1897 to a prominent Boston family. Shortly after her death, her mother commemorated the events of her brief life in a privately published memoir that contains some remarkable first-hand accounts of life with diabetes before insulin.

Ironically, Dr. Joslin was assisting her father in his medical practice the year that Frances was born. In her memoir, Mrs. Putnam related how Dr. Joslin was struck by Frances' quiet good nature as an infant. He gave her a silver lucky piece on a blue ribbon along with a note that was signed, "Your would-be admirer, Elliott P. Joslin." Fifteen years later, Dr. Joslin undertook Frances's care when she was diagnosed with diabetes.

Frances, or Baby as her family called her, enjoyed a happy childhood typical of an upper class young woman around the turn of the century. Her pleasant routine of school, music lessons and dancing classes, punctuated with trips to her country home and to Europe, was interrupted by the diagnosis of diabetes in 1912. Curiously, the family memoir about Frances never mentions the word "diabetes." The polite refusal to name her disease may have been motivated by the attitude toward diabetes at that time. Diabetes was not spoken of openly in those days as it now is. Her mother remarked cryptically, "At this time, Frances was already under the shadow of the serious illness which fifteen months later caused her death." The nature of that illness remains tacit, to be inferred from the mention of restrictions on Frances' diet and activities, her tiredness and her need for rest.

In a letter to her sister, Frances wrote about visiting Dr. Joslin and having a pleasant call on him. "He said I was doing so well that he didn't want to change my food at all. I have got to lunch at home every day, and unless I have a last period study hour and can get in early, I may not be able to go out for athletics, which would be fierce, but still -- he isn't going to let me study a bit hard."

Dr. Hugh Greely, EPJ's temporary assistant in 1913, lived near the Winsor School which Frances attended, and he monitored her diet. On her last birthday in 1913, Frances was given a hollow cake made of soda biscuits and filled with little packages of gifts, an ordinary cake being forbidden to her.

Frances' letters show constant high spirits despite what must have been a depressing illness marked by frustrating restrictions. EPJ gently regulated her activity level. She wrote to her sister that she had refused an invitation because, "Dr. J. didn't warm up much when I suggested it... The week after is Meg's dance, which Dr. J. allows me to go to on condition that I stay in bed the entire P.M."

By the end of October, 1913, Frances' mother, who had just returned from her Cape Cod country home, wrote, "One day with Frances was enough to make me realize that she was losing ground." Despite her "indomitable spirits," she was pale and often tired." Although the doctors allowed her to go on with school and even the occasional dancing class, they could not offer Frances or her family any hope of further improvement.

Frances' mother remembered, "The look of compassionate sympathy in Dr. Joslin's face when we talked over the details of her treatment was only too clearly to be read, and I knew that the day was not far off when she would have to give up her active life."

On a cold rainy evening, when Frances' parents returned from dining with the Emersons (Ralph Waldo Emerson's son) of Concord, Massachusetts, Mrs. Putnam was "struck by Baby's extreme paleness, but she was in gay spirits and put on one of her dancing-school dresses because she thought [a guest] would like to see it." From that point on, her mother wrote in typical stoic fashion, Frances grew steadily worse until "Friday, December 12, 1913, when she fell asleep soon after midnight and died peacefully about eight o'clock."

This sad piece of patient history was repeated all too often in the first two decades of this century. The full picture of diabetic acidosis with its pathetic quartet of extreme thirst, urination, persistent vomiting and labored breathing followed by stupor (i.e. coma), occurred more commonly than was reported in this period. No doubt, most of these cases died rather quickly at home, often undiagnosed and untreated.

In the two years after Frances' death, Dr. Joslin greatly shifted his treatment to a more radical diet therapy. However, it is difficult to see how Frances' life, in the absence of insulin, could have been extended more than a few years even with the strictest diet. It is regrettable that both Sara Joslin and Frances Putnam, privileged as they were, did not survive into the insulin era or have the good fortune to be born a decade later.

Frederick Allen: A Fellow-Traveler in Diabetic Research

A life expectancy of eighteen months for type 1 diabetics was a sorry statistic of the pre-insulin era. This was especially tragic for young persons under the age of thirty. The attempt to improve the grim prognosis posed a challenge to those few investigators interested in the metabolism of diabetes. Both Joslin and Frederick Allen were among this small group.

The year that Frances Putnam died, Dr. Frederick Allen (1879-1964) completed a massive textbook titled *Glycosuria*. Apart from its extensive review of the history of diabetes and the recent literature on the subject, this book reported on Dr. Allen's work with animals with artificially produced diabetes. Dr. Charles Best, in later years, said that he and Dr. Frederick Banting found this textbook their best reference in working on the insulin discovery.

From 1908 to 1911, Frederick Allen conducted a critical series of animal experiments at Harvard Medical School. When he removed, in varying degrees, the pancreas from dogs, the dogs developed a corresponding degree of "carbohydrate intolerance" (diabetes). Allen then fed the dogs varying amounts of animal mash. Allen's experiments proved that while animals with complete extractions died regardless of the diet composition, those with less than a totally extracted pancreas lived longer when their diets contained the smallest number of calories (results were best when animals were fed a diet low in both fat and carbohydrate). The animals left with a moderate amount of residual pancreas could tolerate a bread diet for longer intervals than the prior group. Even the addition

of sugar to the diet produced freedom from the "diabetic state," depending upon the amount of pancreatic residual and the time a particular menu was fed the animals. Allen's tissue staining data confirmed less islet cell degeneration in the animals with the least carbohydrate in their diets even when their residual pancreatic tissue was limited.

Allen believed that this type of program, called "under-nutrition," could be applied to humans if carefully followed in a sequential pattern. The actual program as later devised for humans included a variety of regimens designed to address the glycosuric or glycemic range of the particular patient. These programs ranged from a short number of fast days (no food except for liquids) to a vegetable-only diet, culminating in a diet that imposed strict limitations on all varieties of carbohydrate, protein and fat. Cautious excursions into more normal amounts of fruits and bread were made under strict physician surveillance.

The same year that Allen published his thesis, he applied for a position at the Rockefeller Institute in New York City as a physician on its investigative ward. Founded in 1906, this particular type of institute was unique at the time and was a precursor of the wider effort in clinical research later embodied by the National Institutes of Health in Bethesda, Maryland.

While Allen was the antithesis of Dr. Joslin in background and personality, they shared an interest in diabetes, the diligence to pursue complicated matters to their conclusions, and a fine reporter's writing style. Elliott Joslin's gentleman's upbringing left him both well-connected and well-schooled in the classics; he was able, for example, to read and speak Greek. Frederick Allen grew up in much more modest circumstances near Chicago and went to medical school in San Francisco, graduating a year after the harrowing, but to a fledgling doctor, helpful experience of the San Francisco earthquake. To earn money he practiced in a frontier logging town as "the" physician.

He was a cantankerous loner from the time he started to collect equipment to begin his initial research on food preservation. However, what Allen lacked in sociability, he made up with a prodigious capacity for work. He was always more interested in investigation projects than in clinical medicine, but even so, he made a name for himself as a clinician in Manhattan. He left the medical institute on an old New Jersey estate that had brought him some short-lived fame as "Dr. Diabetes" shortly before insulin entered the mainstream of medical usage. Thereafter the practice of medicine was never as satisfying for him. Finally his rigidity

with patients and lack of interest in the numerous chronic clinical problems incurred by patients in the decade after insulin caused him to retreat once again to basic research.

Allen died in obscurity in a rural hospital south of Boston three years after the death of Dr. Joslin. From the start, EPJ's manner, in contrast to Allen's, was direct but polite, distinctively persuasive and personal in tone. These qualities helped to ensure EPJ's mounting success.

While at Harvard, Allen thought little of the professors at the medical school except Dr. Mallory, the pathologist, whom he highly respected. He claimed that he met few helpful persons and most of them were consumed with an abiding self-interest. He found EPJ to be an exception to that rule, however, and their friendship continued for the next two decades. When Dr. Allen had particular patients who wanted a second opinion, he would refer them to EPJ and send them "up to Boston" from the New York City area. Such patients included the inventor Thomas Edison and the philanthropist banker, George F. Baker.

Frederick Allen was EPJ's contemporary ideal, so much so that Joslin referred to the years of 1914 to 1922 as the "Allen era in diabetes." Joslin, always the editor as well as the publicist and historian, energized his manuals with interesting icons and descriptions of time sequences in order to hold the reader's attention. Thus, when EPJ wrote his textbooks and manuals over the next four decades, he used this label to designate the eight-year period when Allen's under-nutrition therapy dominated the treatment of diabetes and gave much needed hope of increased survival to the patient.

The Young Investigator

EPJ was one of a few physicians in the entire city that juggled three major roles during a most intense decade of his career (age 35 to 45). He practiced medicine on a complicated spectrum of patients, he maintained an active "attending role" as an instructor (primarily at Boston City Hospital in those years), and from 1908 to 1917 he collaborated with Dr. Francis Benedict, the internationally known physiologist. EPJ seemed to belie the adage that one person cannot drive three mules down a road, or, as EPJ himself would say, a "spiked team (three horses and a driver) is no joke."

The fact that EPJ managed this triple role is all the more astonishing when one realizes that he, like most physicians in the city, did not own a car until around 1914. Joslin was a master at using the tram system, particularly the one that ran up and down Boylston Street and Massachusetts Avenue. He would easily switch to horse-drawn cabs and may have employed a private driver when he needed to travel between various hospitals, including the new Corey Hill Hospital on Summit Avenue in Brookline. He used the first subway in America, opened in Boston in 1897, during the last year of his residency. In his consulting work, he was known to manage time artfully by catching the earliest milk trains (often to New Hampshire) and contriving to be back in the afternoon for his schedule of office patients.

Joslin's investigative work came in three phases. For four years following 1908, he and Benedict studied 24 cases in a fasting state (with non-diabetic controls). In 1912, he focused on a two-year study of low carbohydrate-high fat diets (an "over-fed" state). From 1914 onward he shifted to the "under-nutrition" regimen. This last phase was designed to follow up Allen's work, which had shown that the effect on diabetic metabolism of severely restricted carbohydrate, protein and fat allotments needed further study.

In the United States, the Carnegie Laboratory was rivaled in quality only by the Russell Sage Laboratory at Cornell in New York City and the new Mayo Clinic. The study of metabolism involved examining the heat production of patients suffering from illness. The calculation of metabolism bore a direct relationship to the patient's respiratory quotient. References to pulse rate were used to shorten this cumbersome process of estimation. A high metabolic rate appeared to correlate with poorly controlled diabetes. During EPJ's final years with Benedict, he came to understand that the under-nutrition plan with its periods of starvation reduced the metabolic rate to normal.

These years were of enormous educational benefit to Joslin. He mastered the terminology, theory and basic understanding of physiology to the extent possible in the pre-isotope and pre-endocrine era. EPJ's emphasis on order found its challenge with the metabolic balance study measurements. When faced with difficulties in interpreting calorimetric measurements, he consulted other investigators. He was exhilarated by these associations and deeply grateful for the civility of their responses, especially with regard to his correspondence with Graham Lusk, the premier investigator of the science of nutrition in man. All told, this

research was the best training for a "practicing physiologist" available in pre-World War I America. It is little wonder that EPJ, a "triple threat" from the medical school, was considered for the Harvard Dean's position in 1909-1910.

When Joslin found that the laboratory accuracy of diet prescription could easily be translated to the Deaconess Hospital ward, he outfitted one room with respiratory equipment and staffed a special food kitchen so that he could move most of his work to the hospital after June 1914. Some observers thought he expected too much of the nurses and patients in the number and exactitude of notations detailing food "intake" and fluid "output" which he required in the charts. One might have thought that the nurses and patients were employed by the Carnegie unit.

In his 1923 final report on those years, he wrote:

The cases whose metabolism is here recorded have been private patients of the writer and not patients taken from the public wards of a large general hospital. The experiments were performed with the patients rather than upon them, because...their cooperation was not only solicited, but also secured. The investigators and the patients considered themselves united in a partnership, having for its object the accumulation of knowledge for the benefit of all diabetics rather than for the given individual under investigation in particular. This altruistic principle was thoroughly appreciated by the patients.

The Leap Forward: 1914-1916

1914, 1915 and 1916 represented the bridge years for Dr. Joslin's effort to improve diabetes treatment. Figure 7 shows Dr. Joslin with Harvard medical students of the Boylston Honor Society on the steps of the Harvard Medical School circa 1915. He had been nominated by them to be their chairman. Dr. Harvey Cushing, the pioneering neurosurgeon, was a classmate of Dr. Joslin's and is in the back row as another faculty sponsor. This was a frantically busy year for Dr. Joslin, both academically and clinically. His work at the Carnegie Nutrition Laboratory and his observations of patients' responses to treatment on the ward of the Deaconess Hospital confirmed Allen's findings on human subjects at the Rockefeller Institute.

Two cases from EPJ's Carnegie Laboratory ledger (Case #740 and Case #1025) in particular verified Allen's findings. Case #740 describes a 20-year-old man who had been diabetic for one year. The record shows progress in eliminating the feared diacetic acid with an under-nutrition program. EPJ stated: "The chart shows that if a diabetic is fasted, acidosis disappears...in marked contrast to the behavior of normal men who...present [in] acidosis on fasting." In this 1915 article, EPJ's subject patient claimed he was back to work in a month after discharge. During his confinement, the patient endured two trials of starvation followed by a less than 20 gram carbohydrate diet (i.e. one piece of bread or a large fruit) combined with a full protein "maintenance" diet.

Case #1025 was featured in EPJ's 1916 textbook. This young woman, also around age 20, required a shorter period of starvation to end her acidosis during her twelve-day hospital stay.

Dr. Joslin was greatly encouraged by cases like these, as he stated in the preface to the first edition of his "magnum opus" definitive monograph in 1916:

I would not have wished to write a book on diabetes three years ago; today it is a pleasure and an inspiration because the improvement in treatment is beyond question. The introduction of fasting and the emphasis on physical exercise in the treatment of diabetes by Dr. F.M. Allen...has decidedly changed the outlook for this class of patients.

Sadly, EPJ's records show that both patients cited above were dead a little over a year after their diabetes onset. EPJ and other investigators never doubted that this treatment extended the length of patients' lives, albeit with very little enhancement of its quality. Priscilla White related how awed she was over EPJ's equanimity and the steady kindness he showed the many starved and often fatally ill patients on the wards in 1921-22.

With its publication in 1916, Dr. Joslin's *The Treatment of Diabetes Mellitus* became the first edition of its kind in the English language. It represented a significant accomplishment and set EPJ's name at the top of the field of nutrition and metabolism in America. The Table of Contents to the book's 400-odd pages covered all aspects of diabetes. It contained such major categories of information as statistical studies, examination of urine and blood, foods and their contents and an extensive review of treatment. What strikes the reader is Section VI titled



Fig. 7 EPJ (center) & HMS students with faculty advisors—1915
[Boylston Honor Society].

"Aids in the Practical Management of Diabetic Cases," which included subject headings such as "What Every Diabetic Should Know," "Directions for Nurses in Charge of Diabetic Patients" and a diabetic history chart for the use of institutions and physicians especially interested in diabetes (See Fig.8).

His textbook signaled a major bridge for Dr. Joslin. Over this three-year period, the 45-year-old "wunderkind" experienced two transitions that were to define his remaining career. First, he had taken an observation made in an animal lab and translated the finding to humans in a hospital setting. When evidence favored this treatment "system" in the non-complicated patient (such as one with urinary sepsis), he felt it could be modified for the outpatient -- for life. However, professional monitoring was needed to guarantee success with a treatment system that required a series of "scientifically" prescribed menu plans. He answered this life and death treatment challenge by favoring an alliance with nurse specialists, which marked his second transition. His educational contract with nurse and patient also allowed him to extend his treatment plan to larger groups of patients who were only potentially rather than actually ill.

A year and a half later EPJ produced his first *Diabetic Manual for Doctor and Patient* as he prepared to leave for France as an officer in the American army during World War I. A decade later in 1928, EPJ wrote of his goals for his first manuals:

Successive editions of the manual have registered progress in diabetes. The education of the patient about the disease was almost an innovation in 1918 and the possibility of its prevention by the avoidance of obesity in middle life was a forward step the next year (second edition). In the third edition, 1923, early diagnosis and the use of insulin were emphasized and now in the fourth edition I have tried to develop three thoughts. First, the patient can master the disease if he so-wills; second, that his own length of days after his diabetes begins is in some degree a measure of the success he achieves; and third, that he has an excellent chance of living long and well to be an explorer of regions in diabetes, hitherto unknown, and thus to open up trails towards health and the cure of diabetes, which others can more easily follow (from the 1928 Manual).

Dr. Joslin was at his linguistic best in the second and third Manuals (1919 and 1923). These publications demonstrate his mastery of the

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Fig. 8 Table of Contents – one page with section headings for patient syllabus – forerunner of the first *Diabetes Manual* (1918) – from EPJ's *The Treatment of Diabetes Mellitus, First Edition* (1916).

declarative sentence and his knack for turning a phrase. Three samples from his early manuals underline the preventive medicine content of his directives:

You are all living so much longer as a result of better treatment and new discoveries. Therefore, face the facts, accept the situations, study the disease and become master of your fate. By doing so, you are sure to help those less fortunate and may even prevent the onset of diabetes in your descendants and other members of your family.

The patient is his own nurse, doctor's assistant and chemist. To acquire the requisite knowledge for this triple vocation requires diligent study, but the prize often is worthwhile for it is nothing less than life itself.

It is better to discuss how far you have walked than how little you have eaten. Pedometers are to be encouraged. A doctor once observed that those of his patients who took active camping trips in the woods, bore the stress of life best. By this means, exercise as combined with mental relaxation, that good effects of each lasts for months, is not hard to believe.

Another aspect of Dr. Joslin's method as seen in his early writings was the need for order and discipline in note-taking. He wrote:

It is a great advantage for a patient to keep a notebook because gradually it becomes valuable for reference and his whole plan of treatment is systematized. Such treatment data can easily be gathered on one page and thus save time [in visits to the doctor].

Since diabetes had so many twists and unknowns, including the twin fates of possible diabetic coma and gangrene, Dr. Joslin felt the necessity for a strong message of prevention. "To be forewarned is to be fore-armed" best epitomizes Dr. Joslin's challenge to his patients in his early Manuals.

Dr. Joslin preached the need for "hygiene" in all its dimensions. This antique word has little meaning for the current reader. Ironically, however, most contemporary health writers advocate this approach, with freedom from smoking and obesity and the need for daily exercise as modern examples of the way to secure longer and healthier lives well into the next century. For the layman, the self-help cry has returned to

"know your condition and follow sound health principles and your life will improve."

Empowering patients as equal partners in the active treatment of their condition was a pioneering stance for a physician at that time. Clearly, diet therapy was in the province of the patient and his family. However, the call for the diabetic actively to chart his course, measure his progress and, with insulin, to adjust his own medication, was a radical notion for the traditional physician. The hawkers of patent medicines for diabetes and other diseases drew scorn from organized medicine then as they do today. The "alternative medicine" groups of that era were treated as sects at best, or "quacks" likely hostile to the academic medical community. The total authority that such so-called purveyors of health wanted to award to patients was not the cohort status that EPJ advocated.

EPJ's Manuals best expressed the element of hope he offered to the beleaguered and often frightened patient with diabetes, as well as to his practitioner. It was an axiom of Dr. Osler's that professor/physician should always reach out to the general practitioner. This theme appeared repeatedly in nearly all of Dr. Joslin's prefaces to his textbooks and manuals.

The Eve of Insulin

By the end of World War I, Dr. Joslin was acknowledged as the leading clinician in the country for the treatment of diabetes, and he was asked to speak at numerous medical meetings. After discussion of a paper given by Dr. Joslin in 1921 at the Southern Medical Association, Dr. James S. McLester remarked: "To paraphrase a well-known advertisement, when we think of diabetes, we think Joslin."

Case #2185 and a striking letter which surfaced recently illustrates the plight of people in those precarious years just before the discovery of insulin.

On May 12, 1921, a married woman from Nova Scotia, age 37, made the difficult and expensive steamer trip to Boston to consult Dr. Joslin and his associates. Excerpts from her letter are informative. From her bed on the ward of the Deaconess Hospital, she wrote:

We were awakened at 6:00 Sunday morning and were within a few miles of Boston with a heavy fog and rain coming down simply in torrents. We really had a very long, fussy morning, passing

the quarantine and then the immigration officials...Pitt [her cousin], appeared suddenly and rescued me from a very fussy medical officer who insisted on my producing a doctor's certificate when I had explained to him fifty times that I had no doctor except the Joslin manual for over two years, and therefore had no doctor's certificate (Emphasis by author).

Dr. Joslin came in for a few minutes Sunday night to the wards and I liked him so much from the very first. The next morning, he examined me himself. His hospital assistant, Dr. Root, was with him and the two graduate nurses who made rounds every morning with the doctors. My weight, undressed, was 73-1/2 pounds when I came. Since then I have wavered between that and 71, but I have never gone even a fraction above that weight I brought in. I have been measured standing and sitting. I have had to blow into different glass tubes with clock faces. I have had blood drawn from my arm twice a week for the blood sugar list. I didn't think there could be any more sensations left...I do not know yet how long I may be able to stay, but I shall do whatever Dr. Joslin advised now that I am here and it cost so much to come! My ticket was \$50.50 and I had to pay the same for Marie [the patient stayed three weeks].

Do not think I stay in bed because I write in pencil, I am really in bed now having a half a day rest. But other days, I am up and about and take a little walk and usually try to do my writing out in doses. I can't understand why my strength does not come back quicker. Dr. Joslin seems to think I am all right. In every single lecture he has given, he has explained to newcomers that I manage my diet alone for two years and always speaks of me as a "very remarkable" patient. I shall much prefer being fattened up a little to being pointed to as a model.

The important features of this letter show that her weight was that of a markedly wasted person and that her strength allowed only a bed to chair level of activity. The course of under-nutrition treatment kept her blood sugars low at the expense of muscle mass. The complex nature of "energy balance" needs little further illustration.

Another striking feature of this letter is its illustration of the lack of knowledge about diabetes in the country areas of North America like Nova Scotia. The Manual was the patient's only guide. The need for self-help was therefore a necessity, going beyond even the "maritime independence" characteristic of that island.

This woman died two years after writing this letter in the early months of 1923, leaving children under the age of 10. Insulin became universally available later that year.

Insulin

Given his prominence, Dr. Joslin was a natural choice to be one of the six physicians in North America appointed to the "Insulin Committee." Its role was to assist with the first clinical trials of a commercially available product that was to replace the scarce, unstandardized variety. The Eli Lilly Company in Indiana, under the guidance of its director, began immediately providing limited amounts of this commercial insulin. Dr. Fredrick Banting received the first supply in July 1922, and in August when the amount rose to 1,200 units per week Dr. Joslin followed by the other leading American investigators was/were given trial doses of the hormone. Not without difficulty, EPJ selected one of seven patients whose medical status was, as he stated, one of "mere existence" deciding upon Elizabeth Mudge, case #1542, age 42, who had lost half her weight and was down to 70lbs. Dr. Joslin described her as the "severest diabetic on our list" having been at a bed to chair status for months; she went on to lead a healthy life for another twenty-five years.

In the 1982 book, *The Discovery of Insulin*, Michael Bliss quotes EPJ's amazed comments about the effects of insulin:

It still remains a wonder that this limpid liquid injected under the skin two times a day can metamorphosize a baby, child or frail adult or old man or woman to their nearly normal counterparts (page 161).

By Christmas of 1922, I had witnessed so many near resurrections that I realized I was seeing enacted before my eyes Ezekiel's vision of the valley of dry bones (page 164).

When rowdy children visited his office, he delighted in their high spirits which contrasted so sharply with his memories of them as sick and worn before insulin. The year insulin became available, EPJ wrote in his textbook, "Who wants a vacation when he can watch mere ghosts of children start to grow, play and make noise and see their mother's smile again and read in the paper that this young colonel, after ten years of faithful dieting, has already won the local golf championship."

Dr. Joslin then warned his readers:

Insulin is still in its infancy. New possibilities still continue to unfold. Gaps in our knowledge are plainly indicated, even to the most casual reading, with hopes that they will be filled. Many represent enticing problems for the patient, investigator, medical student or general practitioner, where the errors and the frank beliefs expressed occasionally with design (that phrase is said often), may stimulate others to confirm or confound.

Prophetically, two years before making this statement, EPJ had written a paper that mentioned for the first time in medical literature the eventual public health problem that would arise from non-insulin dependent diabetes. In a 1921 article entitled "The Prevention of Diabetes," he mused over an actual sample of his parents' neighbors in his hometown of Oxford, Massachusetts:

Although six of the seven persons, all head of families...living in [three] adjoining houses...on [a] peaceful, elm-lined...street...in a country town in New England...succumbed to diabetes...no one spoke of an epidemic...Consider the measure which would have been adopted to discover the source of the outbreak to prevent a recurrence...[as it would]...if these deaths had occurred from scarlet fever, typhoid fever or tuberculosis...Because the disease was diabetes, and because the deaths occurred over a considerable interval of time, the fatalities passed unnoticed.

Dr. Joslin's admonitions about the dangers of obesity appear in many of his writings. (As he jarringly put it, one should avoid belonging to the group of "the fat.") He always emphasized that a delay or remission from active/clinical diabetes is best achieved by avoiding the tendency to gain weight with age. EPJ stated that he had not gained or lost even one pound of weight during his entire adult life. Possibly he feared his own tendency to diabetes inherited from his mother and exacerbated by the fact that his maternal grandfather was very obese.

For many years, Dr. Joslin always agreed to lecture to patients and allowed his name to be on the classroom schedule along with his associates and fellows any day from Monday to Friday. One story illustrates his sense of humor when he arrived at the lecture hall with two pails of water filled to overflowing. He struggled up on to the stage, allowing the water to spill. His theatrics, he explained, were to demonstrate the burden imposed on the pancreas by an overweight condition.

The Impact of Insulin on Dr. Joslin's Work

The arrival of insulin had major repercussions in Dr. Joslin's life. Insulin caused a sharp increase in his patient load, which required more staff and assistants. His first appointee after the arrival of insulin was Dr. Priscilla White, whom he had "discovered" when she was a medical stu-

dent working in his hospital clinical laboratory. Dr. Joslin was in charge of the Deaconess clinical chemistry laboratory until 1927, when Dr. Shields Warren, a modernly trained pathologist, arrived. Increasing numbers of medical students were hired in those days to assist with night-time coverage, especially with the multiple blood sugar determinations required by the Joslin team's treatment of diabetic coma. With Dr. Warren's arrival, Dr. Joslin was soon able to secure daily blood sugars before meals so that the sequential pattern of blood sugar levels could guide insulin therapy. This was the origin of blood glucose monitoring.

In addition to changes in staffing, EPJ's Bay State Road home also required renovations to care for the influx of patients. An Otis elevator was installed to allow more patients access to the upper floors of the mansion, especially to have exams and phlebotomies in the clinical laboratories that had been set up in the former maids' rooms. The basement area was renovated to accommodate radiology equipment and dressing rooms.

Case #2383: The Nobel Laureate

Cases from Dr. Joslin's "black book" ledger again can guide us into the immediate post-insulin age. Case #2383 shows the high drama of the early insulin era. It involved a physician, age 36, from a pedigreed Boston family like the Putnams. He lived on Marlborough Street both as a child and later as a married man. He was Dr. George Minot, whose father had been one of Dr. Joslin's most beloved instructors at medical school and was still alive in 1921

Disease does not respect social class or educational attainment. Many egalitarian "consultant" physicians such as Dr. Joslin were initially sought out by the "privileged few," who as a rule were less accepting of their fate than were persons of more limited means. The dictum "go to the professor" was applied early by this group of people and no distance was too far, especially when youth was stricken with a fatal illness as was the case with George Minot. The film about the discovery of insulin titled "Glory Enough for All" (PBS 1989) depicts the similar case of a desperate Mrs. Charles Evans Hughes, wife of the Secretary of State, who sought out Banting for his first supply of insulin in an attempt to reverse her daughter's fatal decline.

Case #2383 was George Minot. In his 1956 biography of Minot titled *The Inquisitive Physician*, Dr. Rackemann writes of how excited Dr. Joslin was to provide insulin to this man who was later to become such a great contributor to medicine.

George Minot's case history illustrates the drama and pathos of the "transition" period between the "under-nutrition" treatment of Dr. Frederick Allen and the availability of sufficient insulin. "Saved by insulin" was the expression used to describe the fortunate ones.

Many dramatic scenarios played out for patients with diabetes who could not obtain the new hormone, which existed in insufficient quantity and often poor quality during most of 1922. As it is today, when new advances like transplants and AIDS treatments are available only to a few, so it was at that time.

When George Minot developed diabetes, he had been out of medical school for nine years and was engaged in a promising career as a hematologist. Dr. Minot, with a 7 percent sugar in the urine and 430 mg/dl blood sugar, diagnosed his own case of diabetes. As Dr. Rackemann recounts, Minot's weight had fallen from 147 to 135 pounds. Since he was 6'1-1/2" tall, this weight loss left him nearly "cachectic" in appearance. Dr. Rackemann relates:

At the first visit to Dr. Joslin, a daily diet of 189 grams of carbohydrate, 89 grams of protein, and 15 grams of fat was prescribed... "The record of food intake will be an essential guide to treatment, equal in importance to the record of sugar in the urine," Dr. Joslin said. A week later the diet was reduced to 53 carbohydrate, 40 protein, and 17 fat, and that is only 525 calories, or about a third of what a man requires for maintenance if he stays quiet in bed. Two weeks later, the urine sugar was less and the blood sugar was down to 190 milligrams per 100 cubic centimeters. The diabetes was better, but the patient was miserable--literally starved--and he looked it. He had lost seven more pounds...[T]he diet was increased, and his weight rose again to 134, owing in part to the retention of extra fluid in the body.

It appears from his record that Minot's diet was around 2000 calories for most of 1922, when his weight centered around 120 pounds. His blood sugars remained in the 150 mg/dl range. For fifteen months, Dr. Minot's diet was an exemplary case for all the "ordering, monitoring, titrating and tinkering" required by the diabetic diet. This manipulation of food was essential to stave off death from the constant threat of acidosis.

In January of 1923, Dr. Joslin was able to secure insulin for Dr. Minot. He initially received three doses of 1, 2 and 3 units and in a few months

was up to 14 units a day. By 1924, Dr. Minot was receiving 18 units of insulin before breakfast and 14 units of insulin at night. His wife reported, "This is the first winter since marriage that he has not lost 7-14 days from his illness."

Dr. Rackemann describes the fortitude and meticulous care with which Dr. Minot and his wife maintained his diet:

The diabetes was severe. Both George and Marian [his wife] had courage--a much deeper courage than might have appeared... When George and Marian traveled anywhere--even up the street to dine out--they brought along a little black leather slouch bag, which had seen better days but was still all in one piece. It contained a Chatillon scales and a tin pie-plate, and, some time later, it contained the bottle of insulin, with syringes, the alcohol, and gauze sponges, not to mention the little block of blue paper and a couple of pencils. In helping himself to food, George put it first on the pie-plate, to adjust its weight on the scales before adding it to his dinner plate. The amount was noted on the blue paper, which he placed to one side. Often he would turn to Marian: "How much spinach, did you say? I have allowed for the cracker and the bit of cheese that I ate with the cocktail! I figured the cracker as five grams and the cheese at two grams--that's right, isn't it?" Marian could remember the values of food better than George could, and she knew what he should have.

Dr. Minot went on to accept the directorship of the Thorndike Research Laboratory in 1928 following the death of the legendary Dr. Francis Peabody. In the two years before this appointment, he did his seminal work with Dr. Murphy on the liver treatment of pernicious anemia.

During these years, reactions caused him great anxiety. Apparently with hypoglycemia he had personality changes marked by abrupt anger. His wife supported him with an exemplary combination of knowledge, optimism and readiness to help. Dr. Minot won the Nobel Prize in 1934 for his contribution to the treatment of pernicious anemia.

Dr. Joslin was inspired by this man's efforts in dealing with his diabetes and by his work in medicine. In 1960, Joslin devoted a plaque to Dr. Minot -- one of a series detailing the history of medicine and diabetes which was placed on the facade of his new clinic. In the book describing the plaque, Dr. Joslin wrote, "Dr. Minot's dietetic and clinical notes are exact, full and extreme. I would like to think that without having

compelled himself to live on a spartan diet, composed largely of 3% carbohydrates and vegetables, he would never have developed the imagination, courage and assurance which enabled him to induce the frail and feeble pernicious anemia patients to eat each day one whole pound of raw liver."

Harriet McKay, Visiting Nurse, and Dr. Joslin's Ledger Case #2419

In the early 1990s, the Deaconess Hospital Nursing Alumni Association gave several cardboard suitcases from another age to the Joslin Archives. They contained the effects of a 90-year-old nurse named Harriet McKay, a member of the well-known class of 1922 at the Deaconess School of Nursing who witnessed the arrival of insulin. She was chosen by Dr. Joslin to be the first "wandering" diabetic teaching nurse. This curious title designated a category of nursing that combined features of today's Visiting Nurses and the private duty, one-on-one nurse. In nursing parlance, she was a "contract" nurse of the type popular before World War II. These nurses often had a specialty and were engaged by a family for a certain period.

The Deaconess School of Nursing students were given rigorous training in the care of many aspects of diabetes. These students assisted on the surgical wards with cases involving huge abscesses and leg infections. Many cases required weeks of extensive nursing care with special attention to proper dressing management. The nurses handled a wide spectrum of duties from programs being developed to halt the progression of foot lesions to assisting in EPJ's calorimetric determinations to the discharge planning of weighed diet plans, as those were the days before the arrival of dietitians.

It was logical that the arrival of insulin treatment would demand that Dr. Joslin expand the role of the Deaconess nurse to include caring for patients with diabetes and their families in the home. These patients and their parents, particularly at first, needed much instruction in insulin injection technique and diet training. The daily routine for the person on insulin required analysis of food routinely eaten and the planning of snacks, since the correct dose of the insulin could vary widely with different degrees of activity. Avoiding insulin reactions with the mental confusion that resulted challenged the whole team of doctor, parent and the new recruit to insulin use. Working, driving a car or safely playing sports were all matters that needed regulation through a guided "trial and error" experience. Reassurance was needed and who could be better for this type of support than a well-trained and experienced nurse.

Ms. McKay's suitcases also contained an interesting, one-foot square wooden box which held an elaborate glass apparatus for doing sugar determinations by the then (1925) much improved Folin-Wu method. Otto Folin was a pioneer in clinical chemistry at Harvard and a good friend of EPJ. The device permitted a more rapid method for doing a blood glucose than the hospital method. This device was probably infrequently used and notations from Ms. McKay's notebook show that she used it mainly on a particular patient named Sam R. This antique wooden box is probably the earliest example in existence of today's home blood glucose monitor.

A carefully preserved letter written to Ms. McKay by Dr. Joslin is of interest (abstracted):

May 18, 1923

*My Dear Mrs. McKay,
How can I thank you for all the courtesies you extended to me yesterday and today at the Biltmore [a hotel in New York City]. It simply made the affair a success for the patients because otherwise, Ms. Kenseth [a consultant home economics professor] would have simply been swamped with work. I never had to worry after I wrote you because I knew how well you could manage the whole affair.*

Thank Sam for coming.

Some day I hope I can do something for you.

With kind regards,

Elliott P. Joslin

The meeting mentioned in this letter was one of the first conferences or people using the new Lilly insulin, mainly to treat juvenile (type 1) diabetic patients.

Dr. Joslin commented on the progress of Sam R., Ms. McKay's patient many years later. He wrote in 1960:

The origin of the hospital teaching clinic: Sam R. was 14 years old in 1921, just before the discovery of insulin. He was carefully

treated at home at the start and after a few months came under my observation and that of one of the most experienced nurses, Mrs. McKay. She remained with him for seven years. They had everything to help. Control of the disease was paramount. Mrs. McKay found a game of golf or tennis was equal to five units of insulin. Weekdays they flew their own airplane alone from New Jersey to Cape Cod. At the end of 25 years, we noticed he was physically sound and had perfect eyes and arteries as certified by an expert ophthalmologist and retinologist. He had everything that one would think of to make life easy, and along with it, his own backbone, which made him, under all circumstances, invariably adhere to the rules of the game. Now, as a result of his example, we have the hospital teaching unit given by thousands of our patients so that others, at little cost, can have what Sam R. had.

Improving Patient Reports and Patient Education

Joslin and later his associates developed an elaborate dictation system that extended greatly beyond the polite written communication tradition expected from the Boston or urban gentlemen physician of the Edwardian era. For example, each patient received a "report" dictated the same day as their office appointment. These letters not only provided the patient with the laboratory figures and the essential facts of the physical exam, but more often than not included a whole range of advice that might even involve bargaining with the patients about health matters.

One secretary during the last years at Bay State Road claimed she was driven to distraction by Dr. Joslin's habit of writing personally to each patient who gave "even fifty cents" to an appeal for his home, hospital, research or camp funds.

EPJ developed several ways to inquire about the whereabouts of patients for his epidemiology work. An individually signed form letter was sent out yearly with personal notes added in pen by EPJ. He would gently inquire whether, if the patient were not so inclined, other members might write him about the individual's state of health (implying the possibility that the patient had died or might be too disabled to communicate with him).

Dr. Joslin was fond of remarking that "teaching is cheaper than nursing." He continued, "We can only scratch one back at a time, but we

can teach many patients together and each is likely to teach another patient. No wonder the diabetic teaching clinic is a success."

EPJ and his staff continued from the time of his second Manual to devise a set of specific teaching materials. For over three decades a legal sized sheet of heavy bonded paper became the fundamental instructional item for each patient who visited his group. One side of the sheet contained the diabetic diet with a model meal plan along with the correct amounts in gram weights and a table of food values in grams as well. A blank menu section was provided for the patient's actual diet. Patients were instructed to attach this sheet of paper to a kitchen cabinet and bring it in to each subsequent visit. The smudging of ketchup, mustard, flour and the like were always welcome evidence of its clinical use when reviewed by the physician during each office visit.

On the reverse side of this document was general advice on foot care and treatment of early acidosis as well as guidelines for preventing the new problem of hypoglycemia – termed insulin "reactions." The use of the word "insulin shock" was to be avoided, as slight reactions were labeled by the Joslin group good proof of near normal control. Regular insulin (crystalline zinc insulin) with its short duration of action was the sole available hormone until 1936 when the very long acting protamine zinc insulin (PZI) became available.

Dr. Joslin was always interested in expanding his teaching methods to wider audiences. Dr. Minot and Sam R. could afford to receive private instruction and guidance in all aspects of treatment; patients less affluent benefitted greatly from Dr. Joslin's patient education materials. From the start of this period, EPJ also promoted camps as a natural extension of the teaching process with its emphasis on mastery and self-reliance.

The re-education of the patient with diabetes was mentioned increasingly during the first decade after insulin. EPJ's term "islands of safety" emerged in his writings. It came to mean for him the need to create multiple diabetic centers where the latest laboratory methods and educational devices could be available for the general practitioners' referrals. The model unit for this development was to be his Baker Clinic. Despite the Depression and loss in value of the original Baker stock, he bargained the reluctant Deaconess Hospital director to start construction.

The Aftershocks of Insulin

Insulin was an advance of such magnitude as to create its own mandates. Each of the physicians on the international Insulin Committee of 1922 and another dozen physicians scattered across America and Canada all made quick attempts to create diabetic guidebooks like those of Dr. Joslin, and to enlist assistants to care for an increase in patients on insulin and to continue their research as much as possible. Dr. Joslin's group practice had the semblance of a clinic at the time of insulin's arrival. He had two associates. In fact, EPJ's practice had been referred to as a "clinic" as early as 1910. It appears that Dr. Joslin's tie with new clinical laboratories, both in his home and at the hospitals with which he was associated, combined with his emphasis on one disease and the ease with which he acquired medical assistants, all contributed to the development early on of the idea of his practice as a private "clinic."

The Creation of Special Programs for Patient Treatment

When insulin arrived, EPJ was able to expand his team and create new programs to meet the needs of his rapidly increasing patient load. In the years before insulin, he added 200 new cases to his ledger per year. In the first decade after insulin, he added nearly 800 new patients per year.

Before insulin, the patients most commonly referred to EPJ by practitioners were young patients ill with ketone-prone diabetes and many elderly with impending gangrene of the lower extremities. After insulin the picture changed, but mainly in degree. Acidosis was better treated with insulin, so there were many more survivors of the first or second bout of this subacute or acute illness. These patients died less often at home. After insulin, Dr. Joslin organized a coma service with the nurses on the Deaconess wards to cope more effectively with this number one problem.

The second floor of the Deaconess Building, or "Deac 2" as it was known, contained the acute ward where most patients with acidosis were handled. In those days before intensive care units, or even emergency rooms, special treatment areas naturally evolved. Elaborate nursing protocols were developed in the next 20 years, complete with precise methods for restoring bowel function paralyzed by marked hyperglycemia/metabolic upheaval. Today's mainstay protocol for treatment of diabetic acidosis, which includes intravenous solutions, was not perfected completely until the late 1940s. This valiant team of nurses and physicians lacked the ready supply of needed IV solution with guaranteed sterility and had not as yet a complete knowledge of abnormal

electrolyte presentations like potassium deficiency. Hydration with very careful hourly oral administration of fluids to avoid vascular collapse posed a major challenge for this nurse/doctor team. The Deaconess nurses gained the reputation as the best trained professionals in managing diabetic coma in the nation. EPJ as their principal physician instructor became their standard-bearer.

The Foot Team

Early on, EPJ initiated a limb salvage effort organized as a vascular team composed of a surgeon, physician, chiropodist and special nurses. He developed the idea that it served the patient best if these surgical patients were on a medical ward. Attendance at a conference entitled "foot rounds" was enforced for those professionals involved, much like attendance of all staff at medical or surgical grand rounds is required.

A special nurse with a specific list of bandages and antiseptics made rounds at least twice a day – always with the surgeon and other members of the team in the morning, and then later in the day to change the dressings as ordered. These "special dressing nurses" became known as the "foot room" nurses, the name deriving from a special unit that was endowed in 1926 as a "foot room," or a "beauty parlor" for diabetic feet, as EPJ euphemistically called it. Routine treatment was carried out in this room by the newly appointed chiropodist (the forerunner of today's podiatrist).

The inclusion of a "toe nail" doctor to this Harvard team was an unheard of practice and rankled the orthopedic surgeons. EPJ thought that his original choice, a Dr. Kelly from West Roxbury, was a good choice. This chiropodist had the traits of patience, availability and a preventive medicine interest in shoe prescriptions. Proper foot gear was necessary to avoid further trauma to the often "insensitive" skin of the diabetic that could create horrendous foot and toe deformities and an entry point for infections. EPJ forged an alternate specialty that assigned patients with vascular "compromised" conditions to surgeons who would later become known as vascular surgeons. The podiatrist was supervised by the surgeons and assisted the physicians. Eventually, in the Joslin tradition, this team approach favored the development of both podiatry and vascular surgery.

On the days of the week when foot cases were not the focus, the Joslin team of physicians and fellows met at 8 a.m. An intense emphasis on promptness became the rule. Cases just admitted, recent deaths, and difficult cases were all listed in chalk on a large blackboard in the Joslin

classroom in a very specific medical short-hand by the senior trainee who would have arrived 30 minutes earlier. Dr. Joslin, and later Dr. Root, would lead the discussion about each patient. Without exception each case would be mentioned with a recitation of, in cryptic fashion and with no reference to the medical chart, the salient features of the case. Personal comments about the patient's plight or family were welcomed by EPJ and Dr. Root. The group then filed to the radiology department where the radiologist would be waiting. All told, the entire exercise took 60 minutes—no more, no less.

On Saturdays this meeting was shorter and less formal. Hospital rounds and office appointments on many Saturday mornings were the rule. (EPJ felt that it would be easier for the working man or farmer to be seen then).

Despite the workweek, EPJ and his associates managed to get time away. EPJ went to his farm where horseback riding either alone or with all manner of family and visitors was the central activity of any stay at "Buffalo Hill." While there, he managed to write and dictate correspondence, entertain with his wife and supervise the caretakers' work. Ample domestic help facilitated all of this activity. There are family photographs of his engaging in the haying season with his young children, presumably for short intervals. The tenant farmers are visible in the background of one such picture which shows EPJ attired in an Alpine hat and shirt and tie. After 1932 he offered his farm generously for excursions, pony rides and games to nearby Clara Barton Birthplace Girls' Camp. This same standing invitation was extended after 1948 to the Boys' Camp. EPJ very reluctantly agreed to have that camp named after himself when the principal donor threatened to withdraw the offer.

Part II: 1934 – The Second Address: The Baker Clinic Deaconess Road Boston

The second major address that signifies a milestone in the career of Elliott Joslin is the Baker Clinic. This edifice, built and occupied in 1933-1934, allowed Dr. Joslin to focus on the mission to improve both the study and the treatment of diabetes. Carl von Noorden of Hamburg and later Vienna, ten years Dr. Joslin's senior, had created a similar design for a modern diabetes facility in those years. Dr. Joslin appears to have mirrored in his design several of the features engineered by this well-known German professor.

The records show that Dr. Joslin purchased three parcels of land over time near the Deaconess Hospital to further his future building plans. He acquired the land near the Palmer Building to give the Baker Clinic a central location. He also acquired the two boarding houses at 160 and 170 Pilgrim Road occupied first by a Mrs. Leatherbee and a Ms. Lewis. These became known as the Leatherbee and Lewis cottages where ambulatory patients were able to stay and eat their meals.

The design of the Baker Building embodied the goals of Dr. Joslin's work during those years. The first floor of this new building had a director's office for Dr. Joslin and his staff. It also included a foot clinic with podiatry offices and a dental clinic, as well as a modern classroom.

The second floor contained research and clinical laboratory space. The third floor had special plumbing and space adaptable for pediatric patients. The fourth floor was devoted to rooms for adult diabetic patients when they were inpatients, ambulatory or not. The fifth floor had several operating suites that were designed for eye surgery and obstetrics. The pediatric and surgery floors appeared to have served their purpose for only a short time after the opening of this clinic. The sixth floor, called the Baker Roof, was an elegantly designed area for recreation. Again this emphasized Dr. Joslin's interest in exercise as a pillar of diabetic treatment. By the time Dr. Joslin moved to the Baker Clinic he had assembled a large part of his team.

George F. Baker of New York City consulted EPJ in 1925. Baker was in his mid 80s and had already decided to donate a sizable part of his fortune to the Harvard Business School. Correspondence in the archives

shows how extremely pleased Baker was with EPJ, and that Baker asked Dr. Joslin to act as his escort when he received his Harvard honorary degree. Later he asked Joslin if he "could do anything" for him. EPJ requested that Baker establish a Foundation at Harvard Medical School for the Study of Chronic Disease. The \$500,000 benefaction allowed the "modernization" of EPJ's work. George Baker's autographed picture remained in a central location on EPJ's office wall from that time forward.

A revealing letter dated June 1926 divulges that Baker arranged with the Cadillac Company to deliver to EPJ the car of his choice. EPJ declined on the grounds that a car of that sort would "force me to change my standard of living and I would have no time to enjoy it" and asked instead for "a part of a Cadillac's equivalent for secretarial labor upon the book." This request was willingly granted and used for EPJ's 1928 fourth edition of the textbook, the first one to report the group's wide experience with insulin.

The Early Insulin Era –The Fifth Edition of the Textbook

Dr. Joslin in the early 1930s was at mid-career at age sixty plus – an age when most physicians attempt to be less engaged in their work. Figure 9 is a representative portrait of Dr. Joslin at that time and shows him at the apex of his work and full of expectation for the future. This time coincided with the tenth anniversary of insulin treatment, and preparation was underway for still another edition of his textbook which was needed to report on the fast-paced progress in the field. Endocrinology as we know it was fully launched, and it was hoped that the "hormonal orchestra" held clues to a possible correction of the diabetic state. One of the earliest benefits of insulin in the laboratory came when the Argentinean physiologist, Houssay, demonstrated that diabetic animals supported on insulin had their requirements greatly reduced with a removal of their pituitary gland. Houssay never forgot the kindness of EPJ in securing the publication of his paper on the subject in the widely read *New England Journal of Medicine*.

The title page of EPJ's fifth edition of the textbook, *The Treatment of Diabetes*, is a revealing one (See Fig.10). Authorship of this work for the first time included Dr. Joslin's three principal associates, Drs. Howard Root, Priscilla White and Alexander Marble. From this time on, they were co-editors of his books – an illustration of the central place these three people were assuming as EPJ reached 65 years of age.

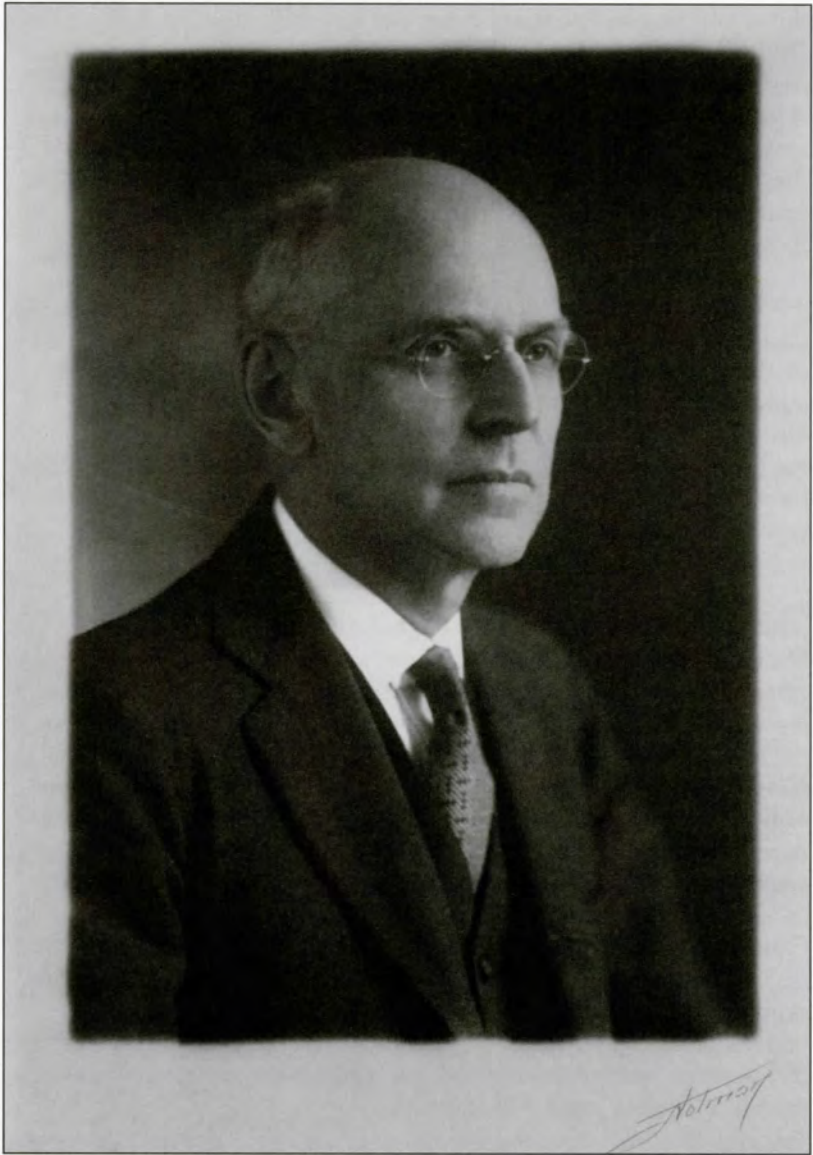


Fig. 9 Dr. Joslin, circa 1930 – age 61.

THE TREATMENT
OF
DIABETES MELLITUS

BY
ELLIOTT P. JOSLIN, M.D. (HARVARD), M.A. (YALE)
MEDICAL DIRECTOR, GEORGE F. BAKER CLINIC, NEW ENGLAND DEACONESS HOSPITAL;
CLINICAL PROFESSOR OF MEDICINE, HARVARD MEDICAL SCHOOL; CONSULTING
PHYSICIAN, BOSTON CITY HOSPITAL

WITH THE COÖPERATION OF
HOWARD F. ROOT, M.D.
PRISCILLA WHITE, M.D.
ALEXANDER MARBLE, M.D.

FIFTH EDITION, REVISED AND REWRITTEN

ILLUSTRATED



LEA & FEBIGER
PHILADELPHIA
1935

Fig. 10 Title Page of the Joslin Textbook, *The Treatment of Diabetes Mellitus, Fifth Edition*, with co-authors.

Dr. Joslin's Original Team

If EPJ had been a lawyer in the early insulin era, his law firm would no doubt have been called Joslin, Root, White & Marble. These three associates, two men and one woman, were as essential to his success as any other factor. Innovative ideas and even discoveries suffer when the pioneer has poor ability to choose and keep talent in his department. This was not EPJ's problem. These partners joined him early, gained great respect for him and remained loyal throughout their long lives despite outside monetary and academic offers. These partners guaranteed that EPJ could institutionalize his solo enterprise.

Howard Root (HFR) and *Alexander Marble* (AM) were born in 1891 and 1902 respectively, and both came from the Midwest (Iowa and Kansas). Both men attended Harvard Medical School and had a formal postgraduate education. Howard F. Root joined EPJ in late 1920 after a fellowship at Johns Hopkins Hospital in Baltimore. He was extroverted and athletic and he tackled the huge assignment of cataloguing the new findings that were increasingly seen as a result of diabetes patients living longer. EPJ gradually shifted to Dr. Root the daily responsibility for enlarging the hospital service of the "Joslin patients" that increasingly dominated Dr. Joslin's practice between 1922 and the 1940s.

Dr. Marble, like Dr. White, worked for Dr. Joslin as a medical student when the phlebotomy and emergency services paid a stipend for the student. Marble had the meticulousness of EPJ, and his military discipline was softened by a civility that outmatched that trait of Dr. Joslin. Dr. Marble was granted a travelling fellowship after his residency for studies in England and pre-Hitlerian Germany. Dr. Joslin guided his career path to the extent that investigative work was to be his eventual goal. Marble's itinerary was similar to the plan undertaken a few years before by Dr. Charles Best, the co-discoverer of insulin.

Alexander Marble was to excel at editing manuscripts and was of great help to EPJ in completing his textbook revisions. Marble became the Joslin group's main link to the Harvard Medical students and fellows from all areas who elected to study for a variety of intervals on the Joslin service. Early on, the laboratory was engaged in clarifying the correct diagnostic tests for diabetes and in standardizing the glucose tolerance test. The place of the liver in glucose "production" versus "utilization" was a topic of central interest during Marble's tenure at The Baker Research Laboratory.

Priscilla White started her career with Dr. Joslin at an earlier point than her two male associates. She was spotted by EPJ while she was on a work-study scholarship in medical school. Though she had attended Radcliffe College, she could not attend Harvard Medical School since they did not admit women until after World War II. She instead attended Tufts College Medical School. Two years later she was finishing her internship in one of the few hospitals that accepted women (Worcester Memorial Hospital in Worcester, Massachusetts) when Dr. Joslin asked her to join him and develop programs for the juvenile diabetic patient.

In his preface to White's 1932 monograph, "Childhood and Adolescence," EPJ wrote:

...in 1922... the writer of this monograph came to my attention. I could not help noting that when this early-rising, young medical student had finished at 7:00 a.m. her two hours of metabolisms for my friend, Dr. Frank H. Lahey, she emerged with enough energy and curiosity to take time to entertain and observe (and eventually, it has proved, capture) my diabetische Wurmschen before she started her classes at the Tufts College Medical School. ...In sickness and in health...through childhood and adolescence to manhood and womanhood they [patients with type 1 diabetes] have come to depend upon her as physician and friend.

Priscilla White's fierce devotion to EPJ was enhanced, no doubt, by an obvious father-figure association. This devotion coupled with her tremendous energy, good looks, photographic memory and tremendous optimism made her a force to be reckoned with. She tackled the often-ugly prospects of treating children with diabetes in this time before antibiotics. She boasted in later life that she had doctored three generations of children with the disease. She hoped that she had helped change the disease to a condition that allowed for a somewhat normal life. The first generation of children was particularly attracted to her many *daschunds* who were in evidence particularly when she occupied the adjacent townhouse on Bay State Road. In later years these dogs were revered on shelves in countless ceramic figurines that her youngsters bestowed upon her. Traditional pediatricians of the time were critical of her for the restricted Joslin food plan, but she shrugged off this complaint by stating that loving discipline was the correct way to guide the young in any case. The children's Camp effort that she directed for EPJ was created, she felt, as much for the weary parents as the children.

Other principle members of EPJ's original team and the approximate dates when they regularly became associated with Dr. Joslin, are as follows:

Leland McKittrick (1926), was a trusted surgeon skilled in abdominal surgery who was to develop parameters for foot care of the diabetic patient. Along with Dr. Root, he compiled the first treatise on the subject under the title, *Diabetic Surgery*. He devised the first limb-saving "trans-metatarsal" procedure, and along with his protegés was instrumental in promoting the present day sub-specialty of vascular surgery.

Shields Warren (1928) was a pathologist who modernized the Deaconess Hospital clinical laboratory. He facilitated EPJ's request for routine, multiple, daily blood glucose determinations, the first such service in the world. The present day huge industry and world-wide practice of self blood glucose monitoring (SBGM) had its origins here on Dr. Joslin's medical-surgical service. Warren, along with his associates, compiled all of the autopsy evidence on the diabetic syndrome including beta cell details and extensive evidence of widespread arteriosclerosis. The 1930 monograph, titled *Pathology of Diabetes* went through several editions before being incorporated into the general Joslin textbook.

William Beetham (1932), a gifted ophthalmologist from a young age, became the principal eye doctor to a majority of the Joslin Clinic patients for forty years. A patient could visit his office easily when at the Clinic by traveling across the street to 109 Bay State Road. Beetham incorporated his practice into the present day Joslin Diabetes Center in the mid 1960s. At that time he capped his career by developing, as a result of his long observation of the retina of these Joslin patients, a laser treatment method that was to revolutionize the treatment of diabetic retinopathy.

Allen Joslin (1934), EPJ's son, shouldered the assignment of managing a constant flow of "walk-in" and later "telephone-in" requests from an ever-widening population of patients. Allen had the kind of disposition, one might say *grace*, which eased his acceptance of this secondary role and allowed him to contribute to the growth of the clinic. EPJ repeatedly stated his appreciation for his son's work, but a general tension existed between them – possibly stemming from EPJ's life-long demand that his son should pursue medicine with the same interest and intensity as he himself did.

Robert Bradley (1949) was an adroit internist who quickly mastered the developments rapidly occurring in the new intensive care unit era. For twenty-five years he was the leading clinician on the Joslin medical service treating the most complex array of diabetic patients, many with long duration disease. He pioneered the concept of the high incidence of asymptomatic ischemia ("silent" coronary artery disease) in the diabetic population. Bradley was the first to observe clinically in the pre-menopausal diabetic women the striking reversal of the freedom from coronary artery disease that had been observed in all studies previously in the female population.

Leo P. Krall (1953) was first observed by EPJ in 1948 as a resourceful epidemiologist who completed the "whole town" review that reset the modern prevalence of diabetes in the general population. Krall's linguistic abilities in more than six languages along with his ability as a journalist made him an ideal international educator for Dr. Joslin. He updated EPJ's manual after the "old man's" death. (This phrase was used affectionately with the junior members of the Clinic.)

Albert Renold (1957). This very young Swiss citizen from the University of Geneva had his career sponsored by Drs. Joslin and Marble when he first became associated with the Harvard Department of Biochemistry in the late 1940s. Renold had an early interest in animal models for the study of diabetes. While he was director of the Baker Research Laboratory, he helped develop the adipose tissue bioassay for quantitating insulin levels, a procedure termed "the serum ILA" (insulin-like activity). This juncture (circa 1960) marked the eve of the modern era in endocrinology when explosive advances were about to surface with the immunoassay and hormonal receptors.

Amelia Peabody (1930) was a sculptress who created the medals for Dr. Joslin that honored patient milestones. Her donations to many scientific and medical causes over the years from her immense fortune qualified her as one of the best examples of a "sustaining patron" that Boston has witnessed. Her support of EPJ as a respected friend, her physician and fellow "gentleman" farmer was important during the demanding times in the early development of his Diabetes Foundation Inc.

Apart from the team, Dr. Joslin continued to revise and update the information contained in his "black book" ledgers. In the year of his signature portrait, 1930, he was approaching 12,000 entries of diabetic patients since 1898. These "outcome" statistics were the basis of his phrase, "private statistics precede public statistics." By this phrase he

meant the data regarding treatment of a particular problem always started with individual doctors, but these findings are best pooled with the results of other like-minded "investigators." He became a collaborator during the early 1930s on a range of problems with the Metropolitan Life Insurance statistical team. Their actuarial data on diabetes used Dr. Joslin's statistics from this time on.

Medals for the Patient

During this halfway point in the sixty years of Dr. Joslin's medical career, he struck upon a device to further expand his message of hope and encouragement to the patient with diabetes. In a small Harvard Medical School lecture published in 1930, we can trace his blueprint for the widening of this part of his public mission. He said the following:

How can we measure the success or failure of a diabetic career? Any standard has its deficiencies, but if a diabetic with his disease can live longer than his neighbor of the same age without it, I consider that he has attained a distinction, and should be recognized as outstanding.

He went on to state:

So far as I am aware, this was the first time in medicine that a medal has ever been given to a patient in recognition of his personal share in the management and control of his disease.

These two quotations signify a unique alliance that started a decade earlier between Dr. Joslin and the patient, with the nurse as intermediary. The medal (See Figure 11) was designed to signify the expanded duration of life for these patients.

One side of this medal depicts a boy, his dog and a boat with the sun rising in the distance. It is entitled, "Explorers in an Uncharted Sea." On the opposite side of the medal is the phrase "Prolonging life span after the onset of diabetes – a scientific and moral victory."

Again Dr. Joslin used a specific patient from his ledger (Case #2007) to be a model for this medal. George B.'s diabetes was diagnosed in 1920 when he was 5, and by the time the medal was created he was 15 years of age. The boy and dog scene was featured in EPJ's fourth to tenth Manuals, and was a clear message regarding the qualities of daily care,



Fig. 11 The First Joslin Achievement Medal-Expectation of Life Award – 1931.

August, '31

Dear Doctor Joslin,

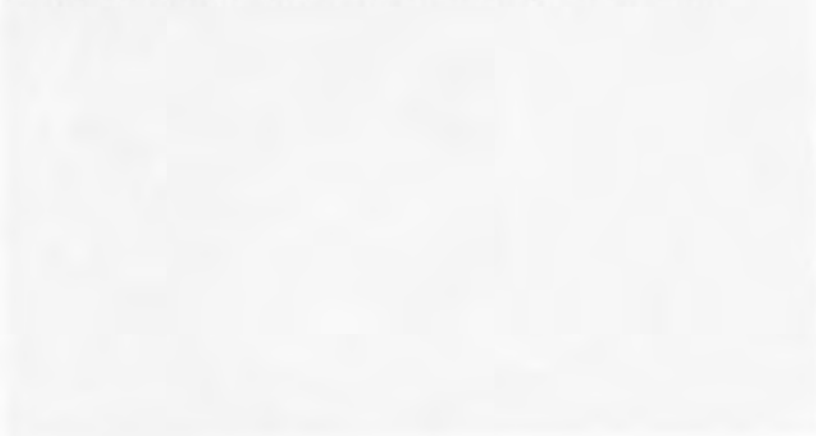
I received your letter the other day, knowing of the great work being done in the Leacoxess Hospital I want to help all I can. I decided to send all the money I made last Saturday shining shoes in my father's shoe shop. As I made exactly \$4.00 I am enclosing it in this letter. I only wish it could be much more, however I'm sure that more fortunate people will donate larger sums.

Yours very truly
Louis Campin
Watertown,
Mass.

Fig. 12 Letter to EPJ from 15 year old shoeshine boy with diabetes – 1931.

faithfulness and the lack of criticism that are required to execute a good diabetic treatment program.

The range of donors that were attracted to EPJ's appeals even in the worst days of the American economic Depression is evidenced by the letter reproduced as Figure 12. This example and several more like it all underscored EPJ's ability to make diabetes a public health issue.



With a missionary zeal, one must convert not only the patient's mind and soul, but also his doctor to the realization that it is worth the effort to control the disease as shown by the sugar-free urine, normal blood sugar and cholesterol.

Elliott P. Joslin — 1959

Part III: 1957 – The Third Address: 15 Joslin Road (Place) & 170 Pilgrim Road Boston

As Dr. Joslin approached 90 years of age, he moved his clinic to a new address. The new building stood exactly where the old Leatherbee and Lewis boarding houses or cottages had been from 1922-1952. In addition to Joslin Road, the patch of land that separated this street from Deaconess Road was also to be named in his honor as Joslin Park by the City of Boston that year (1957).

EPJ would have reflected upon the previous decade (1946-1956) as a time of both celebration and controversy within the specialty of diabetes as well as in his own personal career.

Time of Celebration

Similar to the 1914-1916 bridge of dates in Dr. Joslin's career, the time of 1946-1948 was also of importance. These years saw Dr. Joslin and his group celebrating the past and forced to plan for the future.

First, in 1946, the silver anniversary of insulin was celebrated in Toronto. A photograph found of that time shows the principle professionals who benefited and contributed to this epic discovery and its aftermath. In Figure 13 Dr. Joslin is on the extreme left next to Dr. Best. This photograph also shows the international effort that was generated by the discovery of insulin.

The following year, 1947, Dr. Joslin was to prevail upon the Surgeon General of the United States Government to institute a modern study of the epidemiology of diabetes. In 1947 Dr. Joslin and his team assisted a group of public health service physicians in canvassing an entire town for the diagnosis of diabetes. Oxford, Massachusetts, Dr. Joslin's birthplace, was chosen for this survey. The use of a new device of postprandial blood glucose determinations to confirm the diagnosis of diabetes was a major dimension of this study. A prevalence rate of 1.7% of diabetes was a surprisingly high figure from the results of this year long study. This type of work set a standard for epidemiological investigation in the field.



Fig. 13 25th Anniversary of Insulin Celebration –Toronto, Canada-1946 – Honored Guests. EPJ first on the left next to Charles Best, co-discover of insulin. H.C. Hagedorn of Denmark, the discoverer of protamine insulin, and B.A. Houssay of Buenos Aires, discoverer of the pituitary- pancreatic axis are fifth and sixth from the left.

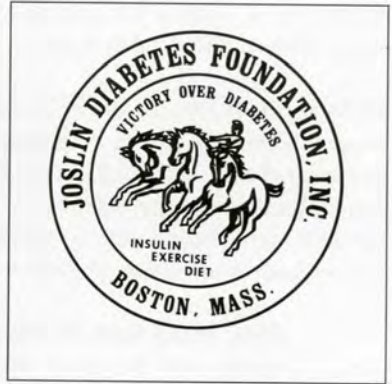


Fig. 14 The second Joslin Medal – The Victory Medal – 1948, and the Diabetes Foundation Inc. Seal – 1953.

During the Oxford study, Dr. Joslin noted the enthusiasm and energy of Dr. Leo Krall. Six years later Dr. Krall was asked to join the group as the Joslin Clinic was formally being declared (1952-1953).

In 1948, Dr. Joslin created his second patient award called the Victory Medal (See Figure 14). It was created to celebrate the extension of life and good health with insulin to the 25-year mark. It was modeled, as stated before, on the good example of an individual patient (Sam R.). The rigorous qualifications to receive the medal caused consternation from the beginning, as the patient had to be free of every detectable form of tissue abnormality. Even before Dr. Joslin's death it was so rarely awarded that a "Certificate of Achievement" citation replaced it. For those who reached this point, however, rapid developments with new antibiotics, improved surgery and the addition of several improvements in insulin preparations had all contributed not only to a longer life span, but to a greater quality of life in a select number of these survivors of the early insulin age.

Dr. Joslin also made a three-horse motif as the symbol of diet, insulin and exercise needed to achieve "victory" over the disease. Five years later he made the same figure the signage for his Diabetes Foundation Inc. organization. Horses had played a large role all his life and he drew upon them at this time in a major way.

In his textbook (fourth to eighth editions) under a subsection in the chapter on the treatment of diabetes, he created a curious category for comment titled "The Diabetic Creed," This section contained ten principles that had guided his practical judgement in the treatment of diabetes. It included, with a mild apology from the author, illustrations and explanations on the symbolism of horses as follows:

Three horses draw the diabetic chariot and their names are diet, exercise and insulin. In fact, all of us in our life's journey depend upon the three, but seldom recognize the third although we often realize that we are poor charioteers. Yet we fortunate ones have instinct to help us hold the rein, but the diabetic cannot trust his instinct as a guide, and in place of it must depend upon dieticians, nurses and doctors unless he understands his disease. To drive a pair requires skill, but to manage a spiked team (three horses) is no joke, and doctors and patients alike remember that ponies are more mischievous than horses and must be expected to upset the diabetic children's pony cart now and then. Therefore, the education of the diabetic charioteer is serious business. It

sometimes needs a woman's hand to tame the team because her intuition, patience, mastery of detail, sympathy and even love are required to make these crude drivers, young and old, become masters of their steed, and incidentally, of their fate."

The last sentence gives indirect clues to EPJ's respect for women in general. In particular the women who were most important to him in his life included first and foremost his wife, followed by his mother, his daughter Mary, his daughter in law, Barbara Joslin, the Deaconess School of Nursing students and their faculty and, of course, Priscilla White. EPJ also had a unique career-long association with his research assistant, Anna Holt. Although she shields her work in the memoir about EPJ that she composed, Holt fulfilled crucial roles for him. She was a governess for his children when she was near twenty and then served as his research editor for his Carnegie studies and early editions of the Joslin textbook. In her later years when she was the Harvard Medical School librarian she assisted her aging mentor in completing his last publication. Together they created a guide to the exterior plaques of the Joslin Place building which commemorate the history of medicine through the ages, with an emphasis on diabetes.

A Fond Farewell

Figure 15 shows EPJ addressing the 1950 dedication of the new building that was to link up all the subdivisions of the Deaconess Hospital complex. He stands there at 81 years of age, resembling a man a decade younger. In effect, this man, the hospital's first physician was soon to shift course from his beloved institution. EPJ's idea at mid-century was not to plan a graceful end to his hospital and medical career. He was preparing at the time of this photograph to announce a farewell to his organizational and endowment commitments of nearly fifty years to the hospital. When the Deaconess Hospital was the first medical facility to move to the Riverway section of Boston (the Harvard Medical School area) he became, as mentioned, its prime medical doctor—admitting as many patients as most surgeons, and serving as one of the hospital's best fundraisers, its original clinical laboratory director and its nursing school advisor.

At a time when most leaders would depart from their professional institution with the hopes of a wing or a building or an elaborate plaque named for them, EPJ was embarking on a third phase of his career. He was about to create a new institution.



Fig 15 EPJ, age 81, at the 1950 dedication of the new Central Building of the New England Deaconess Hospital.

In the photograph (Figure 15), over EPJ's left shoulder is a young administrator, Richard Lowry, who was an assistant hospital director at that time. He was one of two administrators skilled in the growing complexities of the business of medicine. The second administrator was to arrive a few years later in the form of the very personable William Barry who had been trained in the new field of "practice management." Both of these men proved to be artful negotiators in dealing with EPJ and his still surprisingly small group of clinicians in the urgent need for institutional change. The first administrator was soon to catalyze EPJ's desire to reshape ambulatory in-patient care. The second one was to completely modernize the old Bay State Road practice's accounting and personnel systems.

The Winds of Change

The Baker Clinic had been operative for only six years when World War II moved in and made expert manpower scarce. When the war was over the surge of growth in the soon to be labeled "age of hospital medicine" changed all prior assumptions. Surgeons, particularly, formed the largest group of physicians at the Deaconess Hospital and they clamored for more beds. The Baker Building proved inadequate from almost every aspect of its design. It had too few rooms, and it was placed in a corridor between the two major and contentious sections (fiefdoms) of the hospital. Only the research floor and the "roof garden" remained intact. Finally the hospital staff agreed upon a new building that would literally and figuratively join the old Deaconess staff members with the Palmer Building staff group. The arrival of the Deaconess' Central Building in 1951 marked the cessation of the Baker Clinic as the Joslin group had come to know it.

Furthermore, EPJ's popularity as a fund raiser for his programs involving foot care, education and the children's camps had grown. Objections were raised from many donors about funding projects associated with a sectarian hospital. Many contributors wondered why they were giving to an institution that was closely associated with the Methodist Church rather than to a disease-oriented or preventive "cause." Bauer writes in the history of the Deaconess Hospital (1996) that the hospital trustees of the 1940s were distressed with the persistence of requests from the specialty groups (Drs. Joslin and Lahey [Lahey Clinic] particularly) for special areas or bed allocation allowances in the rapidly developing Deaconess Hospital complex.

Perhaps the stress of these years was having its effect on EPJ's disposition despite his Yankee civility. Photographs of EPJ with his trainees in the

years 1948-1953 show him appearing very stern, even angry. He was known to dismiss office personnel for a breach of manners to patients. One story that was repeated frequently and probably exaggerated, came during these years and relates to EPJ's attitude towards liquor. Apparently when EPJ was given whiskey as a Christmas gift by patients, he would lecture to his secretarial and nursing staff about the "evils of drink" and then proceed to pour the entire quantity available down the drain before the presenter had reached the first floor door of Bay State Road.

The Joslin Clinic

The Joslin practice was legalized into a group practice in 1952. At last the official name of EPJ's solo medical practice with assistants as loosely described "partners" was to be officially called The Joslin Clinic. The general public saw little change, however, as the Joslin Clinic had been the name even all taxi drivers knew. Mayor Curley saw to it, after parking meters were placed on Bay State Road, that ticketing would not be done near 81 Bay State Road.

A year later (1953) it was evident that for Joslin and his group, a master plan for funding projects and for the future development of diabetes programs also was needed. In describing the charter to his Diabetes Foundation Inc., EPJ wrote about his funds (General Endowment Funds and a "Home, Hospital and Camp Fund" were created in the 1940s.):

Although each of the Three Funds were serving a useful purpose, it was felt an organization of broader scope was desirable and to protect the younger diabetics and research. The conduct of such an undertaking would be much facilitated if the controlling body was incorporated and therefore the Diabetes Foundation was organized as a charitable corporation under the laws of Massachusetts. The charter states the corporation's purpose is the advancement of medical science and the promotion of the health of the community...with special emphasis upon research of all kinds in the field of diabetes and related diseases...and the establishment of one or more camps...clinics or hospitals (or units thereof)...the title of the hospital teaching unit is vested in the corporation...

Time of Controversy

A major debate over the treatment of diabetes arose gradually and without resolution in the years following the introduction of insulin. By the 1930s the emergence of different complications of diabetes became a persistent and disturbing finding. Not only were new problems being described in the medical literature, but the magnitude of these problems seemed to increase for the individual patient who now lived longer because of insulin (and soon because of the arrival of antibiotics). These problems had previously taken just a few pages of description in Dr. Joslin's early textbooks. By the fifth edition, a much more elaborate description was needed to cover them.

EPJ assigned Dr. Root as the author of the chapters that analyzed the various aspects of diabetes that were to be best described as the chronic diabetic syndrome. Specifically, retinopathy, many examples of neuritis, kidney complications, usually coupled with a description of hypertension, were clearly distinct possibilities for many patients with diabetes. However, as the term "syndrome" denotes, these problems were not universally seen in each patient and these presentations were not the same for any two patients observed with the problem. The cluster of complications appeared to accumulate the longer the patient had diabetes.

The question then arose whether or not these tissue abnormalities appeared sooner or in greater combination when the control of diabetes was marginal compared to those who had "excellent" control. The definition of "excellent control" was debated. An answer to the general question was not readily available and became a *cause celebre* of internal medicine for the next 50 years (1940-1990).

In summary, the fear of coma in the pre-insulin era was replaced by a dread of complications. Since Dr. Joslin had long advised, even preached, that meticulous control and attention to detail would lead to better health, his name became affixed to the debate on the control issue. The quandary quickly became: how important to the prevention of diabetes complications was meticulous attention to a patient's diabetes diet, exercise and insulin regimen? Was it enough that a patient's diet, exercise and insulin treatment keep them free of symptoms of low or high blood sugar? Or was it necessary to carefully and arduously pay attention to what and how much a person with diabetes ate at each meal, and coordinate that with their insulin injections and exercise in such a way that blood glucose levels (as measured, albeit imprecisely, through urine testing) could be as close to normal non-diabetic levels as

possible. The question, simply put, was how good did diabetes control have to be to prevent or minimize long-term complications?

Many more physicians than patients became polarized over the control issue. The average patient hoped that what their doctor ordered would be enough to stem the decline in health that they had heard about. Many "average docs" (in the 1940s and 1950s) felt that controlling diabetes was already onerous enough without extra doses of insulin given through fairly dull, steel needles. Also the need to choose a dose of insulin by employing numerous extra tests performed by boiling urine with a "Benedict's" [copper reducing agent] solution was a horrendous task. The most contentious part of a Joslin-type program was the requirement to follow a largely weighed diet with an elaborately detailed substitution system for all carbohydrate, protein and fat in the meal plan. One might engage in this "extra mile" of daily tasks in search of superior results and still develop complications. To many doctors the whole situation was vexing at best and just wrong at worst.

The position of advocating only a symptom-free approach to the acute symptoms of diabetes was promoted as the practical option. The goal for these advocates was to have patients be free of night-time urination, thirst, or bouts of increased hunger, with little attention to the quantity of sugar in the urine. (The only exception to this rule was to avoid acetone in urine). Edward Tolstoi, a physician in New York City, became EPJ's nemesis promoting this "relaxed" control position. The stage seemed set for what many academicians came to consider a debate with little chance of resolution due to too many variables and imprecise measurements.

The Joslin group felt that the meal plan could be quickly mastered with training and that planned exercise could reduce the blood sugar and make for an easier-to-regulate program than the "free diet" approach. Most important, the group felt that their experience was preventive in nature and supported less repeated acidosis, less obesity and less general fatigue. Further, a routine of a urine-testing program meant that a patient and his family would remain more alert to the possibilities of impending ketoacidosis and hypoglycemia than the opposite approach.

Tolstoi was young enough to be EPJ's son. He displayed a brashness on the podium and on one occasion in 1944 was blatantly discourteous to EPJ in a joint discussion, practically dismissing EPJ's rebuttal. He commonly chided the Joslin group about the pseudo logic of linking sugar directly to most of the complications – like it was a "religion." He and

many of his group at Cornell and like-minded schools would tell the Joslin group and the Chicago group, for example, that long term complications appeared even in the "rigidly," well-controlled diabetics and those with his "asymptomatic-only" level did not appear to have more problems.

Dr. Root at first and then, principally and more patiently, Dr. Marble took up the position that those with the best control from date of diagnosis had the least problems. By 1952 the Joslin group had published a study that showed by its observations that insulin dependent type 1 diabetics with "excellent" control ratings had significantly less retinopathy than the "poor" control group. It was agreed that a retrospective analysis of the clinical state of these patients was less than ideal but that the Joslin patient group was a good cross section of the juvenile diabetic population.

The thorny issue for most investigators revolved around the reliability of the barometer for control assessment. To assert that sugar-free urine denoted blood glucose under 150 mgm% (which would be considered good control) was not correct. The tubular re-absorption rate of sugar varied with many factors, making urine testing an inaccurate science. Moreover, ethically speaking, even if measurement indices could be agreed upon, the Joslin physicians and like-minded groups in the country resisted treating one group with what they considered "lax" control and another group by a "good" control method.

Glucose Overflow

Just as the so-called "free diet" group seemed to have the best of the debate over the traditionalists like EPJ and his group, basic science came to the defense of Joslin's position. A pointed example of a new approach to the grand control debate came in the form of the work of a young Baker Research Laboratory physician-investigator, Robert Spiro. Like the research Director, Albert Renold, and his young associate, George Cahill before him, Spiro had been schooled in EPJ's favorite subject of biochemistry with Harvard's Dr. Baird Hastings. Spiro was the new recruit in the lab in 1961 who held both a Ph.D. and M.D. and who was developing a strong focus on the study of the glucose-protein substances in the body called glycoproteins. Specifically, he was in the vanguard of work on pathways in health and disease (diabetes) for the formation of these collagen-like substances in tissues, particularly in the kidney. Spiro was to show that the "basement" membrane of the diabetic kidney (the capillary arteries in the filtering bulbs called the glomeruli) grew wider and less functional in diabetes. He disagreed with

the position of the investigator M.D. Siperstien and others that these changes were already in an incipient form before the onset of diabetes. Spiro considered the lesions to have occurred from the acquired environmental factor of sustained hyperglycemia. This type of investigation was to energize the rebuttal in favor of the importance of the "excellent control."

Intriguingly, the major complications of diabetes seemed to rarely occur in the three major "metabolic mill" locations of the liver, muscle and adipose (fat) tissue. These bastions of basic hormonal investigation each required insulin for glucose entry into their intercellular system. In contrast, the large and small blood vessels of the body along with a wide variety of different peripheral nerves did not require an insulin "visa" to regulate glucose. Metabolites from the uncontrolled diabetes state, principally glucose, could simply diffuse or easily "overflow" into these tissues.

In the fifteen years that followed EPJ's death, other investigators working in the same vein as Spiro's investigations would create a surge of interest in different biochemical pathways that might decipher the pathology of diabetic complications. Strong supporting arguments in favor of good control occurred with dog and rat animal models, supporting the efficacy of normalization of the blood glucose.

Genetics

Most young physicians and investigators soon began to balance the various factors implied in this debate, developing in the process an intermediate position. This formulation weighed the part that genetics could play in favoring some "sub-groups" of people (families) to more easily develop certain complications, if other factors were present. The old nature and nurture dichotomy prevalent in psychosocial theory had arrived in the research laboratory. For these inquisitors into the pathology of diabetes, a major question was how strong was an elevated blood sugar as a co-factor in the production of the lesions. Why did glucose appear to choose major areas like the retina or the (leg) arteries and the coronaries in such mosaic-like presentations as to disable, effectively, a distinct minority of these patients? An epidemiology group at Joslin saw the value in the gold mine of data recorded over sixty years in EPJ's ledgers. This material was to be used increasingly to investigate twins with diabetes, large cohorts of patients with similar clinical features and families seemingly very prone to the disease.

University Group Diabetes Program

The clinical dimensions of this debate, almost of necessity, rolled on for nearly thirty more years. The entrance in 1955 of the "oral agents" (sulfonyleas compounds with orinase as an early example) as a treatment option was welcomed by patients as a substitute for insulin in the adult form of diabetes. A study, the University Group Diabetes Program (UGPD), was undertaken that included this class of medications comparing it with insulin and diet alone. When orinase was linked to an increased mortality in some of the participating centers, an acrimonious debate surfaced. The Joslin group attempted to defend the continued use of the oral agents. The problems with the study design were never resolved, however, leaving in 1972 a deeply divided American Diabetes Association membership with a muted celebration of 50 years of insulin usage.

A proper solution to the control issue would not be possible until self glucose monitoring, and the glycosylated hemoglobin assay that measures average glucose levels, were both available. These tools would be in place by the early 1980s in time to organize a well-designed study of the level of control necessary to be effective in blocking major manifestations of chronic diabetes. When funding became available, a nationwide investigation was begun, more than a full generation after the original protagonists had sparred so heatedly over this most central of issues in diabetes. In the end, Dr. Joslin and his team were proven right when the results of the 10-year Diabetes Control and Complications Trial were released in the 1990s. The DCCT showed that tight blood sugar control could reduce the risk of diabetes complications by 50% or more.

The name "Joslin" continued to stand for the conviction that the better the control, the less the intermediate and long term problems for the diabetic patient. While "weighing all your food" faded as a staple teaching tool, the Joslin team maintained as vitally important the measurement and keen estimate of all calories eaten. When the NPH and lente insulins became the standard choices for treatment, it was said that hardly anyone with juvenile (type 1) diabetes left Joslin, whether it be from the office, hospital or the summer camps, with less than two injections of insulin per 24 hours. EPJ would have approved.

Pregnancy

One of six oil murals in the Joslin Center foyer illustrates powerfully what was meant by good and not so good control in EPJ's day. This most popular of the portraits concerns the plight of yesteryear's pregnant

diabetic woman. Dr. Joslin encouraged Dr. Priscilla White's devotion to this group of very special patients, and her dedication is depicted in the mural.

Although White's work was often confused with the less complicated gestational diabetes that might occur temporarily in the course of pregnancies, one of her major goals in life was to help the full range of young women who had had childhood diabetes attempt pregnancy. The hope was for a live, healthy infant for each woman. Most practitioners in the 1930s had advised all young women with diabetes to have a tubal ligation early in their marriage to prevent the complications of pregnancy. Dr. Priscilla White staunchly defended the opposite strategy.

Dr. White's plan centered around a weekly prenatal program of monitoring the pregnant diabetic women's diabetes and obstetrical status. For the first fifteen years starting about 1937, Dr. White, almost alone, attempted to improve the quality of diabetic control in women with childhood onset diabetes. With the tools available she had to settle for a "fair" category of control at best even in the patients who cooperated fully. If control was poor, fetal survival was extremely limited. Even with the achievement of a "fair" category of control of diabetes, the persistence of wide swings in maternal blood sugars occurred, i.e., hypoglycemia early and very elevated levels in the middle of gestation with rapid growth of the fetus. Simply stated, an elevated blood sugar stimulated fetal insulin production and along with other partially understood placental factors produced growth hormone-like effects in the developing fetus. This resulted, more often than not, in a distinctly oversized infant by the last trimester of pregnancy. During a conventional delivery, edema and organ enlargement jeopardized the infant, to say nothing about risks to the mother.

Priscilla White was to follow her patients in this intensified way with the goal of choosing an ideal date for a surgical delivery. She devised along with the obstetricians, Dr. Titus and later Dr. Luke Gillespie, a 37-week delivery goal as the best time to order a cesarean section. Estimates of the actual duration of each pregnancy were difficult to predict due to the variable ovulation that many of these marginally well patients experienced. Clinical challenges continued to abound: if the delivery, by the best of estimates, was too early (at the 35-36th week of a 40 week gestation) a premature infant was guaranteed with immature lungs that predicted perinatal death; if the pregnancy progressed too far towards the end of gestation, the edematous, "congested" infant was often at an increased risk for death (stillbirth). This specialty clinic within the Joslin

clinic was a supreme challenge for any clinician, medically or surgically trained. It eventually became a mecca for Harvard's "high risk" pregnancy trainees (after 1950 when White's former resident became the Professor of Obstetrics at Harvard).

Dr. White had gained the allegiance of her obstetrical team early on, which was thought to be a remarkable rarity in those years. This was in keeping with Dr. Joslin's adage that patient care almost always benefited from the "fecundity of the aggregation." Amazingly, White would be gowned for attendance at each delivery of these infants and, at first, initiated perinatal care herself when it was indicated. The increased fetal abnormality rate in those early days of that obstetrical era often added an additional, pathetic scenario to the operating room. In essence, the state of anxiety common among pregnant women regarding the possible delivery of a markedly deformed infant was increased greatly because of the lack of today's ultra-sound capability and a three-fold statistic for this probability in these diabetic pregnant women.

– *Case #14064: Minnie K.*

Case #14064 from Dr. Joslin's ledger (Minnie K.) gives a good example of both the drama and devotion to Dr. White that these women experienced fifty years ago.

Yes, I feel that I know Dr. White very well. I had first come to the Joslin Clinic in 1935 at age 16 with newly discovered diabetes. Dr. White was most responsive to me as a teenager, encouraging and helping me with my diabetes. Later, when my husband proposed marriage we went to Dr. Elliott Joslin and had a grandfatherly visit.

I had real problems with my first pregnancy in 1945. My child was born with neurological problems. Naturally, I was anxious when time neared for my second delivery. We were first admitted to the Baker Building for a period of diabetic control and then later transferred to the Faulkner Hospital. The time of confinement was considerably longer than the present system. The other women who were in the hospital at the same time would always compare notes, talk endlessly of their concerns and expectations. It was a group therapy of sorts.

According to one woman whom I met through Dr. White at that time and with whom I still correspond, she and her husband felt that Dr. White did more to help them understand and accept

their disappointment than any other single factor. They have no living children despite five pregnancies.

Dr. White's presence was such a help. Naturally she would chart and guide our medical therapy including the problematic Protamine Zinc Insulin in use at the time. She was endearingly optimistic and happy with each of us individually. She was such a naturally beautiful woman and could easily engage in what I felt to be a genuine interest in fashion and feminine things that interest young women. I remember that Dr. White drove me from the Deaconess Hospital to the Faulkner Hospital in a terrible rainstorm as my due date neared.

When the time for the Caesarian section was chosen—one afternoon as I recall about a week before the date that I had expected—Dr. White informed me of the decision. I started to cry almost hysterically, I believe, and asked many questions like, 'Do you think that there is something wrong—will everything be all right' and so forth? Dr. White replied, 'Why yes, certainly there may be problems—that is why we must move now—right now'. It was the only time in my nearly 40 years of association with Dr. White that I found that she lost her patience with me. I think, in retrospect, that she was as concerned as I was about the clinical outcome.

As was her custom, Dr. White sat with me in the operating room behind the drapes throughout the delivery. I had only spinal anesthesia. She was patient with me and discussed many of the features of what was going on. My husband was allowed to stay directly outside the operating room door. When my child was born, Dr. White related, to my husband with great glee, that my daughter was well. As she put it, 'Your child is a replica of your wife and will stamp her foot and rule the rest of the household'. The prediction was correct. Deborah is a marvelously healthy and independent woman.

My youngest child, Matthew was born much later at the Boston Lying-In Hospital. This came after a period of time when I had trouble conceiving. Several consultants discouraged me from going ahead with further pregnancies despite my desire for a third child. Dr. White, however, encouraged me to get pregnant again. At this time it was my impression that the whole system of treatment that she had pioneered was better recognized and accepted. Certainly the whole procedure during pregnancy and delivery was easier on me.

My relationship with Dr. White has been a long and happy one. Her devotion to me in particular and to 'her girls' in general has been one, I feel, of friendship...genuine friendship. Dr. White's role changed for me from time to time. During the most difficult periods probably she was a medical mother to me.

The greatest tribute I, or any other woman with diabetes could give to Dr. White, is that we shall love her to the end of our days. She made it possible to fulfill our lives as women and mothers.

Dr. Joslin's Triumph

In 1946, Dr. Joslin wrote another "white paper" so to speak, similar to his 1930 address that was to predict his Baker Clinic design. The title of this publication has the curious title: "The Ideal Diabetic Unit – Of the Hospital, But Not In It." This article was the most distinct from any of the 240 odd articles he wrote in his lifetime. It was co-authored with the architect Henry Shepley of Coolidge, Shepley and Bulfinch.

In the article EPJ emphasized that a "Diabetic Hospital of Tomorrow" would need to serve the entire range of patients. This new facility would need to be a "unit in a general hospital." Next he delineated the three types of patients with diabetes that required treatment in the hospital. The first of three categories of patients to be served were those bed-patients who required attention by "preeminent specialists." The second group would include those patients needing continuous supervision or intensive observation, especially those persons with major (or initial) revisions in their care. Patients in early stages of ketoacidosis or those recovering from a full episode of this then prevalent situation were classic candidates for this level of care. EPJ included in his list of candidates any patients that were partially ambulatory, especially those making a "transition" from surgery.

The third category included office patients as well as persons with diabetes and their families visiting the area. This group, EPJ emphasized, were those patients who needed to be "drilled" in meal planning. Attending class often on any or all of the range of topics that changed daily and sharing in the instructional (noontime) meals was his expectation for these day-patients.

EPJ felt that the candidates for the second level of care required an area with an innovative design that would prove less costly for the patient and allow for a different management style. It was this hospital pavilion to which he gave the citation: "ideal diabetic unit."

In essence the main theme in this article regarding hospitalized patients, ambulatory-in patients and office patients was that they should be able to obtain periodic, comprehensive educational "treatment." While the term "treatment" eventually was used to describe the unit, he dubbed the new area that was urgently needed as the "Hospital Teaching Unit." This space as he had stated before in his 1930 manifesto was to be an "island of safety" for people with diabetes.

His article included architectural drawings for patient rooms, diet kitchens, visiting rooms for families, children's units, obstetrical areas, dental and podiatry clinics and a lecture hall for 60 patients. It was, in reality, the Baker Clinic revisited with every service under one roof. EPJ also suggested that a "diabetic store" be in this hospital with profits going to the needy.

EPJ had attempted two other times to create an environment for adequate education for his patients. Figuratively phrased, this was EPJ's third time up to bat and his life was in, at least, the eighth inning as he approached eighty years of age. It was in the little Broadbeck cottage complete with metabolic measurement apparatus for some of his "study" patients that he had attempted meticulous instruction on food portions to help stem death from acidosis. He was to comment later that he was desperate in those years and education was all he had available. It was in this same cottage ward that EPJ and his alter ego Howard Root were the first physicians in the world to inject, with some hesitation about dosage, the newly released commercial insulin.

The Baker Clinic had the awkward requirement that the ambulatory patients live in boarding houses and attend classes there or in other parts of the Deaconess Hospital. His office being over a mile away near Kenmore Square had for thirty years complicated the lives of patients and professional staff. Economy of time alone, he now stated with conviction, favored housing all the categories of patients with diabetes under one roof.

The Joslin group eventually was to agree to an arrangement that gave Deaconess Hospital with its nursing staff an administrative contract rather than have the Joslin Clinic assume responsibility for a free standing hospital unit.

There were two types of laboratories recommended for this "diabetic" hospital. One was a clinical laboratory that would promptly and carefully report laboratory data on a daily basis. By the time he wrote the article, the capillary blood sugar determinations were being done in increasing quantities, almost twice daily in the main hospital by conventional technique. The auto-analyzer was to streamline this laboratory operation but it was more than a decade away. The second type of laboratory that he recommended for this special facility was one for research in diabetes. The following quotation states his case:

It (research in diabetes) is essential in any clinic if it expects to hold the competence of its clientele, or its enthusiasm of its staff, and to be a Mecca for other doctors as well. Diabetics want their doctors to improve the treatment of their disease no matter how modest a way. Therefore, space must be reserved...for special investigators. These would include accommodations for workers in pure chemistry, for metabolism unit, for bacteriology and so forth.

He felt that the diabetic unit would give hope to the patient and show where monies for this purpose had been given. He hoped that the mere knowledge that there was "such clinical research" in a teaching unit for diabetic patients in this one part of the country would "help to stimulate the construction of similar units in other localities."

As he grew older he would more often than not insert in his writings adages or remarks that mirrored his own personal philosophy, as he did in this publication:

I believe that the diabetic needs character building just as much as body building, if he is to be a credit to the clinic and its doctors, his relatives and himself...Personal responsibility for his own and family welfare should always be cultivated and in the foreground. ...as far as possible, each patient should pay something for his care ...

1955: Dedication of the Joslin Building

The new Joslin building was dedicated in 1955. EPJ was never happier. A year later the exterior of the four-floor building was finished, with the Joslin Clinic office practice being the first group to move in. By the summer of 1957 the ambulatory in-patient floor admitted its first patients to a twenty-four bed unit on the second floor. At long last, Dr. Joslin, 40 years from the time he started his original Teaching Plan, had a "state of the art" treatment center (See Figure 16).

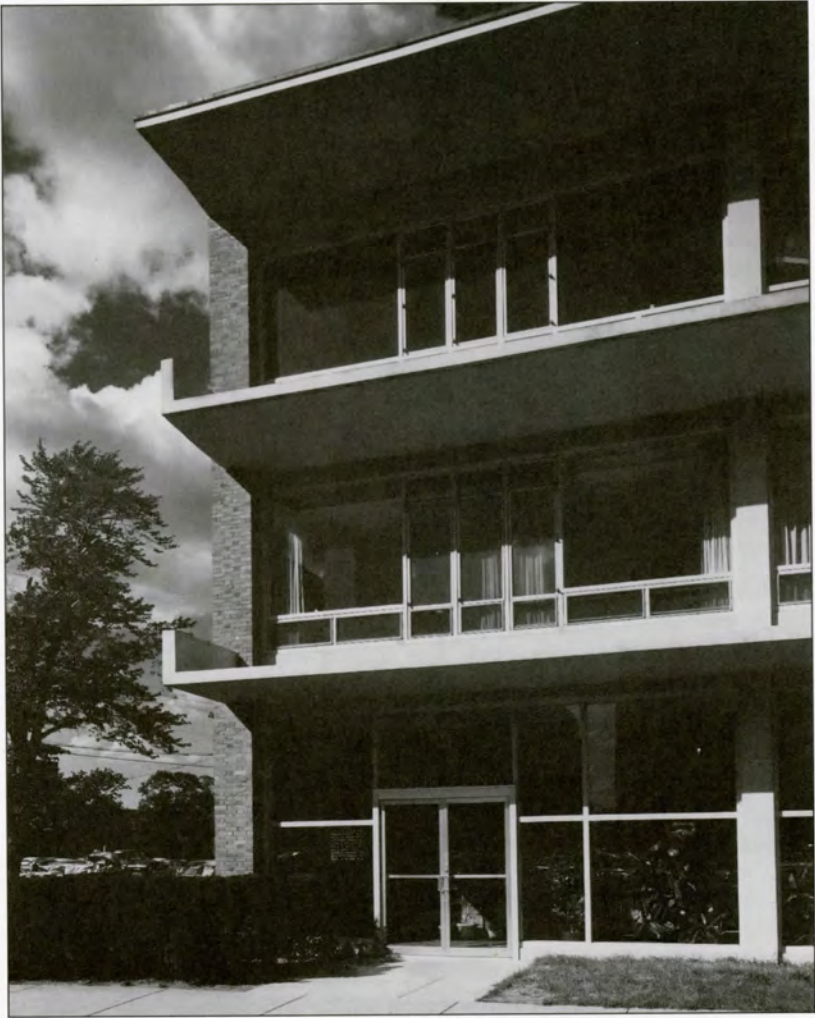


Fig. 16 Front door of Joslin Clinic – Joslin Road (Place) – 1957.

In the preface to the last edition of the Joslin textbook to be written before his death, Dr. Joslin states:

Our own hospital teaching unit has far exceeded our expectations. Never have we had them (patients with diabetes) learn so much in so short a time...we attribute this to more than our supervision (but) to the fact that here one patient learns from another patient, and this often is of more value than what the doctor says.

The patient who now visited the Joslin Clinic offices entered a modern facility on Joslin Road. The contrast to his former home in Kenmore Square was a marked one. Robert Bradley, for one, was relieved to be out of the cramped and often inefficient corridors of the "busting at the seams" practice. The complicated patient often supported with canes or in a wheel chair now had a wide ramp in the foyer of 15 Joslin Road. Still many patients remained nostalgic about visiting the Joslin doctors in the old fashioned ambiance of a home.

EPJ continued to see a decreasing number of patients during the five years left to him, though he increased his dependence on his associates. Dr. Joslin felt that younger house staff "were closer to the books" and made excellent consultants for him. When EPJ was hospitalized in 1961 for congestive heart failure, he insisted that Dr. Younger, the youngest member of the group and a recent second-year fellow, be his physician. He resisted consultations with any of his former students like Paul Dudley White, a noted cardiologist. EPJ explained: "any physician good enough for my staff is good enough to be my physician."

The ambulatory in-patients, the staff of his new Joslin Diabetes Foundation and eventually the research laboratory personnel all entered the building by the Pilgrim Road entrance just around the corner near his new office. EPJ insisted on walking to his apartment three blocks away using his "detestable" cane which was needed for support of his Pagetoid hip. This required the daily navigation of a busy intersection, yet he refused repeatedly to have a driver.

The Boast – A Dream Becomes a Reality

EPJ and his team came to boast that *in less than one week's time* the patient with diabetes (of most all descriptions except the very ill) could become trained in self-management techniques facilitated by 3-6 blood glucose determinations per day. By 1960, the earliest forms of the self-glucose monitoring techniques were being made available. EPJ's term

"Hospital Teaching Unit" was later changed to a more practical name, the "Diabetes Treatment Unit." It had family-style tables manned with dietitians and their aides, postgraduate fellows and an ample supply of food scales. A modern gym rounded out the facilities and was on the same floor as the patient rooms.

House officers were incorporated into the management of patients who gradually became more problematic as the years progressed. Many nurses began training as "teaching" nurses (later as certified diabetes educators). Nurse practitioners were added to the team and shared in the assessment of the patients' wide variety of problems.

Apart from the formal classroom discussions that went on seven days per week, another feature made the facility a real resource station for the patient. Along with the diabetes management features of the unit, each patient could receive a comprehensive set of consultations depending on his or her individual needs. Many patients, and those from rural areas particularly, had never encountered a "real professor" as an ally and consultant who would help decipher their medical problems. Even many urban dwellers had never encountered so much talent delivered in a week's time. One patient explained – "even with all my (financial) means back in (a metropolis) I cannot, mind you, *cannot* receive this totality of care with such dispatch."

The Joslin Unit procedures required patients to chart each of their own multiple blood sugar determinations on their own copy of the doctor's record in their hospital rooms. Even the relatively medically illiterate patient gained a graphic demonstration of the possible patterns of the blood glucose response to insulin when the variables of well-timed meals and activity were mandated. In this environment patients were able to agree on needed changes in their daily routine when they were discharged. These patients were experiencing as never before what it meant to have team management. When the unit opened in the late 1950s this concept was rarely employed by physicians.

The acceptance of multiple insulin injections was enhanced by the appearance of disposable and much smaller insulin needles. Over-sized doses of insulin were very common in the community at that time, facilitated by the standard one-insulin injection practice. Patients entered with complaints of gross overeating episodes and all day hypoglycemia symptoms. Initiating smaller doses of insulin, given more often during the day, easily corrected these problems for many patients.

Over the course of the next two decades, this unit more than doubled in size. The DTU as the unit was called, grew to exceed a 70-bed capacity by the time Alexander Marble and Allen Joslin retired from practice in 1982. Even as the original Joslin group moved into its new offices, the sharp rise in patient referral necessitated the addition of two young internists, Drs. Bill Hadley and Dan Ferguson. At this time, thanks to EPJ's tenacity, this comprehensive training program was about to lead the way in the nation for what is today termed "intensive management."

No advertisement for "the Joslin way" or the Joslin method or the Joslin Foundation Inc. could have been more effective than the endorsement of these satisfied patients and their families. EPJ's fan's, "subway alumni" clientele, were to give generously to his foundation in the years that followed. Some surprisingly large donations came from these thankful patients. When one includes bequests from wills and gifts from the popular memorial gifts program at the Joslin Diabetes Foundation Inc., as it became known shortly after EPJ's death, the endowment expanded well out of proportion to the size of the organization.

In 1976, when Congress enacted a bill entitled "The Diabetes Research and Training Act," one of the technical research designers of the legislation, in attempting to "translate" progress in the laboratory to improved treatment at the bedside, claimed that he had Dr. Joslin's Clinic and laboratory model in mind.

Dr. Joslin could in truth say that his favorite quotation, which was stenciled on the main stairwell of his new diabetes center, was becoming a universal motto for ever more patients. However, this maxim seems best applied to him: "Learn as if you are to live forever. Live as if you are to die tomorrow." (Archbishop of Seville, circa 570-636.)



Fig. 17 EPJ (circa 92 years of age) in his office with sample of framed photographs behind him.

How can we measure the success or failure of a diabetic career? Any standard has its deficiencies, but if a diabetic with his disease can live longer than his neighbor of the same age without it, I consider that he has attained a distinction, and should be recognized as outstanding.

Elliott P. Joslin — 1930

Epilogue: The Last Portrait

*"The greatest insurance for happiness at any age lies in work."
(Piersol, page 125, 8th Manual).*

In 1962, in the last week before he died, apart from seeing about 15 patients and dictating 20 letters a day, Dr. Joslin was busy taking part in a medical film entitled "Diabetes in Youth." His task was to introduce many of the speakers in the film, the majority of whom were his long-term associates. A photograph taken that year shows Dr. Joslin in his office, heavy with age, sitting in his signature Brooks Brothers tweed suit with a vest (See Figure 17).

Dr. Joslin always wore a watchcase and chain. If the picture shown were full length, it would reveal his high button shoes which required special laces. He remained comfortable until the end, with the manners and dress of a 1912 "Boston Brahmin." Admittedly, he had markedly declined in appearance since his return from his last European trip to attend the International Diabetes Federation in Geneva six months previously. What strikes the viewer, though, is his facial expression, accentuated by deep furrows in his face. His whole appearance spelled colossal "determination."

Elliott Joslin never gave up. He seemed to be forever pursuing his mission. In his last textbook he had said:

With a missionary zeal, one must convert not only the patient's mind and soul, but also his doctor to the realization that it is worth the effort to control the disease as shown by the sugar-free urine, normal blood sugar and cholesterol.

A framed picture belonging to Dr. Joslin was discovered several years ago stored in the hall closet of his son's (Allen) home. It was a large portrait of the 17th century English preacher, John Wesley. Their similarities are many.

Wesley and Joslin were both missionaries. By train, ship and later by plane, Joslin and his disciples traveled with a set of "scriptures" – Joslin's revised *Manual* and textbooks. They preached Dr Joslin's gospel: "Right living with attention to daily detail of exercise and a sparse diet control the threat of many diabetic complications." Or, as he would also say: "control of diabetes pays."

Ironically, it was exactly one century later (1993) from the time that Dr. Joslin presented his first paper on diabetes as a medical student, that the bitter controversy over controlling type 1 diabetes was settled. That year, the Diabetes Control and Complications Trial (DCCT) was published. It proved beyond a doubt that intensive diabetic treatment blocked or delayed complications, depending at what stage the disease was studied.

Perhaps the next century will have as effective an educator as Dr. Joslin – one who "rides" the Internet or travels as incessantly for that common purpose, as EPJ stated it: "To study diabetes and care for persons with the condition." And perhaps that person will expand Dr. Joslin's dream, and find a cure.

The words of Wesley state correctly the essential ingredients of EPJ's long career:

*Do all the good you can,
By all the means you can,
In all the ways you can,
In all the places you can,
At all the times you can,
To all the people you can,
As long as ever you can.*

...John Wesley's Rule



Key to Figures:

1. Buffalo Hill.
2. a. EPJ with House Officers (House Pupils) – 1897-98.
b. First Survey on Diabetes written that year.
3. 81 Bay State Road – exterior view – circa 1912.
4. EPJ, wife and daughter, Mary 1905.
5. Interior Scenes – Bay State Road home/office of Joslin Clinic circa 1955.
 - a. EPJ at corridor station.
 - b. Nurse instructing patient in EPJ's dining room.
 - c. Laboratory technicians in converted 4th floor bedroom.
6. EPJ's Diabetes Ledger – page 1.
7. EPJ (center) and HMS students with faculty advisors – 1915 [Boylston Honor Society].
8. Table of Contents – one page – with section headings for patient syllabus – forerunner of the first *Diabetes Manual* (1918) – from EPJ's *The Treatment of Diabetes Mellitus, First Edition* (1916).
9. EPJ – circa 1930 – age 61 – Centenary Photograph.
10. Title Page – Joslin Textbook, *The Treatment of Diabetes Mellitus, Fifth Edition*, with co-authors.
11. The First Joslin Achievement Medal – Expectation of Life Award – 1931.
12. Letter to EPJ from 15 year old shoe-shine boy with diabetes – 1931.
13. 25th Anniversary of Insulin Celebration – Toronto, Canada – 1946 – Honored Guests. EPJ first on the left next to Charles Best, co-discoverer of insulin. H.C. Hagedorn of Denmark, the discoverer of protamine insulin, and B.A. Houssay of Buenos Aires, discoverer of the pituitary – pancreatic axis, are fifth and sixth from the left.
14. The second Joslin Medal – The Victory Medal – 1948, and the Diabetes Foundation Inc. Seal – 1953.
15. EPJ, age 81, at the 1950 dedication of the new Central Building of the New England Deaconess Hospital.
16. Front door of Joslin Clinic – Joslin Road (Place) – 1957.
17. EPJ (circa 92 years of age) in his office with sample of framed photographs behind him.
18. Man on horseback.

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