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Egas Moniz (1874–1955) and the “invention” of modern psychosurgery: a historical and ethical reanalysis under special consideration of Portuguese original sources

DOMINIK GROSS, PH.D., M.D., D.D.S., AND GEREON SCHÄFER, PH.D.

Institute for History, Theory and Ethics of Medicine, RWTH Aachen University, Aachen, Germany

The Portuguese neurologist Egas Moniz (1874–1955) is often regarded as the founder of psychosurgery. He performed the first prefrontal leukotomy in 1935—about 75 years ago—with the help of neurosurgeon Almeida Lima (1903–1985). In contrast to the psychosurgical interventions performed by the Swiss psychiatrist Gottlieb Burckhardt (1836–1907), Moniz’s interventions on the white brain substance caught great attention worldwide. As a matter of fact, it was this repercussion that led to the award of the Nobel Prize for Medicine in 1949, an award that is still highly controversial today.

The goal of the present article is to reconstruct the historical background of the first leukotomies, the tangible expert debate since 1935 on the indication and legitimacy of these interventions, and their contemporary and recent (ethical) evaluation. Special focus will be set on the original Portuguese literature, which has been given too little attention thus far in the English-language literature. (DOI: 10.3171/2010.10.FOCUS10214)

KEY WORDS • Moniz • Burckhardt • psychosurgery • leukotomy • Portuguese literature • ethical discourse

THE term “psychosurgery” describes interventions on the morphologically unobtrusive brain with the goal to exert influence on the psychological experience and behavior. The beginnings of the surgeries, which are regarded as highly controversial today, date back to the second half of the 19th century. It was the Swiss psychiatrist Gottlieb Burckhardt who performed the first psychosurgical interventions at Neuchâtel in 1888.^{24,35,37} In the English-language literature, these interventions were hardly taken notice of, but in the German-speaking area, this unequalled advance was often consciously received with disregard.^{8,38,51} This was possibly why Burckhardt discontinued the intended surgeries,¹² and it explains why the Portuguese neurologist Egas Moniz is often regarded as the actual founder of psychosurgery.³⁵ He performed the first prefrontal leukotomy with the help of neurosurgeon Almeida Lima (1903–1985) in 1935. Moniz’s interventions met with great response worldwide and led to the award of the Nobel Prize for Medicine in 1949, an award that met strong criticism early on.

Egas Moniz and the Historical Background of Leukotomy

António Caetano de Abreu Freire Egas Moniz (Fig. 1) was born in Avanca, a small village in northern Portugal, in 1874.^{16,17,35,40} After attending school, he enrolled at the University of Coimbra in 1891, where he graduated

with honors in medicine in 1899, following a 3-year preparatory course.¹⁰ In 1902, Moniz started his university career as lecturer in Coimbra.⁹ For the time being, his career reached its peak in 1911 with a call to a newly established chair for neurology in Lisbon.⁹ After shortly entering politics (Moniz, among other posts, was Portuguese minister of foreign affairs from 1918 through 1919⁵⁰), he dedicated his time to a series of experiments in the early 1920s, which led to the first performance of cerebral angiography in a patient.⁴²

He presented his experiments only a few days after the first successful recording in Paris to an enthusiastic audience. The works concerned led to the first nomination for the Nobel Prize for Medicine in 1928.⁷

Early Experiments

The leukotomy Moniz developed and dedicated his time to in the 1930s, however, caused a much greater stir than the angiography.⁴⁵ While outlining preliminary reflections, he attached special importance to Ramón y Cajal (1852–1934), who had discovered the contact connections between nerve cells in a histological specimen in 1888.³¹ Moniz⁴⁵ assumed that mental disorders originated from synaptic disorders. He described a “fixation of synapses,”⁷⁴⁷ which were expressed as “predominant, obsessive ideas” in mentally ill persons, which in turn “absorbed” other mental activities. Similar tendency supposedly existed in healthy persons, for example, when learning an activity that at first



Fig. 1. Photograph of Egas Moniz, date unknown. Source: <http://Nobelprize.org>.

caused difficulties but could be performed automatically at a later time.⁴⁵ In this case, the nerve excitation could be changeable as proven by the experiments of the Russian physiologist Iwan Petrowitsch Pavlov (1849–1936).⁴⁵ Pavlov's experiments in dogs and the resulting theory on the "conditional reflexes"^{27,34} (classic conditioning) were received worldwide.

Moniz⁴⁵ also described the experiments conducted on chimpanzees by Fulton and Jacobson as "extremely valuable." In 1935, the 2 British physiologists had presented the results of their research in London; they had explored the importance of the frontal brain in relation to the ability to solve problems and learning processes.

After a double-sided extraction of parts of the frontal brain, the monkeys were not able to perform certain tasks or to relearn them. As an additional finding, 1 female chimpanzee displayed changes in character. Whereas she had to be forced to enter the experiment cage prior to the operation, she now entered it voluntarily and with interest after the operation on the frontal brain.^{28–30,65}

Moniz⁴⁶ also recorded experiences with patients who had been wounded during war and had suffered lesions of the frontal brain and who featured, among others, "changes in character and personality." Here, he especially referred to the work of Karl Kleist (1879–1960)⁴⁷ and Richard Brickner (1896–1959).^{41,43,45–47,49}

The Decision

Based on the reading of specialist literature and on his own experience, Moniz is said to have come to the conclusion that it was necessary to "change the synaptic facilities and also the path which is chosen by the stimuli in their continuous process, in order to change the corresponding thoughts and to force them into other channels. For this reason,... I decided to cut the connecting fibers of the neurons concerned."⁴³

Moniz also expressed his thoughts and plans to Barahona Fernandes,⁹ who later reported how long Moniz had thought that one could attain an improvement of the illness if the nerve fibers in the depth of the white mass of the frontal lobe were separated surgically.

It is striking how much Moniz retrospectively stressed that he had prepared his decision for a long time to counteract the accusation of an imprudent, hasty, and precipitated action. It is more probable that a speech of the American John Fulton (1899–1960) at a neurology convention in 1935 gave the first and decisive impetus to Moniz's work in this area.²² Moniz soon instructed his long-time staff member Almeida Lima (1903–1985) to test the procedure on a heterogeneous group of 20 psychiatric patients; they mostly featured clinical pictures such as schizophrenia, cyclothymia, and anxiety neurosis. Moniz would not have been able to perform the surgeries himself as his hands were deformed by gout.¹⁸ Even so, Lima saw himself only as an "instrument handled by the Master."^{7,15} Sobral Cid, director of the psychiatric clinic Bombarda in Lisbon, provided Moniz with patients from his clinic for the first surgical trials.⁷ Barahona Fernandes⁹ was ordered by his "old teacher," as he would call Moniz, to perform a psychiatric evaluation on the first 20 patients who had undergone leukotomy.

The Era of Modern Psychosurgery Through the Conferral of the Nobel Prize (1935–1949)

The surgeries took place under general anesthesia. Ten of the first 20 surgeries were conducted by Lima, who was instructed by Moniz, through injection of alcohol. Later, Moniz and Lima developed an alternative procedure with the leukotome, which consisted of an 11-cm-long cannula with an outer diameter of 2 mm. Five millimeters before the closed, rounded end of the cannula, there was a retractable wire loop. By rotating the wire loop, one could separate part of the white brain substance.⁴⁸

First, the leukotome was inserted 4 cm into the white substance, the wire loop was retracted, and by rotating the instrument against a "résistance typique,"⁴⁸ the nerve fiber tissue was cut. When closed, the leukotome was retracted about 1 or 1.5 cm, and the procedure was repeated. This way, lesions were set on both sides in both directions—a total of 8 during the entire surgery.⁴⁸

Moniz's inaccurate description of the technical parameters, lacking angle values and variable depths of insertion, gives us an idea of how different the morphological results of the brain must have been. He presented his results on March 3, 1936 (less than 4 weeks after starting operations), in Paris to an expert audience; a few weeks later, the results were published in the *Bulletin de*

l'Académie de Médecine.⁴⁴ In addition, Moniz wrote the monograph *Tentativas operatórias dans le traitement de certaines psychoses*, in which he not only explained the operation method and summarized the results but also documented case descriptions.⁴⁸

If we believe in the summary published by Moniz⁴⁸ of the first 20 operations, the results look promising: “35% (seven cases) healed, 35% (seven cases) improved, 30% (six cases) unchanged, no worsening, no cases of death.” Categorized according to diagnoses, of the group of 5 cases of “Mélancolie anxieuse,” 4 cases resolved and 1 improved. However, of the 7 cases of schizophrenia, only 2 improved and 5 were unchanged. Although undesirable effects arose in almost every intervention, they were only described as temporary. These were, in particular, increased temperature, vomiting, bladder and bowel incontinence, diarrhea, and ocular affections such as ptosis and nystagmus, as well as psychological effects such as apathy, akinesia, lethargy, timing and local disorientation, kleptomania, and abnormal sensations of hunger.⁴⁸ Moniz did not admit to having detected a decrease in intelligence and memory performance, whereby it is unclear how he could have come to this conclusion.⁴⁸

Development of Leukotomy

In 1936 and 1937, Moniz published 12 articles on leukotomy in international academic journals. In 1936, he published his monograph and 5 articles in French and Portuguese, in 1937, he published 3 articles in French and 1 each in English, Italian, and German. In addition, an editorial in the *New England Journal of Medicine* referred to Moniz's surgeries in 1936.⁵ The number of interventions under the leadership of Egas Moniz amounted to about 100.¹⁸

Undoubtedly, Moniz's leukotomy belongs to the most respected medical innovations of the first half of the 20th century. Among former advocates of Moniz's method, one person is especially striking: Walter Freeman (1895–1972). Freeman made a substantial contribution to the popularization of Moniz's procedure within the expert community and also conducted several psychosurgical interventions himself. As early as 1937, Freeman and Watts^{19,20} reported on 6 patients whom they had surgically treated according to the Moniz method. Walter Freeman and James Watts later modified the method, which was then known by lobotomy and used in many regions of the world until 1955, in particular in the Anglo-American area.²¹ Freeman not only increased his own popularity with his works but also the level of awareness of Egas Moniz, whom Freeman referred to as the pioneer of psychosurgery, in a book by Freeman et al.²¹ that was published in 1942 and appreciated by Moniz as “magnífico volume” (magnificent work).⁴¹

In 1948, at the First International Conference on Psychosurgery in Lisbon, the Brazilian delegation was also pleased with the “good results” of Moniz's leukotomy.⁶⁸ The delegation reported on more than 200 leukotomies performed in Brazil between 1936 and 1945: 21 of 143 schizophrenic patients had reached “complete or social recovery” after operative treatment according to the Moniz method, whereas only 3 of 46 patients treated with

the Freeman parietal lobotomy displayed similar results. The Brazilian Yahn⁶⁹ reported further on his leukotomy experiments on a total of 9 children, 2 of whom died of hemorrhages. One is described as “bastante influenciado” (very influenced), 4 others as “parcialmente influenciado” (partially influenced), and 2 as “não influenciados” (not influenced).³⁶

The Nobel Prize

The Brazilians were also the ones who recommended Moniz for the Nobel Prize and who generated a proposal for this purpose at the psychosurgical convention. Moniz was awarded the Nobel Prize for Medicine on October 27, 1949,³ for the “discovery of the therapeutic value of prefrontal leukotomy at certain psychoses.” In his laudatory speech, Herbert Olivecrona (1891–1980), member of the professorial staff of the Karolinska Institute, described Moniz's therapeutic procedure as follows: “Many of these patients, in particular the group of schizophrenic, are very difficult patients and often constitute a danger to the persons in their surroundings. Considering that other treatment methods have failed or that after some time there had been a relapse, the immense importance of Moniz's discovery for the problematic issue of psychiatric treatment is understandable.”³

The news of the Nobel Prize award made headlines around the world. On October 28, 1949, the *New York Herald Tribune* announced, “Dr. Egas Moniz developed a surgical operation on the brain...with brilliant results against such mental illnesses as schizophrenia and paranoia.”⁷⁴ The journal *Nature* made the following statement regarding the award on December 3, 1949: “[Moniz] has demonstrated that skilful intervention may yield a degree of success even in the most serious and advanced cases of psychosis.”^{2,55}

The Portuguese neurologist had reached the peak of his career. Antunes⁷ estimated the number of interventions performed based on their psychiatric indication between 1942 and 1954 in Great Britain to be about 11,000; in the US, it was at least 18,000²³ for the same period of time as was probably closer to 50,000.^{7,60} Besides the US and Great Britain, at this time the romance-language and Eastern European countries in particular arose as advocates of psychosurgical interventions, namely Portugal, Italy, France, and Spain, as well as Russia and Hungary.⁶⁰

Leukotomy Under Fire From Critics

As early as the time of the award of the Nobel Prize to Moniz, psychosurgery was already regarded as controversial.¹¹ For example, Galeano Muñoz und Arana Iñiguez (Uruguay) criticized Moniz's interpretations in 1949: “The principles on which Egas Moniz bases his conceptions are the existence of dynamic automatism to which he assigns a determined [sic] nervous path. There is nothing to allow such a supposition. Psychological activity is global, not in the excitation processes but also in those of concomittend [sic] inhibition....”^{13,52}

The harsh ethical criticism expressed by the German psychiatrist Siegfried Haddenbrock²⁵ is paradigmatic. In

1949, he turned against the measures of the psychosurgeons by equating leukotomy with a “definitive destruction of the self-confident and free personality of the human being.”

Although the award of the Nobel Prize to psychosurgeon Moniz is surprising from today’s point of view, it must be seen in the context of its time. Following the world economical crisis and, in many respects, the traumatizing World War I, the number of psychiatric illnesses increased dramatically in many regions of the world. At the same time, there was no effective medication available worldwide, unlike today.

Only during the midcentury was chlorpromazine brought to the market as an effective psychotropic drug, and several years went by to gain sufficient experience with the application of psychotropic drugs (indication, dose, side effects, and interactions). By the time of the award to Moniz, lobotomy appeared to be the only treatment method that promised help in severe cases, although it did not prove to have a curative effect.

Increasing Criticism

The criticism against Moniz’s intervention and the decision of the Nobel Prize committee increased quickly after 1949. Despite the often-expressed fundamental reservations about psychosurgical interventions, the technical procedure—that is, that the operations were merely performed by eye—was also discredited. A new stereotactic surgery method was presented in Lisbon as early as 1948, which consisted of a target insertion of the instrument into the brain after prior stereometric determination and calculation of the target area. This procedure allowed the targeting of smaller, more determined brain areas and limiting of lesions of neurosurgical interventions.^{1,26} However, this technique underwent a longer period of improvement and propagation; thus, “free” leukotomies and lobotomies dominated until at least the mid-1950s. In the early 1960s at the latest, psychosurgery experienced a withdrawal worldwide, mostly as a result of the increasing number of effective psychotropic drugs. Nonetheless, wherever it was practiced, stereotactic interventions dominated.

In the last third of the 20th century, the fundamental criticism against psychosurgery reached its peak. One such critic was the American psychologist Elliot Valenstein, who discussed Moniz’s biography and his first leukotomy operations in his monograph of 1986: He described Moniz’s theoretical considerations as “vague and loosely reasoned argument[s],” his approach to a solution as not oriented on theory: “the logic of his arguments was typically weak if not fallacious.”⁶⁵ Valenstein⁶⁵ saw the reason why Moniz hardly faced public criticism in his high reputation as former Portuguese minister of foreign affairs and in his position as founder of cerebral angiography. He also referred to the great hastiness of Moniz in publishing his first results and attributed it to his age: “He was, after all, over sixty, and had not many years left to achieve a place in history.”⁶⁵ Another reason for Moniz’s rush, according to Valenstein, was the competition with other scientists, for example, Maurice Ducoste, who in 1932 injected blood into the frontal brain of his

patients as expansion of Jauregg’s fever therapy to treat progressive paralysis, or the Italian Ody,⁵⁴ who in 1938 was said to have performed operations upon psychiatric indication on the frontal brain months before receiving Moniz’s monograph and to have waited with his own publications.^{65,66}

The criticism expressed by the British neurologist and author Oliver Sacks is also quite drastic: “[Moniz’s] lack of rigor, his recklessness, and perhaps dishonesty were all overlooked in the flush of therapeutic enthusiasm.... Moniz was widely acclaimed as a ‘savior’ and received the Nobel Prize in 1951 [sic] – the climax...of ‘this chronicle of shame’.”⁵⁹

With reference to the continuous expert criticism against psychosurgery and its most renowned exponent Egas Moniz, an international initiative for persons affected by psychosurgical interventions and their families was started, which aims for social rehabilitation of persons affected and the disqualification of the Nobel Prize to Moniz by the Stockholm committee. However, this initiative has been mostly unsuccessful thus far.⁶²

Conclusions

In retrospect, there are convincing arguments that disavow Moniz’s interventions from a clinical and ethical view.

Efficacy and Informed Consent

One must refer to 2 aspects that were hardly considered by Moniz: the medical efficacy of the method and informed consent. It can be demonstrated without a doubt that, according to modern standards, no evidence whatsoever could be shown for the efficacy of leukotomies considering the heterogeneous composition and small number of leukotomized patients in the first operation series, the differing and variable techniques used, and the purely subjective and nonstandardized interpretation of results. In addition, the concluding examinations took place only a few days or weeks after the operation. Midterm or long-term observations over months or years did not occur. Moniz could not or would not report on social or familial integration, the reintroduction to professional life, and a sustainable improvement or healing.

The patient’s right to self-determination was not taken into account. Departing from this principle, therapeutic intervention on mentally ill patients could only be performed with the valid consent of the patient or (when decision-making ability was missing) of a legal representative.⁵³ Nowadays, research on persons without decision-making ability—which would encompass most of Moniz’s patients—is bound to strong criteria. Against this background, it is explainable why, for example, an investigative committee of the American Congress recommended in 1974 that psychosurgical measures were not to be used on jailed inmates, on persons with forced hospitalization in psychiatric institutions, on persons with limited legal capacity, or on persons for whom the controlling committee has the impression they are not capable of well-informed consent. Said recommendation, however, allowed for the exception that a legal representative could

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consent to an operation if the patient did not deny it at the same time.^{1,61} The basis for a consent by the legal representative had to be his or her commitment to consider the interests, wishes, and life plans of the person concerned to the best of his or her knowledge and to make decisions that the patient would have made.³²

Historical Context

Concepts of health and illness and their ethical evaluation are always subject to the influences of their time and the relating spirit of the time.⁵⁷ In view of this, it is not enough to compare the leukotomy operations of the 1930s and 1940s of the 20th century with the interventions exact to the millimeter and minimal invasive possible today and to qualify them prematurely as “coarse” and immature.

It is also not possible to easily apply our modern view of proof of efficacy and informed consent to this time period. In the same way, we cannot deny Egas Moniz’s wish to contribute to the healing of chronically ill persons a priori, that is, without closer look at his picture of the patient and his procedure. His reference to the missing therapeutic possibilities of his time (he spoke of “*impotência terapeutica*”³⁹) is true. In the first half of the 20th century, there was an enormous increase in internments into psychiatric institutions; thus, a therapy that promised improvement seemed to be urgent and was therefore gratefully received.

The overcrowding of institutions and the resulting inadequate hygienic conditions quickly led to a spreading of tuberculosis and other infectious diseases. Swayze⁶³ estimated the mortality of these diseases of manic-depressive patients after a 15-year stay in an institution for the said period to be 17.7% and for patients with dementia praecox at 25%. Effective therapeutic alternatives such as the application of psychotropic drugs were not yet available at that time.⁶⁷

Position Toward the Patients

What was Egas Moniz’s perception of the physician-patient relationship? What was his position toward the patients? Moniz³⁹ wrote a monograph in 1954—a year before his death—in which he stated the different positions that were mostly taken by theologians. Moniz recurred to the opinion of a Jesuit priest named Tesson, according to which the physician had no right to intervention if the patient did not agree to it, even if the family had recommended it. However, if the patient was mentally ill and could not make a decision him- or herself—so the limitation—the family and the physician could make a decision. In this statement, it is not clear whether mentally ill persons were in principle denied the capability of consent and if the authority to decide in these cases was given to the physician or the family or both.

Latent Euphoria?

It is highly interesting to understand how not only the general basic position toward leukotomy but also of the persons responsible changed over time. After initial excitement, which led to the award of the Nobel Prize



Fig. 2. Portuguese stamp from 1974 honoring Egas Moniz.

in 1949, the public criticism against leukotomy reached a temporary peak in the late 1970s.^{6,32,33} As a consequence, the pressure to provide justification by its advocates was extremely high. In contrast to this, Moniz and his scientific work have recently been connoted in a positive way, especially in Portugal. As shown by the 50th anniversary of the award of the Nobel Prize to Moniz in 1999 and the edition of the special stamp in his honor, he is highly revered in his country (Fig. 2). At the same time, leukotomy is designated as a procedure of “apparent importance and validity” by individual authors.⁶⁴ The latent euphoria transpiring is alarming. On the one hand, the debate of the 1970s is rated as “virtual cessation of psychosurgical procedure,”⁵⁶ whereas on the other hand, psychosurgery is currently seen as “probably underutilized”⁵⁸ and the modern technique characterized as “minimally invasive and highly selective.”¹⁴

In light of this, a critical comment made by Feldman and Goodrich¹⁴ strikes a reflective chord: “...economic pressures to decrease the costs of caring for chronically ill patients, may provide an opportunity for psychosurgery to become a more attractive option for the treatment of psychiatric diseases.” If the authors are correct in their prediction, medicine and society will indeed be facing new challenges.

Disclosure

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author contributions to the study and manuscript preparation include the following. Conception and design: both authors. Acquisition of data: both authors. Analysis and interpretation of data: both authors. Drafting the article: both authors. Critically revising the article: both authors. Reviewed final version of the manuscript and approved it for submission: both authors.

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Address correspondence to: Dominik Gross, Ph.D., Institute for History, Theory and Ethics of Medicine, RWTH Aachen University, Wendlingweg 2, D-52074 Aachen, Germany. email: dgross@ukaachen.de.