“A Beautiful Mind” and Schizophrenia Treatment under the Biological Paradigm

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The film *A Beautiful Mind* (2001) illustrates the mental disorder and the history of treatment for paranoid schizophrenia through the biographical account of noted mathematician and founder of game theory, John Nash. The film depicts the early onset Nash’s mental illness in early adulthood, the customary deterioration and reduction of thinking capacity, the various treatments methods and his eventual recovery. Nash is introduced on screen as a graduate student attending Princeton University in 1947. The era of the film is a key period in the development of schizophrenia treatment. The film promptly illustrates the typical symptoms of schizophrenia, as Nash’s social awkwardness, isolation and lack of social skills are quickly apparent at the Princeton University graduate student meet and greet. Nash finds a certain safety with numbers and attempts to formulate algorithms to explain everyday occurrences. This safety contributes to his withdrawal and isolation as Nash attempts to define the seduction of a woman through algorithms. The emotionally detached, socially isolated, bizarre and inward thinking of Nash were rationalized as normal behaviour of an eccentric genius instead of early onset symptoms of a mental illness.

As his mental illness progresses, Nash becomes more guarded and nervous and Nash’s paranoid schizophrenia symptoms begin to take over his life. The Department of Defence recruited Nash during the Cold War due to his brilliance with mathematics to decode various strings of coded numbers at the Wheeler Laboratory of Defense. Nash begins to experiences
delusions of grandeur and of persecution and hallucinations as his rational thought diminishes. Nash is involuntarily put under the care of psychiatrist Dr. Rosen, who diagnoses Nash with paranoid schizophrenia. The history of treatment of schizophrenia is evidenced in the movie as Nash undergoes insulin coma therapy, electroshock therapy and with antipsychotic pharmaceutical drug therapy. The trials and tribulations associated with a diagnosis and treatment of schizophrenia are shown in Nash’s attempt to regain control of his life. Nash demonstrates the aversive side effects of antipsychotic medication, and the main issue with patients of such treatment: compliance. While the symptoms of schizophrenia that Nash experience do not disappear, he is able to consciously address them. Nash is able to regain his mind and return to his passion for mathematics and teaching at Princeton University. In 1994, Nash was awarded the Nobel Prize in economics for his game theory.

The film *A Beautiful Mind* shows the range of symptoms and complications of the mental disorder schizophrenia, but also the hope for recovery and return to society through proper treatment. The film presents the typical symptoms of schizophrenia and presents a timeline of the various treatment methods. *A Beautiful Mind* adequately depicts the struggle of doctors in their quest to find a cure or at least to find a treatment that adequately addresses the associated symptoms. While there is presently no cure for schizophrenia, there are various antipsychotic pharmaceutical drugs that address the various symptoms associated with schizophrenia. These antipsychotic drug treatments are based on the biological paradigm which claims mental disorders and its associated abnormal behaviour are derived from disturbances in the body’s biological process (Davidson, G., Blankstein, K., Flett, G. & Neale, J., 2008). While antipsychotic drug treatment allows the majority of individuals diagnosed with schizophrenia to live and function within the community, there are many aversive side effects which can make
adherence to this treatment problematic. The treatment of schizophrenia based on the biological paradigm will be analyzed with support from John Nash’s life as depicted in A Beautiful Mind.

Schizophrenia is a mental disorder that is classified under Axis I of the Diagnostic and Statistical Manual of Mental Disorders – Forth Edition (DSM-IV). Symptoms of schizophrenia emerge typically in late adolescents or early adulthood. According to the DSM-IV, a diagnosis of schizophrenia may be made if two or more of the characteristic active-phase symptoms are evident for a significant portion of time during a one-month period. These active-phase symptoms are classified as either positive in excessive behaviours (such as delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behaviour) or negative in behaviour deficits (such as avolition, alogia, anhedonia, or flat effect). The duration of the disturbances must be persistent for at least six months and must include at least one month of active-phase symptoms (DSM-IV). As well, the DSM-IV states that the individual must experience functioning below their level of achievement prior to onset in areas such as self-care, interpersonal relationships or work, for a significant portion of time after the onset of the above-mentioned symptoms.

In the film A Beautiful Mind, the symptoms of delusions and hallucinations are illustrated over a 25 year period in Nash’s life. Beginning in 1947 at age 19, Nash experienced hallucination in his visual distortions of three individuals. The delusions of persecution and grandeur plagued Nash as he firmly believed that, despite his dismissal in 1954, he still was employed by Department of Defence and he was being followed by Russian spies. Nash also experienced a reduction in his level of functioning achievement in the mathematical world and interpersonal relationships with his wife. The incidents of these active-phase symptoms lead to a diagnosis of paranoid schizophrenia in 1954, when Nash was 26 years old. The film A Beautiful
Mind accurately illustrates the early onset and duration of psychotic symptoms prior to diagnosis through two of the most common symptoms of schizophrenia.

Schizophrenia is a distressing mental illness where there is no conclusive treatment. The history of treatment is accurately illustrated in *A Beautiful Mind* and follows the somatic therapy theory where “each treatment was better than the former and less effective or more troublesome than the next” (Doroshow, 2006, p. 215). After insulin was discovered in 1920, insulin coma therapy was utilized as the main treatment for schizophrenia between 1930 and 1960 (Doroshow, 2006). This treatment was developed by Austrian physician Manfred Sackel, who believed that “if the brain was deprived of sugar, which is what keeps it going, the cells that were functioning marginally would die. It would be like radiation treatments for cancer” (Nasar, 293). In *A Beautiful Mind*, Nash is committed involuntarily to the Macarthur Psychiatric Hospital and is observed receiving insulin coma therapy treatment. In this treatment, patients are admitted to a hospital and put under the watchful care of the insulin coma therapy team. For each treatment session, patients were administered a high dose of insulin intravenously, which would remove any glucose from the bloodstream, and the patient would eventually lose consciousness in an insulin-shock coma (Doroshow, 2006, p 214). The patients would remain in a ‘death-like’ coma for a period of time ranging from a few minutes to several hours, depending on the doctor’s treatment plan. After this period, a sugar solution would be administered intravenously to bring the patient back to consciousness (Doroshow, 2006). After the insulin-induced coma, the patient’s “symptoms would temporarily vanish in what [their physicians] deemed a ‘lucid period’” (Doroshow, 2006, p. 214). The length of the lucid period would gradually increase with treatment until no symptoms were observed (Doroshow, 2006). A typical course of insulin shock treatment was five to six comas per week for a time period of several weeks to several months,
Insulin shock therapy is embedded in the biological paradigm through the hypothesis that faulty brain cells were the cause of the symptoms. Through the deprivation of glucose nutrients from the brain with massive doses of insulin, it was theorized the faulty brain cells would die and would be replaced with new healthy brain cells (Doroshow, 2006). It was theorized that as the length of lucid period increased, the faulty brain cells would be destroyed and the patient would be cured and would no longer exhibit symptoms. During its use, insulin coma therapy was believed to be an effective treatment for schizophrenia among doctors and physicians. As one doctor stated, it “was something we could do … there was a history of people who told us it was useful treatment [and] we certainly didn’t have much else to offer” (Doroshow, 2006, p 242).

Insulin coma therapy was a treatment for schizophrenia based in the malfunctioning biological processes of the mind, and was the most conclusive treatment available during its utilization.

The next advancement in schizophrenia treatment was electroshock therapy. In 1937, this biologically-driven treatment method was brought to the forefront of schizophrenia treatment by neurologist Ugo Cerletti (Sabbatini, 1998). For this treatment, the patient was also admitted to a hospital and placed under the care of a physician. The patient was given a general anesthetic and a muscle relaxant to include a sedated state. Once sedated, electrodes were placed on the patient’s scalp and an electric current was applied which caused brief seizures in the brain (Sabbatini, 1998). In A Beautiful Mind, Nash is prescribed electroshock therapy “five times per week for 10 weeks” (2001). It was believed a seizure in the brain caused by the electric current would stimulate the release of neurotransmitters, and would allow the brain to reorganize to function correctly (Tharyan, 2005). Neurotransmitters are chemical substances that transmit
signals that facilitate cell to cell communication throughout the nervous system, and play a key component in the biological paradigm for treatment of schizophrenia. At this early stage of understanding schizophrenia’s pathology, it was believed these chemicals were imbalanced and shocking the brain would force a rebalance of these vital chemicals. Once rebalanced, it was hypothesized the patient would no longer suffer from schizophrenia (Tharyan, 2005). The insight into treating neurotransmitter imbalances in patients diagnosed with schizophrenia began the treatment path to present day antipsychotic pharmaceutical drug therapy. While the actual effects of electroshock therapy on patients with schizophrenia are unclear, it is still used today to treat schizophrenic patients who are resistant to pharmaceutical drug therapy. Electroshock therapy was

The utilization of insulin coma therapy and electroshock therapy to treat schizophrenia were successful partly due to the required hospital admittance and doctor administered methodology. In both treatments the patients were required to be admitted into a hospital and were not responsible for administering the treatment themselves. While both treatment methods were viewed as inhumane and morbid, electroconvulsive therapy was the favoured treatment over insulin shock therapy. Insulin shock therapy was very unscientific and administered without full understanding of the etiology of schizophrenia (Nasar, 1998). It was more dangerous and expensive than electroconvulsive therapy, and was concluded not cost-effective based on the cost of insulin, the risk and the investment of doctors and nurses time (Nasar, 1998). By 1950, treatment of schizophrenia through insulin coma therapy was phased out due to the introduction of antipsychotic pharmaceutical treatment and inconsistent and inconclusive clinical trial results. Although insulin shock therapy treatment was not proven definitively less effective than the
pharmaceutical treatments that followed, however, the introduction of a less-evasive, less-costly, and more scientific and humane therapy directed the progression in schizophrenia treatment.

The most common treatment for schizophrenia is antipsychotic pharmaceutical drug medication. As this mental disorder is considered to be the by-product of genetically determined neurochemical imbalances, the biological paradigm is the appropriate paradigm for discussing schizophrenia treatment (Bemak & Epp, 2002). Despite the advancement in pharmaceutical treatment to address the symptoms of schizophrenia, the molecular physiology of schizophrenia is still not entirely understood. While cautious of over-simplifying schizophrenia to complications in one neurotransmitter amongst a complex phenomenon of hundreds of possible neurotransmitters, the current theory of schizophrenia revolves around the neurotransmitter dopamine (Bemak & Epp, 2002). Brain and PET scan results revel people with schizophrenia have more dopamine receptors, which signify a greater opportunity for dopamine to be released, and thus cause an excess of dopamine in the body (Davidson, G., et al, 2008). Also, studies have shown that an increase in dopamine generally exacerbate schizophrenic symptoms (Davis, K., Kahn, R., Ko, G & Davidson, M., 1991). Studies have shown that antipsychotic medications which suppress dopamine activity have been found effective in reducing or eliminating symptoms in many cases of schizophrenia (Bemak & Epp, 2002). Through reducing dopamine levels through antipsychotic drug treatment, the symptoms of schizophrenia can be reduced, and many patients are able to return to a somewhat normal life.

While antipsychotics have been shown to improve the symptoms of schizophrenia, they are not a cure for this mental disorder. It is argued that reducing dopamine levels constitutes a “chemical lobotomy”, where the patient looses “spontaneity, interest in the environment and passion” (Bemak & Epp, 2002, p. 17). This ‘chemical lobotomy’ and other adverse side effects
often lead to patient’s discontinuance of medication. The aversive side effects of antipsychotic medication include an exacerbation of symptoms, mental fog, weight gain, metabolic effects, sedation, movement disorders, heart problems and sexual dysfunction. In *A Beautiful Mind*, Nash suffered the side effects of drooling and sexual dysfunctions while under antipsychotic drug treatment. Nash also suffered from the emotional flatness produced by antipsychotic medication and left him unable to emotionally connect with his infant son. Due to these side effects and the mental fogginess Nash experienced, he discontinued his medication and succumbed to the symptoms once again. In a study conducted in the United States on 1493 patients diagnosed with schizophrenia, 74% of patients discontinued antipsychotic treatment with 18 months of the study’s commencement (Lieberman, J., Stroup, T., McEvoy, J., Swartz, M., et al., 2005). Although the primary purpose of the study was to differentiate in the overall effectiveness of five antipsychotic drug treatments, the study was also conclusive in demonstrating the high termination of treatment by patients due to inefficacy and intolerable side effects (Lieberman, J., et al, 2005). Antipsychotic drug therapy does not provide a cure and complete erasure of symptoms, however, it does allow patients to reintegrate into society. Many patients may still experience delusions and hallucinations albeit to a lesser degree and severity. As illustrated in *A Beautiful Mind*, the hallucination experienced by Nash still persisted after taking antipsychotics drugs for over thirty years who chose to ignore the hallucinations (2001). One of the disadvantages of antipsychotic treatment therapy is the reliance on patient self-administration. A patient suffering from a mental illness may not understand the disease or the necessity to continue treatment, and may stop taking the medication against medical advice. Despite the intolerable side effects and discontinuance, antipsychotic drug therapy has become the cornerstone for treatment of schizophrenia.
The treatment history of schizophrenia through the biological paradigm is portrayed through *A Beautiful Mind*. The film demonstrates a typical patient with schizophrenia through the timing of Nash’s illness with early adulthood onset, the withdrawal and reduced thinking capacity, the inability to obtain relief from medication and his eventual reintegration into society. While there are many antipsychotic pharmaceutical drug treatment available that treat the symptoms of schizophrenia, a patient’s response remains highly variable and many patients are resistant to the various treatments. As stated earlier, electroshock therapy is still used in present day to treat schizophrenia in patients who are resistant to antipsychotic pharmaceutical drug therapy. A main concern with antipsychotics drug treatment is adherence and compliance, with frequent discontinuation due to the inefficacy or intolerable side effects. In *A Beautiful Mind*, Nash is able to attain the level of mental reasoning that he previously enjoyed and was able to return to his passion for mathematics, and sharing his brilliance through teaching at Princeton University. As new advancements are made in the biological base of schizophrenia and the brain’s chemistry, new and more effective antipsychotic drugs are developed.
References


