Blood, Meth, and Tears: The Super Soldiers of World War II

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Day and night, soldiers in World War II were physically and mentally strained by fatigue, long missions, and life-threatening combat operations. Consequently, many soldiers were left tired and demoralized. War efforts hinged on soldiers succeeding in missions, thus a fast-acting solution was needed. Development of the psychostimulant drugs Benzedrine and Pervitin[1] in the 1920s and 30s spurred enthusiasm among scientists, the media, the public, and various governments. Potent and powerful, these drugs exert effects that promote wakefulness, elevated mood, and improved field performance. Governments quickly began researching use of stimulants to improve their war efforts. By the early 1940s, both drugs had millions of tablets in circulation. Though controversial, both scientific and anecdotal accounts showed psychostimulants as effective combatants of fatigue, low morale, and were even proclaimed as life-saving.[2]

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[1] Benzedrine (amphetamine) was the stimulant widely used by American and British forces, while Pervitin (methamphetamine) was widely used among Nazi troops.

[2] For a historical and political review of military stimulant use, see Nicolas Rasmussen, "Medical Science and the Military: The Allies' Use of Amphetamine During World War II", *Journal of Interdisciplinary History* 17, no. 2 (Autumn 2011): 205-233. Retrieved from PUBMED May 2nd, 2018; Nicolas Rasmussen, "American's First Amphetamine Epidemic 1929-1971", *American Journal of Public Health* 98, no. 6 (June 2008): 974-985.; James Pugh, "The Royal Air Force, Bomber Command and the Use of Benzedrine Sulphate: An Examination of Policy and Practice During the Second World War", *Journal of Contemporary History* 0, no. 0 (2016): 1-22. Accessed on EBSCO June 17th, 2018; James Pugh, "'Not … Like a Rum-Ration': Amphetamine Sulphate, the Royal Navy, and the Evolution of Policy and Medical Research during the Second World War", *War in History* 24, no. 4 (2017): 498-519; Ray J. Defalque and Amos. J. Wright, "Methamphetamine for Hitler's Germany: 1937-1945", *Bulletin of Anesthesia History* 29, no. 2 (April 2011): 21-24, 32. Retrieved from PUBMED April 28th, 2018; Stephen Snelders and Toine Pieters, "Speed in the Third Reich: Metamphetamine (Pervitin) Use and a Drug History From Below", *Social History of Medicine* 24, no. 3 (2011): 686-699. Accessed electronically August 31st, 2018; Jonathan Lewy, "The Drug Policy of the Third Reich", *Journal of Social History of Medicine* 22, no. 2 (Spring 2008): 144-167. Accessed electronically September 22nd, 2018; Nicolas Rasmussen, "Making the First Anti-Depressant: Amphetamine in American Medicine 1929-1950", *Journal of the History of Medicine and Allied Sciences* 61, no. 3 (July 2006): 288-323. Accessed electronically October 1st, 2018; Wolf R. Kemper, "Pervitin - Die Endseig-Oroge? Wach uno Leistungsstark Durch Methamphetamin". In *Nazis on Speed: Drogen im 3. Reich*, 122-133. Pieper Werner Medienexp (2002). Accessed online September 15th, 2018; Nicolas Rasmussen, "Controlling "America's Opium": Barbiturate Abuse, Pharmaceutical Regulation, and the Politics of Public Health in the Early Postwar United States", *Journal of Policy History* 29, no. 4 (2017): 543-568. Accessed on Project Muse October 5th, 2018; Peter Steinkamp, "Pervitin (Methamphetamine) Tests, Use, and Misuse in the German Wehrmacht" in *Man, Medicine, and the State: The Human Body as an Object of Government Sponsored Medical Research in the 20th Century by Wolfgang U. Eckart*, 61-71. Printed in Germany, 2006. Accessed electronically September 24th, 2018**;** Karl-Heinz Roth,

This essay will examine historical and scientific evidence to show how amphetamines served as soldier enhancement drugs in World War II. Two areas, fatigue and morale, will be discussed. Previous scholars have debated the reasons governments sanctioned amphetamines. Nicolas Rasmussen argued that research did not support amphetamines for military use. Rather, it was amphetamine's mood enhancement that was favored by soldiers and military officials. James Pugh, in researching Benzedrine use in the British Royal Air Force (RAF) and Royal Navy (RN), provides evidence in disagreement. While the British noted Benzedrine's morale enhancement, Pugh argues emphasis was placed on fatigue and not mood. Another issues this essay will discuss is the "super soldier myth". This myth holds that amphetamines were not

"Leistungsmedizin: Das Beispiel Pervitin". In *Ärzte im Nationalsozialismus by Fridolf Kudlien*, 167-174. Accessed electronically September 30th, 2018; Alan Derickson, "'No Such Thing as a Night's Sleep': The Embattled Sleep of American Fighting Men From World War II to the Present", *Journal of Social History* 47, no. 1 (Fall 2013): 1-26. doi:10.1093/jsh/sht049. Accessed from Project Muse September 16th, 2018; John P. Swann, "Drug Abuse Control under FDA, 1938-1968", *Public Health Reports (1974-)* 112, no. 1 (Jan-Mar 1997): 83-86. Accessed on JSTOR October 6th, 2018; Glenn E. Ullyot, Barbara H. Ullyot, and Leo B. Slater, "The Metamorphosis Of Smith-Kline & French Laboratories to Smith Kline Beecham: 1925-1998", *Bulletin for the History of Chemistry* 25, no. 1 (2000): 16-21. Accessed electronically September 15th, 2018; For a review of wartime scientific literature on stimulant use, see W. R. Bett, "Benzedrine Sulphate in Clinical Medicine: A Survey of the Literature", *Post Graduate Medical Journal* 22, no. 250 (August 1946): 205-218. Retrieved from PUBMED August 26th, 2018; Andrew C. Ivy and L. R. Krasno, "Amphetamine (Benzedrine) Sulphate: A Review of its Pharmacology", *War Medicine* 1 (1941): 15-42. Retrieved electronically September 22nd, 2018; Erich Guttman and William Sargant, "Observations of Benzedrine", *British Medical Journal* 1, no. 3984 (May 1937): 1013-1015. Retrieved from PUBMED June 17th, 2018; H. L. Tidy, "Discussion on Benzedrine, Uses and Abuses", *Proceedings of the Royal Society of Medicine* 32 (1939): 385-398. Retrieved electronically September 25th, 2018.; British Medical Journal, "A Stirrup Cup for the Panzers", *British Medical Journal* 2, no. 4316 (September 1943): 396-397. Retrieved from PUBMED June 17th, 2018.; British Medical Journal, "Benzedrine", *British Medical Journal* 2, no. 4095 (July 1939): 25. Accessed on JSTOR October 6th, 2018; Edward C. Reifenstein and Eugene Davidoff, "The Psychological Effects of Benzedrine Sulphate", *The American Journal of Psychology* 52, no. 1 (January 1939): 56-64. Retrieved from JSTOR October 6th, 2018; John Hill, "Benzedrine in Sea Sickness", *British Medical Journal* 2, no. 4013 (December 1937): 1109-1112. Retrieved from PUBMED June 17th, 2018.; John Boyd, "Benzedrine Sulphate: Its use to Interrupt Avertin Anesthesia", *British Medical Journal* 1, no. 4139 (May 1940): 729-730. Retrieved from PUBMED August 10th, 2018; G. Lehmann, H. Straub, and A. Szakall, "Pervitin als leistungssteigerndes Mittel", *Arbeitsphysiologie* 10, no. 6 (August 1939), 680-691. Retrieved electronically September 17th, 2018.; Fritz Hauschild, "Tierexperimentelles uber eine Peroral Wirksame Zentralanaleptische Substanz mit Peripherer KrelSlaufwirkung", *Klinische Wochenschrift* 17, no. 36 (1938): 1257-1258. Retrieved electronically September 6th, 2018.; Fritz Hauschild, "Zur Pharmakologie des 1-Phenyl-2-methylaminopropans (Pervitin)" *Naunyn-Schmiedebergs Archiv fur experimentelle Pathologie und Pharmakologie* 191, no. 2-4 (1938): 465-481. Retrieved electronically September 6th, 2018; See George Barger and Henry H. Dale, "Chemical Structure and Sympathomimetic Action of Amines", The Journal of Physiology (October 1910): 2-59. Accessed electronically September 17th, 2018; All German sources were translated to English using Google Translate.

dispensed by war leaders to create “super soldiers”. Rather, they were willingly taken against military sanctions by individual soldiers. All known scholars have argued against the notion that amphetamines were used to create “super soldiers”. Stephen Snelders and Toine Pieters argue that German soldiers chose to take and misuse Pervitin rather than being ordered to. Treading middle ground is Peter Steinkamp, who provides evidence that liberal drug use violated German regulations. However, Steinkamp concludes his essay by stating the “greed” of pharmaceutical companies created German Pervitin addiction. Evidence does support the notion that soldiers were not coerced to take drugs. However, evidence also indicates that many soldiers benefitted from using amphetamines. The idea of “super soldiers” might conjure mental images of stormtroopers from a dystopic science fiction world. This essay will offer an alternative narrative to what makes a “super soldier”. Scientific evidence indicates that amphetamines enhance biological functioning beyond normal limits. That is, amphetamines did allow many soldiers to stay awake, alert, and energized longer than otherwise possible. In addressing this “myth”, I will argue that the introduction of amphetamines created “super soldiers” with enhanced mental and physical functioning.

World War II was a milestone that marked the beginning of war as a non-stop phenomenon. Alan Derickson notes that, before World War I, wars typically took place during daylight hours of warm-weathered, grazing seasons. Innovations in military technology created faster aircrafts, submarines, and tanks that required long, careful, and precise operation. For example, the German Navy’s (Kriegsmarine) so-called “Schnell Boote” were small torpedo boats that had operation duties lasting up to 12 hours. Advances in communication technology also changed aircraft and ship operations. Faster communications could keep ship commanders awake at all hours of the day. Introduction of the radar allowed militaries to track enemy movements in

real time. The Japanese bombing of Pearl Harbor demonstrated the devastation of a surprise enemy attack. Long missions, watch duties, tactical nighttime operations took their toll on soldiers. Robert Franklin, an American soldier who served in Germany and Italy said, "we slept when we got the chance, but chances rarely lasted more than three or four hours". Colonel James Fry viewed his nighttime battles as "a heavy drain on the physical and mental stamina of every participant."[3] Air supply crews in Burma slept in uncomfortable humid conditions. GIs and air troops in Belgium were stuck sleeping in freezing conditions. Cramped tropical battlefields and the crackling of loud gunfire rendered sleep near impossible to soldiers.[4]

Sleep deprivation can have profoundly negative impacts on global functioning. The average adult human requires roughly eight hours of sleep to maintain proper physical and mental health. According to Derickson, 85% of American soldiers in the Italian campaign slept fewer than 6 hours, while 31% slept fewer than 3 hours per night. Sleep deprived individuals are more prone to task errors, experience higher levels of psychological stress, are less likely to properly follow orders, are more likely to take shortcuts in decision making, and suffer from potential muscle atrophy. The need to overcome fatigue was a challenge, one that needed a fast-acting solution. For many governments, psychostimulant drugs would answer the call.[5]

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[3] Quoted from Derickson, p. 4, 5.

[4] Derickson, p. 2; 4; Defalque and Wright, p. 23; Pugh, p. 510.

[5] Derickson, p. 2, 6, 7.; For information on the biological and psychological effects of sleep deprivation, see Michele E. Stepan, Kimberly M. Fenn, and Erik M. Altmann, "Effects of Sleep Deprivation on Procedural Errors", *Journal of Experimental Psychology: General* (2018): p. 4-5. Accessed online from PUBMED October 19th, 2018; Johanna Schwarz et al., "Does sleep deprivation increase the vulnerability to acute psychosocial stress in young and older adults?", *Psychoneuroendocrinology* 96 (October 2018): p. 163. Accessed online from Science Direct October 20th, 2018; Ewa Jówko, Paweł Rózanski, and Andrzej Tomczak, "Effects of a 36-h Survival Training with Sleep Deprivation on Oxidative Stress and Muscle Damage Biomarkers in Young Healthy Men", *International Journal of Environmental Research and Public Health* 15, no. 10 (September 2018): p. 10. Accessed online from PUBMED October 20th, 2018.; Mindy Engle-Friedman et al., "The role of sleep deprivation and fatigue in the

Psychostimulants are a class of psychoactive drugs that exert energizing effects, enhance cognition, raise mood, and reduce fatigue in their user.[6] Ephedrine, a naturally occurring psychostimulant, has been used in human medicine for several millennia. In 1887, Romanian chemist Lazar Edeleanu created amphetamine, a synthetic stimulant derived from ephedrine. In 1927, American chemist Gordan Alles perfected the sulphate (salt) form of amphetamine. In 1933, American pharmaceutical firm Smith, Kline, and French (SKF) sold a gaseous form of amphetamine as a decongestant inhaler under trade name "Benzedrine". Alles sold his patent of amphetamine sulphate to SKF in 1934, after which Benzedrine Sulphate was quickly pushed to market. Methamphetamine was first synthesized by Japanese chemist Nagayoshi Nagai in 1893. Chemist Akira Ogata later perfected the hydrochloric salt form of methamphetamine in 1919. Methamphetamine found its way to Nazi Germany when Fritz Hauschild synthesized it in 1937.

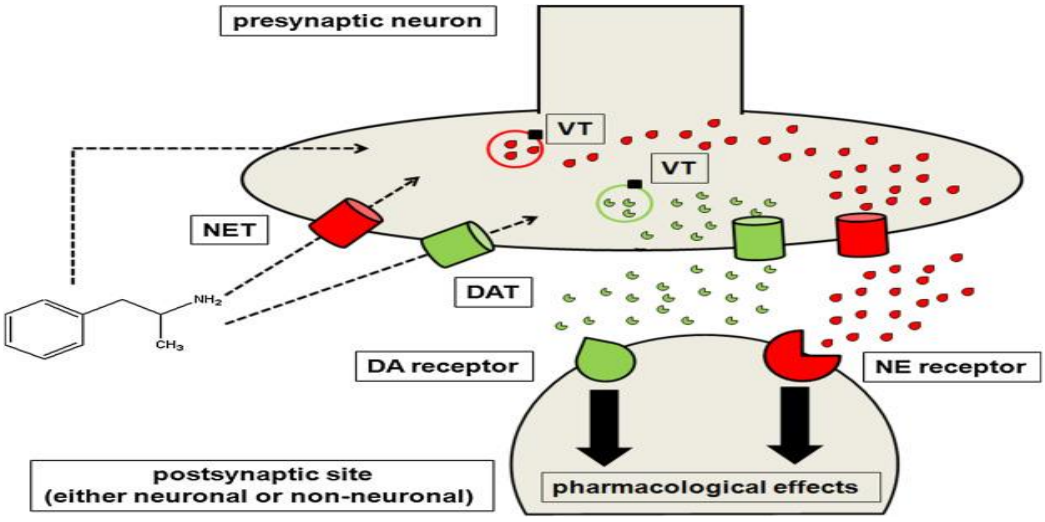
perception of task difficulty and use of heuristics", *Sleep Science* 11, no. 2 (Spring, 2018): p. 81. Accessed online from PUBMED October 20th, 2018.; Pugh, p. 7, 15.; Rasmussen, p. 217.

[6] For a review of the pharmacology, chemistry, and uses of amphetamines, see: Steven M. Berman, Ronald Kuczenski, James T. McCracken, and Edythe D. London, "Potential Adverse Effects of Amphetamine Treatment on Brain and Behavior: A Review", *Journal of Molecular Psychiatry* 14, no. 2 (February 2009): 123-142. Accessed online from PUBMED May 10th, 2018; Craig W. Berridge, John O. Neil, and Kelly Wilfer, "Amphetamine Acts Within the Medial Basal Forebrain to Initiate and Maintain Alert Waking" *Neuroscience* 93, no. 3 (1999): 885-896. Accessed electronically September 30th, 2018; David J. Heal, Sharon L. Smith, Jane Gosden, and David J. Nutt, "Amphetamine, past and present – a pharmacological and clinical perspective", *Journal of Psychopharmacology* 27, no. 6 (2013): 479-496. Accessed online June 17th, 2018; Robert C. Spencer, David M. Devilbiss, and Craig W. Berridge, "The Cognition-Enhancing Effects of Psychostimulants Involve Direct Action in the Prefrontal Cortex", *Journal of Biological Psychiatry* 77, no. 11 (June 2015): 940-950. Accessed online from PUBMED April 26th, 2018; Kelly E. Courtney and Lara A. Ray, "Methamphetamine: An Update on Epidemiology, Pharmacology, Clinical Phenomenology, and Treatment Literature", *Drug and Alcohol Dependence* 1, no. 0 (October 2014): 11-21. Accessed on Science Direct June 17th, 2018; John F. Marshall and Steven J. O'Dell, "Methamphetamine influences on brain and behavior: unsafe at any speed?", *Trends in Neuroscience* 35, no. 9 (September 2012): 536-545. Accessed online from Science Direct October 24th, 2018.

Hauschild's employer, German pharmaceutical firm Temmler, patented and pushed methamphetamine to market under the trade name "Pervitin" in 1938.[7]

How Amphetamines Affect the Brain:

Amphetamine and methamphetamine are drugs of the phenylethylamine class. Both drugs can be snorted, injected, smoked, or taken orally. In the brain, amphetamines bind with high affinity to dopamine and norepinephrine neurons. Here, they inhibit post-synaptic reuptake of dopamine and norepinephrine, increasing their availability in the brain. Amphetamines also interfere with the dopamine transporter (DAT), norepinephrine transporter (NET), and vesicle monoamine transporter (VT) proteins. This allows more dopamine and norepinephrine to be carried from cell body to synapse. This influx of dopamine and norepinephrine causes increased energy, attention, alertness, and mood. Below is an illustration of amphetamine acting on a neuron's synapse.



[7] Kemper, p. 123; Rasmussen, p. 974; Rasmussen, p. 300; Lewy, p. 148; Steinkamp, p. 61; Hauschild, p. 1257; Defalque and Wright, p. 21; **From box**: Dopamine and norepinephrine are brain neurotransmitters that play roles in locomotion, attention, alertness, arousal, wakefulness, learning, memory, reward, and addiction; The synapse is a physical space between neurons where neurotransmitters are released in the brain; Courtney and Ray, p. 15, 17; Heal, Smith, Gosden, and Nutt, p. 482; Berman, Kuczenski, McCraken,

The ability of Benzedrine and Pervitin to improve energy and mood made both drugs sensational to society. During the 1930s, psychiatry had few pharmacological treatments available, relying instead on Freudian psychoanalytic methods. Newspapers and scientific articles alike praised amphetamines as "miracle pills". Amphetamines were medically used to treat symptoms of depression, narcolepsy, obesity, Parkinson's Disease, schizophrenia, sexual dysfunction, addiction, common colds, and hyperactive behavior. In Germany, Pervitin became a staple of daily life. Temmler successfully promoted Pervitin to numerous German physicians, who zealously prescribed it for numerous medical conditions. Doctors also prescribed Pervitin for productivity, being used by office workers, armament workers, and late-night workers. Young people used Pervitin recreationally for partying and enhancing sex. In the United States, Benzedrine's numerous endorsements and popularity made it SKF's most successful product. By 1941, after only seven years in public markets, SKF's sales of Benzedrine topped $500,000 and accounted for 4% of its revenue. In 1945, Americans consumed between 13 million and 55 million tablets of Benzedrine and SKF's sales topped over $2 million annually. Supplies were large enough to give every man, woman, and child 2 tablets of Benzedrine each. Both Benzedrine and Pervitin could be purchased cheaply over the counter, and consequently, many citizens became addicted. Pervitin came to German markets in 1938 and had thousands of addicts by 1939. Some users of Benzedrine cracked open their inhalers for one large dose. The British and German governments listed each drug a controlled substance to curb public abuse in 1938 (Benzedrine) and 1941 (Pervitin). Federal drug laws in the US were weak in the 30s and

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and London, p. 124, 129; Picture taken from Nicola Simola and Manola Carta, "Chapter 2 - Amphetamine Usage, Misuse, and Addiction Processes: An Overview", in *Neuropathology of Drug Addictions and Substance Misuse*, vol. 2, edited by Victor R. Preedy (N.p., Academic Press, 2016): p. 14-24. Accessed on Science Direct January 23rd, 2019 at https://www.sciencedirect.com/book/9780128002124/neuropathology-of-drug-addictions-and-substance-misuse#book-info.

largely ignored amphetamines. Though medical use decreased, by the early 40s, both SKF and Temmler began supplying their biggest, most lucrative customer possible: the military.[8]

Amphetamines first gained notoriety through scientific studies. George Barger and Henry Dale first noted the excitatory actions of synthetic stimulants in 1910 using animal models. Studies in the 30s explored the therapeutic potential of amphetamines in humans. Benzedrine administration was noted to increase confidence, talkativeness, energy, wakefulness, alertness, attention, memory span, immune system functioning, and intelligence test scores. Pervitin was found to increase energy, alertness, work capacity, decrease fatigue, and improve mood in both animals and humans. Both drugs also induced negative subjective effects including anxiety, psychosis, hallucinations, nausea, increase blood pressure, and increase heart rate.[9]

While initial scientific research showed promise for Benzedrine and Pervitin, early military research was mixed on their utility to soldiers. Dr. Otto Ranke, a researcher at a Berlin military academy, began studying the effects of Pervitin in September 1938. Ranke concluded Pervitin was useful for wakefulness and superior to caffeine, but not a substitute for sleeping.

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[8] Roth, p. 167; Rasmussen, p. 290; Guttman and Sargant, p. 1014; Bett, p. 206-215; "Drug Held Cure for Alcoholism: Benzedrine Gives Lift like Liquor:, *New York Times* December 17th, 1938; "New Drug Found to Combat Suicide", *New York Times* September 3rd, 1936; "New Gain in Treating Colds: Adrenaline, Ephedrine, and Benzedrine now combined with Vitamin C", *New York Times* September 12th, 1939; "'Pep-Pills' Keep Takers Awake 18 hours: Drug Reputedly Used to Spur Hitler Troops", *Washington Post* December 24th, 1942.; "Think Nazis Had Drugs: Doctor says Panzer soldiers received Stimulant to Keep Going", *New York Times*, August 4th, 1940; British Medical Journal, p. 25; Defalque and Wright, p. 21-22; Snelders and Peiters, p. 690, 693-696; Ullyot, Ullyot, and Slater, p. 17; Swann, p. 83; Rasmussen, p. 545-548; "Poisons List Amendment: Home Office Notice to Traders", *The Times*, December 23rd, 1938; "Germany's Sick List Growing: Under Nourishment and Fatigue", *The Times*, January 12th, 1942.; Rasmussen, p. 974-976.

[9] Barger and Dale, p. 58-59; Guttmann and Sargant, p. 1013-1014; British Medical Journal, p. 626-627; Ivy and Krasno, p. 20, 38; Reifenstein and Davidoff, p. 57-60; British Medical Journal, p. 396; Hauschild, p. 481; Lehmann, Straub, and Szakall, p. 690; Hauschild, p. 1257-1258; Kemper, p. 125; Levine, Rinkel, and Greenblatt, p. 433.

Ranke stressed the importance of Pervitin in stimulating mentally fatigued soldiers, however, his pleas for more testing were ignored. As Germany prepared to invade Poland in 1939, Ranke was granted his wish. With the approval of Dr. Leonardo Conti[10], Ranke began testing Pervitin in the military. Ranke supplied Pervitin to medics in motorized convoys and Krad drivers. In 1940, Ranke's research helped secure Temmler's request to approve Pervitin for soldiers in the Wehrmacht. Medical officers (MOs) were authorized to dispense 5mg doses of Pervitin to soldiers strictly for life threatening fatigue.[11]

In 1940, the British discovered Pervitin on a crashed German pilot and began testing Benzedrine themselves. Dr. Roland Winfield and Dr. Frederick Bartlett tested Benzedrine on flight crews in the RAF. Winfield found Benzedrine successfully improved attention and morale, but noted some pilots were reckless and aggressive. Bartlett found Benzedrine did not improve pilot performance but prevented performance deterioration. Winfield advised pilots get two 5mg tablets for long missions and that Benzedrine be taken under medical supervision. Winfield and Bartlett together helped persuade the RAF to sanction Benzedrine in 1942. Dr. Norman Mackworth and Bartlett conducted field studies on Benzedrine for the RN. Mackworth and Bartlett both concluded Benzedrine had no effect on improving physical performance but kept sailors awake and improved morale. Bartlett advised Benzedrine be taken only once every 8-12 hours in doses not exceeding 10mg.[12]

Dr. Andrew C. Ivy conducted Benzedrine studies for the American military. Ivy's 1941 paper recommended against using Benzedrine in fatigued individuals or those operating

[10] Dr. Leonardo Conti (1900-1945) was a German physician and leader of the Reich Health Office in Nazi Germany.

[11] Defalque and Wright, p. 21-22; Snelders and Pieters, p. 691.

[12] Pugh, p. 503, 505-507, 509, 512; Pugh, p. 9-10; Rasmussen, p. 212, 214-215.

advanced equipment under anxiety. Ivy also noted Benzedrine's superiority to caffeine was not proven in some instances. However, Ivy found amphetamine did have positive utility in fatigued and depressed individuals. Other studies Ivy partook in found some positive results. Using an atmospheric pressure chamber, Ivy found amphetamine useful at high flying altitudes and helped improve visual discrimination in pilots. The US Navy found no improvements in marksmanship of marines given Benzedrine but found it heightened morale. Despite mixed results, by 1943, all armies in Europe approved amphetamines for their militaries.[13]

A large component of the "super soldier myth" is that war leaders did not order their soldiers to take amphetamines. Amphetamines were plentiful in Europe and, despite strict regulations, not all MOs or soldiers took them responsibly. In 1940, an estimated 35 million tablets of Pervitin circulated the Wehrmacht, enough to give each soldier roughly 3 tablets. When Germany invaded the Soviet Union in 1941, a force of 3 million soldiers had an estimated 29 million tablets that year. After the Poland and France campaigns, Ranke surveyed MOs and found that 70% had misused or given out Pervitin for unsanctioned reasons. In one case, a commander of the 12th tank division died of a heart attack after taking Pervitin. Despite efforts by Ranke and Conti to tighten regulations, abuse continued in the Wehrmacht.[14]

The British army supplied an estimated 72 million tablets across it's military throughout the war. In the RAF and RN, MOs were tasked with dispensing Benzedrine. However, RAF bases were often short on manpower, leaving one MO to manage up to 2000 individuals. Nicknamed "wakey wakey pills", a pilot of the no. 115-squadron recalled "there wasn't a wakey

[13] Rasmussen, p. 217-219, 226-227; Ivy and Krasno, p. 28, 41-42.

[14] Steinkamp, p. 63-66, 68; Snelders and Pieters, p. 691-692.

wakey philosophy, you just took one if you were sleepy".[15] RN regulations required an MO to be present on ships that carried Benzedrine, though this wasn't always the case. A 1943 amendment allowed small and costal ships to carry Benzedrine without an MO. Additionally, long voyages at sea motivated some sailors to take Benzedrine out of boredom.[16]

The US Army Supply began selling Benzedrine in 1943 to any soldier who wanted it. Despite its wide distribution, the US military implemented no regulations on Benzedrine's sale or use. An estimated 16 million young enlistees were exposed to Benzedrine through the war. Consequently, 15% of air force pilots admitted to misusing Benzedrine while enlisted. Evidence clearly indicates that many soldiers consumed amphetamines willingly and not coercively. This does not mean, however, that amphetamines did not create "super soldiers". The biological effects of amphetamines act independent of consumption motivation. That is, amphetamines still created "super soldiers" by permitting soldiers to function beyond normal human limits.[17]

The primary reason for providing soldiers amphetamines was preventing fatigue. Fatigue was a threat to soldier functioning and had many causes. In addition to sleep deprivation, the simple work load during day to day operations were strenuous. Infantrymen spent much time engaged in marches, during which they carried an estimated load of 77lbs (35kg). Terrains like snow, sand, and heavy brush added further strain to the load carrier. Amphetamines helped soldiers overcome their fatigue and pain from long, heavy marches. For example, one German soldier endured fatigue marching in -38 degree cold after taking Pervitin. The soldier said, "Ultimately I walked as if in trance, my wounded legs moved automatically, I didn't feel the cold

[15] Quoted from Pugh, p. 18.

[16] Bett, p. 215; Pugh, p. 17-18; Pugh, p. 506, 508, 517.

[17] Rasmussen, p. 226-228; Rasmussen, p. 975-976.

anymore, nor hunger or thirst."[18] In some cases, soldiers had to endure their load with haste. In the Soviet Union, a group of 500 German soldiers became encircled by the Red Army. When all but certain death seemed to befall them, many soldiers credited Pervitin with giving them the needed energy to escape the Soviets.[19]

Airmen also used stimulants for reducing fatigue on long flight missions. Some fatigued pilots steered their plane more erratically and endangered it to crashing. The war caused the RAF to shorten its training program, reducing in-craft bomber pilots from two to one. Benzedrine was found to reverse performance deterioration induced by fatigue and hypoxia.[20] A member of the no. 50-sqaudron stated that Benzedrine helped prevent "adrenal crash" during his long return flight. Benzedrine was also included in emergency bail out kits, enabling crashed pilots to escape capture or death. Mission failures often resulted in the loss of trained pilots and expensive aircrafts. Thus, amphetamines played an important role in reducing the cost of war. Pilots in the Luftwaffe did not use Pervitin, opting for either caffeine or cocaine-infused chocolate bars instead. However, Pervitin was included in bail out kits.[21]

Amphetamines helped reduce fatigue at sea. The RN used an estimated 28 million Benzedrine tablets during the war, most carried by large ships and vessels. The complexities of running a large war ship required synchronized efforts by a large, skilled crew. Benzedrine was

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[18] Quoted from Snelders and Pieters, p. 692.

[19] Rasmussen, p. 212, 217; Snelders and Pieters, p. 691-692; see Joseph J. Knapik, Katy L. Reynolds, and Everett Harman, "Soldier Load Carriage: Historical, Physiological, Biomechanical, and Medical Aspects", *Military Medicine* 169, no. 1 (January 2004): p. 46-49. Retrieved from PUBMED January 20th, 2019.

[20] Hypoxia refers to a state of low oxygen.

[21] See D. Russell Davis, "The Disorganization of Behavior in Fatigue", *Journal of Neurology, Neurosurgery, and Psychiatry* 9, no. 1 (January 1946): p. 25-28. Retrieved from PUBMED January 27th, 2019; see R. C. Browne "Amphetamine in the Air Force." *British Journal of Addiction* 44, no. 2 (1947): p. 66-70. Accessed electronically September 18th, 2018; Pugh, p. 15, 18; Defalque and Wright, p. 23.

used in a wide array of field operations such as convoy workers, surface engagers, submariners, and naval aviators. Benzedrine helped radar monitors stay vigilante and reduced sea sickness. The wakefulness effects of Benzedrine were valued highly by the RN, particularly in survival at sea. Shipwrecked sailors could be at sea for long periods of time, and without rescue, would die a slow, agonizing death. Life rafts were approved to carry Benzedrine, and some RN researchers praised the drug's ability to prolong sailor survivability. For the Germans, there is some evidence that Pervitin relieved fatigue in the Kriegsmarine. In 1942, the Kriegsmarine undertook the Channel Dash operation in which several vessels fled the French port Brest. German submariners were given Pervitin to help them remain vigilante during a tedious and long operation. Whether land, air, or sea amphetamines provided valuable, life-saving, and tactically important fatigue relief.[22]

A second factor driving amphetamine use was improving soldier morale. World War II was the deadliest conflict in recent history, and the witnessed horrors left many soldiers anxious and demoralized. A post-war survey suggested that just 15% of infantrymen used their weapons proficiently in combat. The majority of American soldiers either shot above enemies or did not shoot.[23] This meant, theoretically, that some battles hinged on a mere fraction of soldiers. Indeed, the mere thought of killing a fellow human typically induces feelings of anxiety. Some researchers theorized that soldier distress was intricately linked to morale. Morale was linked not just to mood, but confidence in personal ability, leaders, fellow soldiers, and received support. For example, early war losses in the RAF decreased pilot confidence in their technology and

[22] Pugh, p. 499, 508, 510, 514-515; Defalque and Wright, p. 23.

[23] This statistic has been disputed as flawed, exaggerated, and even fabricated. As such, use of it is purely rhetorical.

leadership. Demoralized soldiers could become dysfunctional and hinder battlefield operations. Some may socially withdrawal and weaken group cohesion.[24]

The biggest threat to soldier morale was "psychoneurosis", commonly known as "shell shock". Shell shock was a disability recognized as a threat to soldier functioning. Shell shocked soldiers often suffered from panic attacks, insomnia, amnesia, mutism, blindness, deafness, nightmares, and physical health problems. Soldiers typically broke down in response to prolonged stressors such as long missions and/or dangerous combat situations. For example, a 20-year old American sergeant in the Tunisia Campaign became shell shocked after witnessing his platoon die to German gunfire. In the US Army, psychoneurosis accounted for 72.2% of psychiatric hospitalizations and 30.3% of all discharges during the war. The war's escalation increased incidence of psychoneurosis. In 1943, there were, on average, 25.4 cases per 1,000 soldiers compared to just 11.2 in 1942. The Allies encounter of strong German and Japanese resistance spiked soldier breakdowns as high as 40% among those incapacitated. Military guidelines disqualified diagnosed soldiers from combat and sent them home for treatment. This resulted in increased soldier turnover and, consequently, significant manpower shortages in North Africa and the Pacific.[25]

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[24] See Hans Pols, "Waking Up to Shell Shock: Psychiatry in the US Military During World War II", *Endeavor* 30, no. 4 (December 2006): 144-147. Retrieved from Science Direct January 24th, 2019.; see Edgar Jones, "LMF: The Use of Psychiatric Stigma in the Royal Air Force during the Second World War", *Journal of Military History* 70, no. 2 (April 2006): p. 441-442. Retrieved from Project Muse January 27th, 2019.

[25] Pols, p. 144-145; Rasmussen, p. 209, 214; see John W. Appel, "Preventative Psychiatry" in *Neuropsychiatry in World War II*, vol. 1, *Zones of Interior*", edited by Robert S. Anderson, Albert J. Glass, and Robert J. Bernucci (n.p. Office of the Surgeon General, 1966), p. 374-375, 381. https://history.amedd.army.mil/booksdocs/wwii/NeuropsychiatryinWWIIVolI/chapter14.htm.; See Norman Q. Brill, "Hospitalization and Disposition" in *Neuropsychiatry in World War II*, vol. 1, *Zone of Interior*, edited by Robert S. Anderson, Albert J. Glass, and Robert J. Bernucci (n.p. Office of the Surgeon

Given the war costs associated with shell shock, treating or preventing it was critically important. Treating shell shock, however, encountered numerous pitfalls. First, treatment availability was limited. The US Army suffered a shortage of psychiatrists during the war, and most present lacked proper training or required certifications. Second, a liberal hospital discharge policy designed to curb loss of manpower left many soldiers undertreated. And third, contemporary attitudes shied from recognizing shell shock as a disorder. The British military banned use of the term "shell shock", viewing broken down soldiers as cowards instead. The RAF began labelling anxious pilots as "lacking morale fiber" in 1940. Those deemed lacking morale fiber were shamed and punished with loss of rank and privileges. By stigmatizing psychiatric distress, the RAF hoped to reduce casualties and loss of manpower. Consequently, this stigma complicates measuring the true incidence of shell shock in the British military. In contrast, American officers glorified some broken-down soldiers as heroes surviving hardship. Nomenclature, however, did not detract from the real, terrifying reality shell shocked troops experienced.[26]

Amphetamines proved a fast-acting tool for improving morale and confidence. These increases to morale allowed some soldiers to succeed in risky attacks. Over Cologne, Benzedrine enabled an RAF pilot to make a risky attack in the face of heavy anti-aircraft fire. The risk worked as the pilot landed a direct hit. During an RAF bombing near Paris, another risk-taking

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General, 1966), p. 195, 208. https://history.amedd.army.mil/booksdocs/wwii/NeuropsychiatryinWWIIVolI/chapter9.htm.

[26] See Malcolm J. Farrell and Ivan C. Berlien, "Professional Personnel" in *Neuropsychiatry in World War II*, vol. 1, *Zone of Interior*, edited by Robert S. Anderson, Albert J. Glass, and Robert J. Bernucci (n.p. Office of the Surgeon General, 1966), p. 42, 45-51. https://history.amedd.army.mil/booksdocs/wwii/NeuropsychiatryinWWIIVolI/chapter3.htm.; Brill, p. 197-198, 202-207.; see Edgar Jones, Nicola T. Fear, and Simon Wessely, "Shell Shock and Mild Traumatic Brain Injury: A Historical Review", *American Journal of Psychiatry* 164, no. 11 (November 2007): p. 1643. Accessed from PUBMED January 26th, 2019.; Jones, p. 439-440; Pols, p. 146.

Benzedrine pilot successfully took out an enemy anti-aircraft team. In the RN, Benzedrine was regarded as valuable for morale in the wake of stress and shipwreck. The Arctic Theater resulted in high incidence of "stress related disorders". Sailors became anxious over long watch duties, inconsistent weather patterns, and fear of bombings. The RN recognized morale as a crucial factor in using Benzedrine. During instances of shipwreck, Benzedrine could potentially help sailors prolong their survival by lifting their spirits. In North Africa, Bernard Montgomery took interest in using Benzedrine as "pep pills". Montgomery was facing feared German commander Erwin Rommel[27] and saw Benzedrine as a method to increase soldier confidence.[28]

Few positive accounts of Pervitin's euphoric effects for German soldiers have been found. However, some evidence does indicate that Pervitin caused many soldiers to be more confident when engaged in battle. The notion that Pervitin was the "fuel" for Germany's successful Blitzkrieg strategy has been controversial. Evidence does indicate many in the Wehrmacht widely used Pervitin for both fatigue and mood enhancement. However, many of these individuals did so by their own accord and not military orders. Many Nazis enjoyed Pervitin's euphoria, but most reported instances involved partying not war. As such, conclusions cannot be drawn about Pervitin's role in boosting morale in the Wehrmacht.[29]

In general, available evidence indicates that amphetamines had positive effects on soldiers, pilots, and sailors during the war. However, the narrative is far from complete. First, few primary sources on Benzedrine's use by American soldiers could be located. Thus, conclusions on Benzedrine's precise role in the American military cannot be drawn. Second, no

[27] Erwin Rommel (1891-1944) was a German general who led staunch defenses in North Africa and Normandy. His service earned him the nickname "the Desert Fox".

[28] Rasmussen, p. 214-217; Pugh, p. 506, 512, 516.

[29] Snelders and Pieters, p. 691-692, 695; Defalque and Wright, p. 22-23.

data has been found on Benzedrine use by British civilians. Understanding wider societal trends that could have influenced military use is important. Third, the British military ordered an estimated 72 million Benzedrine tablets and inhalers during the war. Despite this number, we still do not know the full extent to which this supply was distributed and used. More particularly, there is currently no essay exploring Benzedrine use in the whole British army. Lastly, the lack of primary accounts means the benefits of amphetamines are inferred rather than proven. Several authors have shown that amphetamines did not benefit all soldiers, as some suffered adverse side effects. More primary accounts from all soldier types (i.e. infantrymen, medics, pilots, etc.) are necessary to illustrate the positive and negative effects most soldiers experienced while taking amphetamines.[30]

The purpose of this essay was to use scientific and historical evidence to address the "super soldier" myth. Many soldiers who took amphetamines reported longer wakefulness, higher confidence, and increased alertness. All such effects show users operating at levels beyond normal biological human limits. For this reason, it cannot be reasonably denied that amphetamines created "super soldiers". Manufacturing and consumption of amphetamines increased drastically as the was escalated in 1940. Their wide presence coupled with recognized utility to soldiers suggests that leaders sought amphetamines to enhance soldier performance.

Finally, I would like to thank Dr. James Pugh for providing photographs of Roland Winfield's Benzedrine field experiments report.

[30] Bett, p. 215.

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