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LETTER TO THE EDITORS OF HEALTH
MATRIX
IS ANTIDEPRESSANT DRUG
DISCONTINUATION WARRANTED
PRIOR TO POLYGRAPH
ADMINISTRATION?

J. R. Kuykendall[†]

Although the use of polygraph evidence is allowed in many legal situations, knowledge of the influence of legitimate drug use on those tests is limited. One of the most common indications for drug therapy is depression, and several drug classes are used to treat the many aspects of this psychological disorder. Currently, there are no published guidelines or precautions for drug cessation prior to polygraph testing. This communication is meant to address this deficiency and is intended for the non-medical professional as well as the lay public.

The involuntary or “autonomic” nervous system controls basic functions—which do not require conscious effort—such as breathing, blood pressure, heart rate, perspiration, and body temperature. Control of these autonomic nervous functions is achieved by two opposing systems (a sort of checks and balances effect), which are termed the sympathetic and parasympathetic nervous systems. The sympathetic nervous system is also termed “adrenergic” because the neurotransmitters involved in these processes are the hormone epinephrine (adrenalin) and the neurotransmitter norepinephrine. The sympathetic nervous system is generally activated in the “flight or fight” responses, which are elicited by fear, hunger, and sexual aggression to name a few. The chemical signals of the sympathetic nervous system (epinephrine and norepinephrine) cause increases in blood pressure, heart rate and breathing rate. In opposition to the sympathetic (or excitatory) nervous system is the parasympathetic nervous system. The parasympathetic nervous system is also termed “cholinergic”

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because the primary neurotransmitter is acetylcholine. This system is able to cause slowing of heart rate and breathing rate. A well-characterized exception to this scheme is the perspiration response, which is caused by sympathetic activation, but acetylcholine is the chemical signal that mediates this response.

The autonomic control of basal body functions such as breathing, blood pressure, heart rate, and perspiration can be monitored using electric and/or pneumatic devices. This is the basis of polygraph testing, which employs three basic features, 1) a blood pressure cuff to detect changes in blood pressure, 2) pneumatically operated recorders to detect changes in respiration, and 3) electrodes fastened to the fingers and connecting to an electrical device for recording of the "galvanic skin reflex," which is a result of changes in the activity of sweat pores in a person's hands.¹ The responses to questions are monitored through changes in respiration, blood pressure, and perspiration, which are not readily controlled by alterations in conscious thought (such as motor control of voluntary movement). Rather, these alterations in involuntary functions are thought to more likely represent emotional responses to the thoughts evoked by the investigator's questions.

The central nervous system's role in voluntary responses and conscious thought, among many other functions, is far more complex than that of the involuntary peripheral nervous systems (sympathetic and parasympathetic). However, both the central and peripheral nervous systems use epinephrine and acetylcholine as neurotransmitters. Also, a third major neurotransmitter, serotonin, is a primary factor involved in the central nervous system activity. Drugs affecting behavior can often cause changes in the norepinephrine, acetylcholine, and serotonin activities in the brain. Antidepressant drugs can cause an increase in either norepinephrine or serotonin (or both). Some of the earlier antidepressants,² primarily affect the adrenergic (norepinephrine) and cholinergic (acetylcholine) systems, and some simultaneously affect serotonergic (serotonin) systems, as well. This could explain the high incidence of side effects, such as changes in blood pressure, respiration, heart rate and perspiration.

A newer class of antidepressants, known as serotonin selective reuptake inhibitors (SSRIs) work primarily through increases in serotonin activity in the brain. These compounds, which include Prozac (fluoxetine), are known to have minimal or no effects on adrenergic

¹ *The polygraph (lie-detector) technique*, in SCIENTIFIC EVIDENCE IN CRIMINAL CASES 699-723 (3rd ed. 1986).

² *Central Nervous System Agents*, in DRUG FACTS AND COMPARISONS 890-929 (Philip O. Anderson et al. eds., 2004).

and cholinergic systems. This results in a very different side effect profile compared to the earlier antidepressants. As a result, the SSRIs do not interfere with the autonomic nervous system, which controls the involuntary nervous functions such as respiration, heart rate, blood pressure, and perspiration.

To reiterate, drugs which affect epinephrine, norepinephrine or acetylcholine levels could be expected to interfere with tests which monitor the involuntary nervous system (such as those used for polygraph testing). However, SSRIs such as Prozac do not have this mechanism of action; rather they work more specifically by increasing serotonergic activity in the brain. In fact, there are no published reports in the scientific medical literature (MEDLINE) to indicate that Prozac, or any other SSRI, is able to affect polygraph results, either positively or negatively.

Should someone request that a medication be discontinued so that a polygraph test could be administered, the timing of the period when the drug is withheld is important. For example, Prozac (fluoxetine) has the longest half-life (three to four days with multiple daily dosing) of any of the currently marketed SSRIs,³ meaning that it will be present in the blood stream for weeks after drug administration has stopped. In addition, metabolites with pharmacologic activity may be present for even longer periods of time. For instance, fluoxetine is metabolized by the liver to norfluoxetine, which retains some of fluoxetine's activity, yet norfluoxetine has an even longer half-life than fluoxetine of seven to fifteen days.⁴ Standard procedure is to allow seven half-lives to pass after drug discontinuation in order to clear the drug (less than 0.01% of original drug levels remaining in the bloodstream). This would translate to a period between 21-28 days to clear fluoxetine, and at least 49-105 days to clear its metabolite. This is termed a "wash out period" and would be required in order to eliminate any possibility that the drug may be adversely affecting polygraph results by direct mechanisms. This scenario could be applied to any medication which has pharmacological effects on the peripheral nervous system. These may include most of the antidepressants, anti-anxiety, and anti-psychotic medications, as well as pain medications, stimulants, over-the-counter cough and cold medications and many of the commonly prescribed blood pressure and heart medications.

To further complicate the matter, many antidepressants affect the levels of neurotransmitter receptors or the sensitivity of the receptors

³ HANDBOOK OF CLINICAL DRUG DATA 358-59 (Philip O. Anderson et al. eds., 1997).

⁴ *Id.*

to neurotransmitter levels. This is a well-known phenomenon which appears to be based, in part, on modulation of the receptor numbers in nerve cells. This being the case, drug withdrawal can cause “rebound effects” which lead to exacerbation of the very condition (such as depression and anxiety) that antidepressants were originally intended to treat. In many cases, discontinuation of the above medications would not be prudent, and may even be hazardous. Conversely, forced discontinuation of medications which do not affect polygraph results would be unnecessary and unethical.