The neurobiology of substance use disorders: How can it inform treatment court practices?

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Treatment court clients struggle with significant cognitive, emotional, behavioral, and social problems. Understanding some basics of the neurobiology behind these difficulties may help court team members tailor their interactions and services more effectively. They may even start to view their roles as meeting clients' cognitive and behavioral rehabilitation needs.

The article "Neurobiologic Advances from the Brain Disease Model of Addiction" by Nora Volkow, George Koob & Thomas McLellan (2016) reviews scientific recent evidence that supports the view that substance use disorders are rooted in changes in how our brains are structured and function. The authors note that findings are consistent with a disease model of addiction, and while still controversial in some circles, the model does not assert that substance users do not have control or are not responsible for their behavior. The review highlights the pivotal role that cultural, environmental and developmental factors play in the onset and course of substance use disorders and credits the disease model for informing more effective medical and behavioral treatments, enhanced prevention efforts, and health policy changes (e.g. medical insurance must provide equal coverage for mental health and substance use services). The authors contend that a brain disease model of substance use has facilitated a movement away from shaming, stigma and incarceration.

Volkow and colleagues describe addictions as having three recurring stages: **1) binge and intoxication**, 2) **withdrawal & negative affect**, and 3) **preoccupation & anticipation**. These stages reflect brain changes associated with impairments in how rewards are processed (reward circuitry), increased reactivity to stress, and a weakening of cortical areas that control impulsivity, planning, and decision-making. The cyclic nature of the stages is evident, as the neurobiological disruptions associated with each one impacts the others.

The authors explain what "goes wrong" in the brain to create and maintain this harmful cycle, including:

<u>1) Desensitization of reward circuits.</u>
Repeated substance use leads to brain changes such that the impact of rewards becomes less and less powerful. As people develop tolerance and need more of the drug to obtain the desired effect, natural and socially meaningful rewards like praise, sense of belonging and time with family, lose their luster. The ability to feel pleasure is greatly diminished, and motivation can be hard to find. It is difficult to compete with the punch of dopamine that is released in response to the drug and its associated cues, yet the "euphoria" becomes more elusive with use. The substance user may begin to narrow their life, restricting their activities to focus on only those cues associated with drug use, as just the cues alone can deliver a "boost." Behaviorally, this shows up as compulsive drug seeking, as this conditioned response becomes stronger with continued use. The authors state, "These conditioned responses become deeply ingrained and can trigger strong cravings for a drug long after use has stopped (e.g., owing to incarceration or treatment) and even in the face of sanctions against its use," (p. 366).

<u>2) Brain reactivity to stress increases with continued drug use.</u>
Changes in reward circuitry are associated with alterations in the amygdala, the brain's emotional processing center that is essential to detect and respond to danger. Repeated drug use leads to greater stress vulnerability and reactivity. The experience of craving and related negative emotions (irritability, anger, anxiety) may be temporarily relieved through increased drug use, only reinforcing the three-stage

cycle of binge & intoxication → withdrawal & negative affect → preoccupation & anticipation, described above.

3) Weakening of executive functioning in the prefrontal cortex.
The processes in the brain area that underlies one's ability to plan, make wise decisions, and delay rewards is impaired due to changes in reward circuitry and stress reactivity. People who use substances may have difficulty determining what should be the focus of their attention, have trouble learning and recalling information that supports healthy choices and struggle with impulsivity and self-regulation. The ability to detect and monitor one's own errors is also diminished.

While Volkow and colleagues' article does not specifically address treatment courts, the findings can be applied to treatment court functions and contexts. NADCP's "Adult Drug Court Best Practice Standards" reflect awareness of some of the neurocognitive challenges clients face, including a focus on salient and timely incentives/rewards, repeated contact with supportive professionals and peers, clarity of expectations and consistent contingencies, and delivery of evidence-based, cognitive and behavioral practices that incorporate skills training components.

Considering the articles findings, the following may be helpful for team members to consider:

Adapt procedures and services to compensate for cognitive and motivational challenges.
Given the changes in the prefrontal cortex, it is important to communicate with clients in clear, supportive ways that invite them to engage in independent decision-making, planning, and pro-health behaviors. Motivational interviewing with its use of open-ended questions can focus clients' attention on their own goals and values and promote self-exploration (and engage the prefrontal cortex). All members of the court team can interact with clients in this way-not just treatment providers. Treatment should be tailored to meet clients "where they are" in terms of their ability to sustain attention, recall essential information and utilize coping and self-regulation skills. A century of educational and therapeutic research confirms that Confucius got it right 2500 years ago when he stated, "I hear and I forget. I see and I remember. I do and I understand." Treatment should be individualized and incorporate visual aids and physical activity. Work sheets, role plays, and daily practice can compensate for impairments in executive functioning.

Make rewards/incentives as potent as possible
The impairments in reward circuitry described in the article help to explain why treatment court clients may repeatedly opt for "quick fix" rewards (drug use) rather than for longer-term rewards that clients insist they deeply value (e.g., regaining child custody). Clients genuinely express confusion and dismay at why they continue to use a drug despite the negative consequences. This can be confusing and frustrating for court team members as well. The more teams can focus on the salience of rewards, the more likely they are to motivate positive client change. For example, interactions with the judge—even for just a few minutes-- are consistently cited as predictive of client engagement and change. It may be that the unusualness or formality of the setting (courtroom) combined with the potency of the judge's individually tailored praise or words of caution increase their salience. All team members can individualize their positive praise and encourage the client to relish their successes, breathe them in deeply and engage all their senses.

Expand the realm of clients' experience
Volkow and colleagues describe the neural and conditioning process that lead clients to narrow the scope of their experience to focus on drug seeking. Treatment courts typically require participants to engage in work, education, or caregiving activities, which may disrupt conditioned drug-use responses and stimulate opportunities to establish new reward pathways that may compete with use. Mindfulness-based interventions have shown promise in altering brain function and structure, and encouraging the expansion of temporal windows may help reduce impulsive decision-making (e,g., "What fun event do you have to look forward to next week/month/year? Who will be there? What will you see? How will you feel?" (Snyder et al., 2016).

Anticipate and re-frame clients' negative emotions

The review article notes the impact of drug use on the amygdala, the brain's emotional processing center. Negative emotions including anger, irritability, depression, apathy, and avoidance are not simply signs of poor motivation or uncooperativeness. They are a product of neurobiological changes that also fuel continued drug use. Through that lens, cravings and irritability may be reframed for clients as a sign of healing, or as an opportunity to practice a skill. Providers may offer self-regulation strategies based in mindfulness, "urge surfing" and centering exercises (Bowen, Chawla & Marlatt, 2011).

Support Medication Assisted Treatment (MAT)

Decades of research supports the use of medication assisted treatment "to normalize brain chemistry, block the euphoric effects of alcohol and opioids, relieve physiological cravings, and normalize body functions without the negative and euphoric effects of the substance used," (https://www.samhsa.gov/medication-assisted-treatment). MAT addresses impairments associated with the neurobiological disruptions detailed in Volkow and colleagues' review, increasing the chances that clients can engage more meaningfully in cognitive and behavioral treatments, and in their lives outside of treatment court.

Acknowledge that change is difficult and slow

The often-repeated adage, "Recovery is a marathon, not a sprint," is well taken. But where is the "finish line" in substance use recovery? Clients face the prospect of a lifetime of running hard, and counteracting or adjusting to harmful neurobiological changes in order to remain drug-free is a heavy lift. Because they care deeply about clients, treatment court personnel naturally can become frustrated and disappointed. Paradoxically, this form of caring can reinforce clients' own doubts that change is even possible. Court phases should be consistent with Best Practice Standards (NADCP 2020), and movement among the phases should be framed and presented as providing the level of support to meet the client's needs and not as punishment. Punishment is generally ineffective in this context, as the article explains.

Volkow and her colleagues have made an important contribution in helping those of us who are *not* brain scientists understand more about the neurobiological changes associated with substance use disorders, how a disease model of addiction fits the evidence, and why recovery can be so challenging. Treatment courts are invited to learn more and explore how to harness this growing body of knowledge in their everyday work to improve client outcomes.

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