Title: Screening behavioral effects of drugs of abuse in zebrafish models

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Our lab utilizes adult zebrafish to better understand the behavioral and neuroendocrine consequences of several common drugs of abuse. These psychoactive substances can be grouped into four broad categories: stimulants, depressants, narcotics, and hallucinogens. While members of each group share unique behavioral and physiological effects, and often, conserved pharmacological profiles underlying these effects, all drugs of abuse have at least one common characteristic; they have the potential to make patients “feel good”. That is to say, drug action results in bodily effects with some reinforcing property. Examples may include behavioral inhibition and the anxiolytic nature of central nervous system depressants, such as ethanol, the barbiturate pentobarbital, and the benzodiazepines diazepam (Valium) and chlordiazepoxide (Librium) used in our lab. Morphine and the herbal supplement kratom, examples of opioid narcotics to which we expose zebrafish, are often abused for their analgesic effects, while stimulant abuse, including the widely consumed drugs caffeine and nicotine, is reinforced through increased energy and attention. Lastly, by exposing zebrafish to lysergic acid diethylamide (LSD) and 3,4-methylenedioxymethamphetamine (MDMA, ecstasy), we are able to investigate the reinforcing alterations in perception, emotion and cognition brought on by psychedelic hallucinogen abuse. By studying zebrafish behavior in multiple paradigms that capitalize on innate behaviors of these fish to novelty, predators and other aversive stimuli, as well as zebrafish social interaction and shoaling behavior, we are able to gain insight into the effects elicited by exposure to each of these drugs of abuse. Moreover, paralleling behavioral results with physiological endpoints, such as cortisol levels (a biomarker for stress), further validates our conclusions. In this way, research in our lab strives to contribute to a more comprehensive understanding of the mechanisms of action and behavioral consequences of drugs of abuse in zebrafish. Ultimately, these conclusions may be translated to humans, expediting the development of more effective ways to treat and prevent drug abuse.