

1. Addiction is a complex, chronic brain disorder characterized by compulsive drug seeking and use despite harmful consequences. NF- $\kappa$ B, a transcription factor central to innate immunity, further bridges neuroimmune interactions: its activation in microglia drives neuroinflammatory cascades in conditions like Alzheimer's disease, while neuronal NF- $\kappa$ B may exert protective effects .3. Among substance use disorders, psychostimulant addiction encompassing substances like cocaine, amphetamines, and synthetic cathinones has emerged as a critical public health challenge, linked to severe neurobiological alterations and systemic health complications. 2. Globally, addiction affects approximately 10% of the population, with rising prevalence attributed to biological vulnerabilities, environmental stressors, and social determinants .4. Methamphetamine, a potent synthetic stimulant, exemplifies the neurotoxic consequences of chronic psychostimulant use. 6.