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Misuse of psychoactive pharmaceuticals in the United States is widespread and now rivals illicit drug abuse in magnitude. The Internet has become a major source for information on misuse of pharmaceuticals and provides advice, tips, procedures and specific recipes on drug/formulation tampering. In this context, we define drug/formulation tampering as “physical or chemical alteration of a specific drug formulation for purposes of enhancing drug effect, increasing speed of onset of effects, eliminating undesirable actives and excipients, and chemically modifying actives”. Recipes are posted on the Internet that inform recreational users on methods for tampering. Examples of the many and varied Internet sites that post tampering information include: erowid.org; bluelight.nu; lycaeum.org; dextroverse.org; totes.com; groups.google.com. Tampering recipes range from simple manipulations such as tablet crushing for faster drug release and for administration by other routes to complex procedures involving extraction and purification that require considerable time and effort to accomplish. Some examples of Internet tampering methods are as follows:

- Crushing methylphenidate and oxycodone tablets for intranasal administration
- Removal of fentanyl gel from patches for administration by various routes
- Purification of codeine from tablets containing undesirable actives such as acetaminophen and ibuprofen
- Removal of dextromethorphan from cough syrup by acid/base extraction
- Extraction of morphine from controlled release formulations
- Conversion of morphine to heroin in a spoon for intravenous injection

Because of the extent of pharmaceutical misuse, tampering, toxicity, and risk of overdose/death, there is growing interest in various regulatory agencies and in the pharmaceutical industry to develop “tamper-resistant” formulations that are therapeutically efficacious, but discourage misuse. Formulation changes that increase tamper-resistance include the following:

- Increased hardness of solid formulations to resist crushing
- Inclusion of undesirable excipients and actives
- Development of controlled-release formulations that are resistant to extraction
- Addition of antagonists that prevent drug administration by non-therapeutic routes
- Development of pro-drugs that must be metabolized to be active

Development of methods for assessment of tamper-resistance will become increasingly important. We conclude that development of successful tamper-resistant formulations containing psychoactive drugs should take into consideration the scope and practice of tampering methods available to recreational drug users on the Internet.

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