

# Fentanyl Profiling Program Report



CY 2021

Drug Enforcement Administration  
Special Testing and Research Laboratory



## Summary and Key Findings

The Fentanyl Profiling Program (FPP) performs in-depth chemical analyses on fentanyl and fentanyl-related samples obtained from seizures made throughout the United States. Analytical methodologies developed at the Special Testing and Research Laboratory (SFL1) allow in-depth reporting on samples. The Fentanyl Profiling Program Report summarizes the results and conclusions derived from these analyses on a bi-annual basis. FPP data is not intended to reflect U.S. market share, but is rather a snapshot of samples submitted to this laboratory from the eight DEA regional and sub-regional chemistry laboratories.

For this reporting period, 1,233 fentanyl and fentanyl-related samples seized during CY 2021 were examined by the FPP. Of these samples, 1,013 contained fentanyl as the only fentanyl-related compound and 192 contained both fentanyl and a fentanyl-related compound. Twenty-eight samples contained only fentanyl-related compounds.

- The Gupta Method was the primary synthetic route used in the synthesis of fentanyl samples examined by the FPP.
- The average fentanyl powder purity for domestic samples was 14.4% with a range of 0.1% to 75.6%. The average tablet contained 2.2 mg of fentanyl with a range of 0.01 to 8.4 mg/tablet (median = 2.1 mg/tablet).
- Two hundred seven of the tablet samples examined (44%) contained at least 2 mg of fentanyl.

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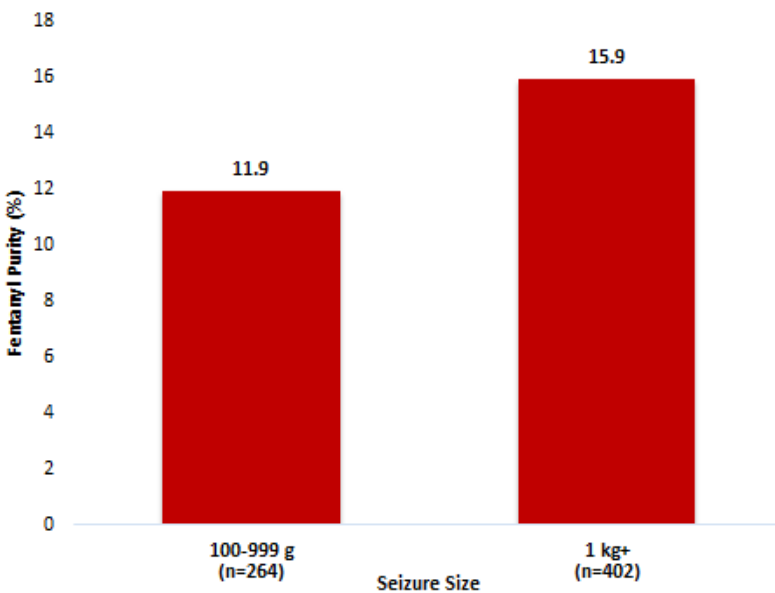
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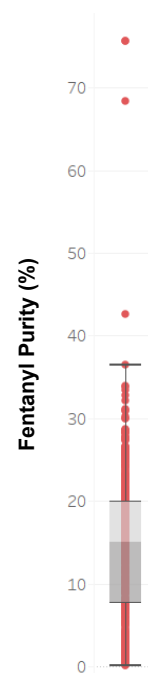
## CY 2021 Fentanyl Seizures—Powders

Six hundred sixty-six samples representing more than 778 kg were examined. The average fentanyl purity was 14.4% with a range of 0.1% to 75.6%. The overwhelming majority of samples were fentanyl HCl with the exception of 12 samples identified as fentanyl citrate. The salt form could not be determined for 3 samples due to low fentanyl concentration. The predominant synthetic route was determined to be the Gupta Method.

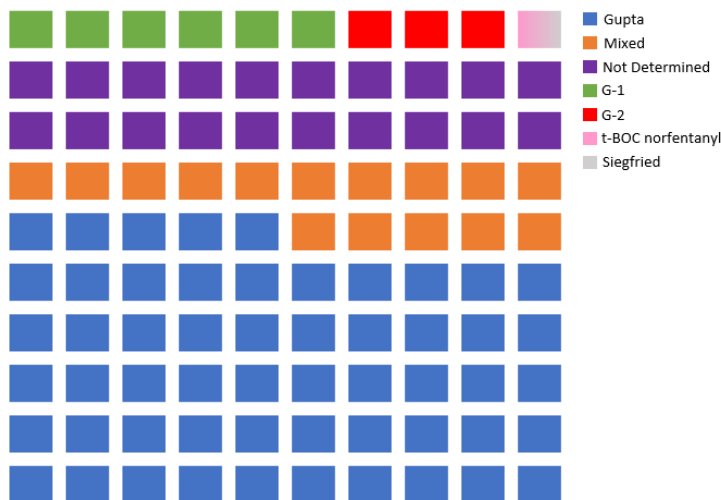
**Average Fentanyl Powder Purity by Seizure Size — CY 2021**



**Fentanyl Powder Purity Distribution — CY 2021**



**Synthetic Route Determined for Fentanyl Powders — CY 2021**

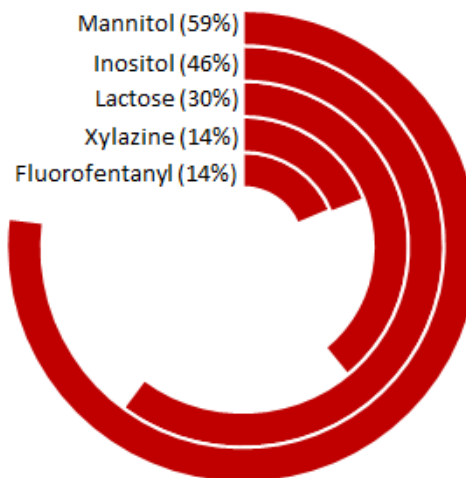




## CY 2021 Fentanyl Seizures—Powders, continued

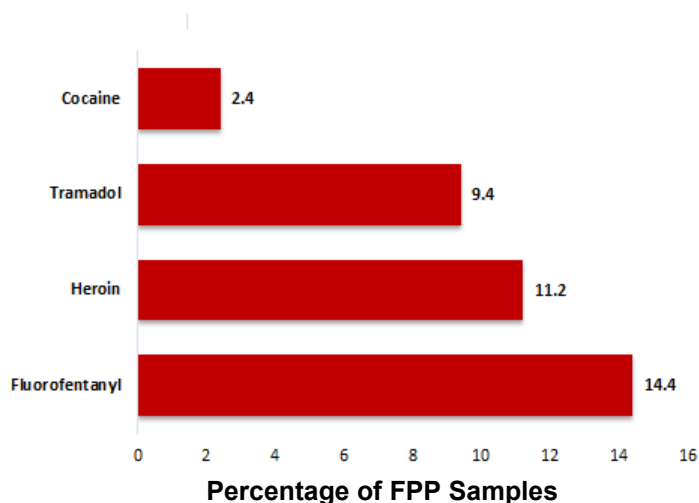
### Top Secondary Substances Detected in Fentanyl Powders — CY 2021

Xylazine reporting increased from 6% in CY 2020. The prevalence of sugars in FPP samples has changed slightly since CY 2020. In CY 2020, mannitol was identified in 51% of samples, lactose in 45% of samples and inositol in 35% of samples.



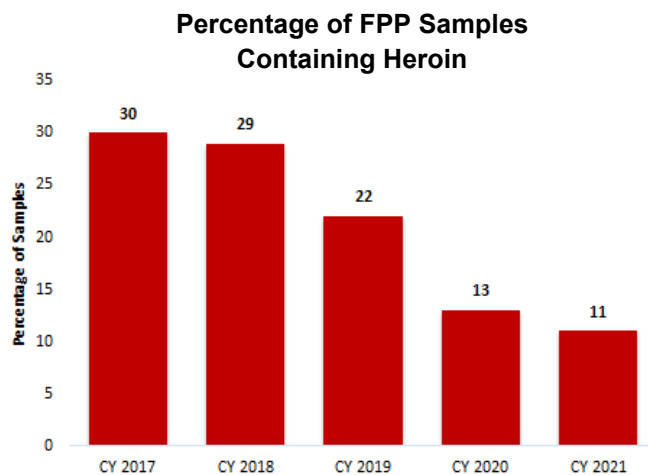
### Top Secondary Controlled Substances Detected in Fentanyl Powders — CY 2021

The number of FPP samples found to contain fluorofentanyl, heroin and tramadol has increased since CY 2020. The number of FPP samples found to contain cocaine remains consistent.



### Fentanyl/Heroin Mixtures

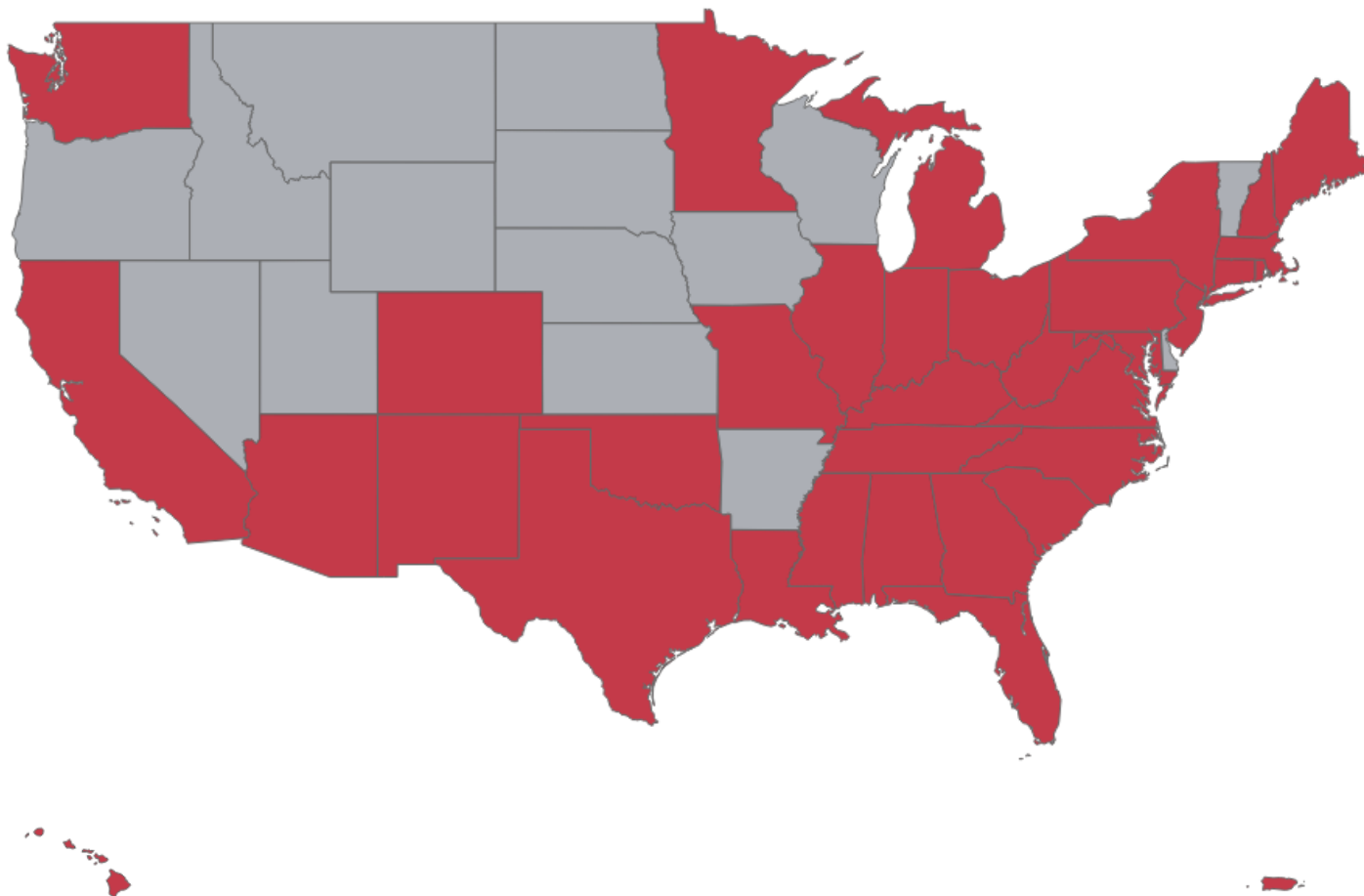
Fentanyl was mixed with heroin in 11% of the exhibits examined. Heroin was quantitated in five exhibits where the average fentanyl and heroin purities were 2.2% and 4.8%, respectively.





## CY 2021 Fentanyl Seizures—Powders, continued

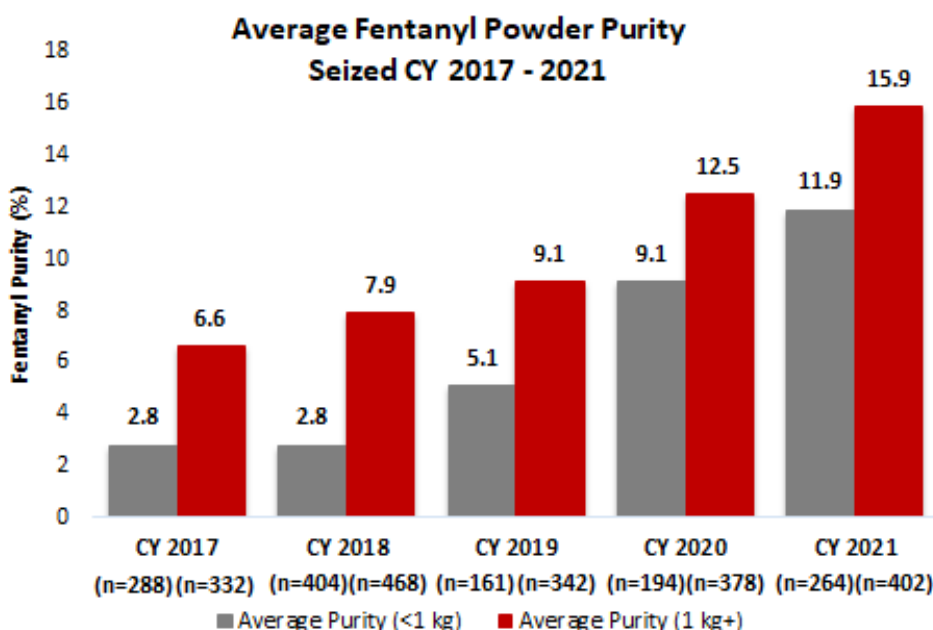
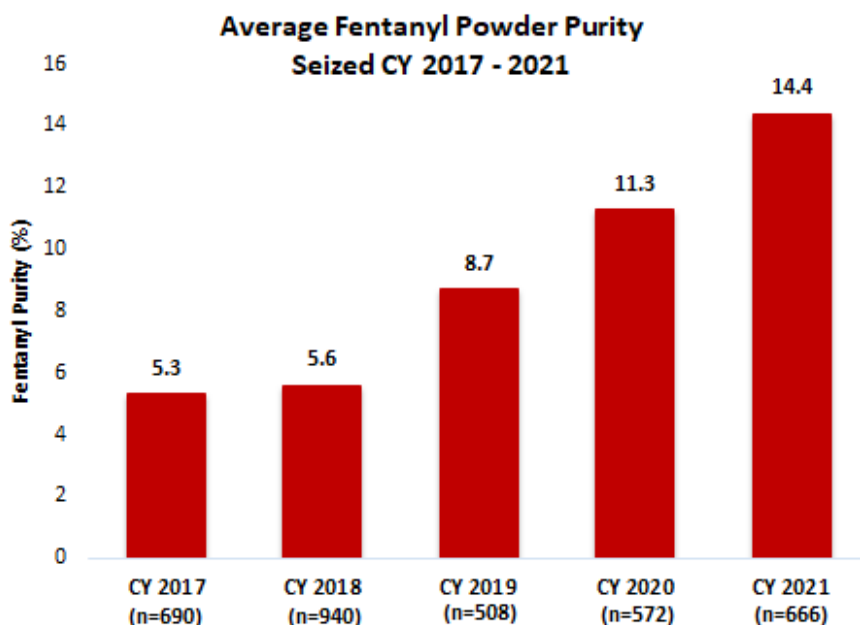
The following map summarizes the number of powder samples, total kg seized, and purity by state. States shaded in color indicate samples were analyzed by the FPP. Place your cursor on a state to preview the information.





## Year-End Trends—Powders

Over the last 5 years, the average purity of illicit fentanyl analyzed by FPP has increased by approximately 9 percentage points. Since CY 2017, there has been a significant increase in average purity of all samples. For samples weighing less than 1 kg, the average fentanyl purity increased from 2.8% to 11.9%. For samples weighing 1 kg or greater, the average fentanyl purity increased from 6.6% to 15.9%.

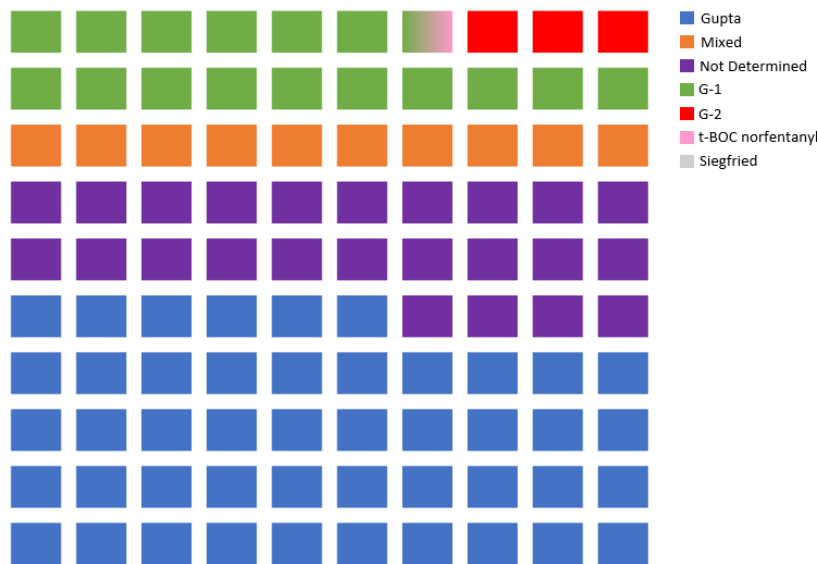




## CY 2021 Fentanyl Seizures—Tablets

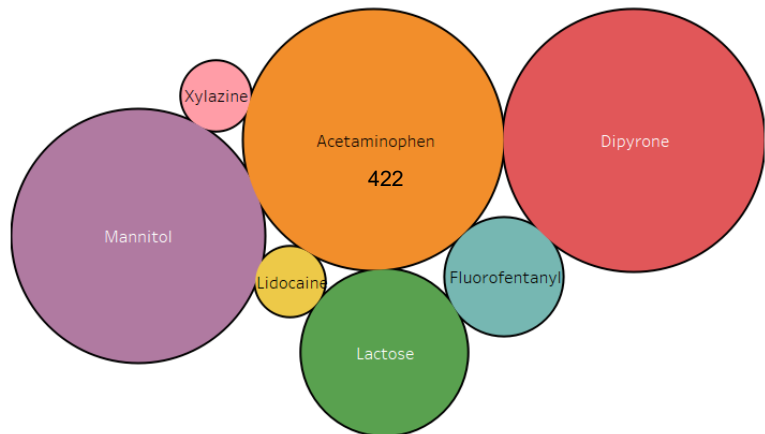
Four hundred seventy-one tablet exhibits representing approximately 461 kg of seized material were examined. The average tablet contained 2.2 mg of fentanyl with a range of 0.01 to 8.4 mg/tablet (median = 2.1 mg/tablet). The overwhelming majority of samples were fentanyl HCl; the salt form could not be determined for 3 samples due to low fentanyl concentration. The accompanying graphic illustrates the determined synthetic routes for tablet exhibits.

**Synthetic Route Determined for Fentanyl Tablets — CY 2021**



### Top Substances Detected in Fentanyl Tablets — CY 2021

The graphic to the right displays the top substances identified in fentanyl tablets. The size of the bubble is proportionate to the number of samples in which that substance was found.



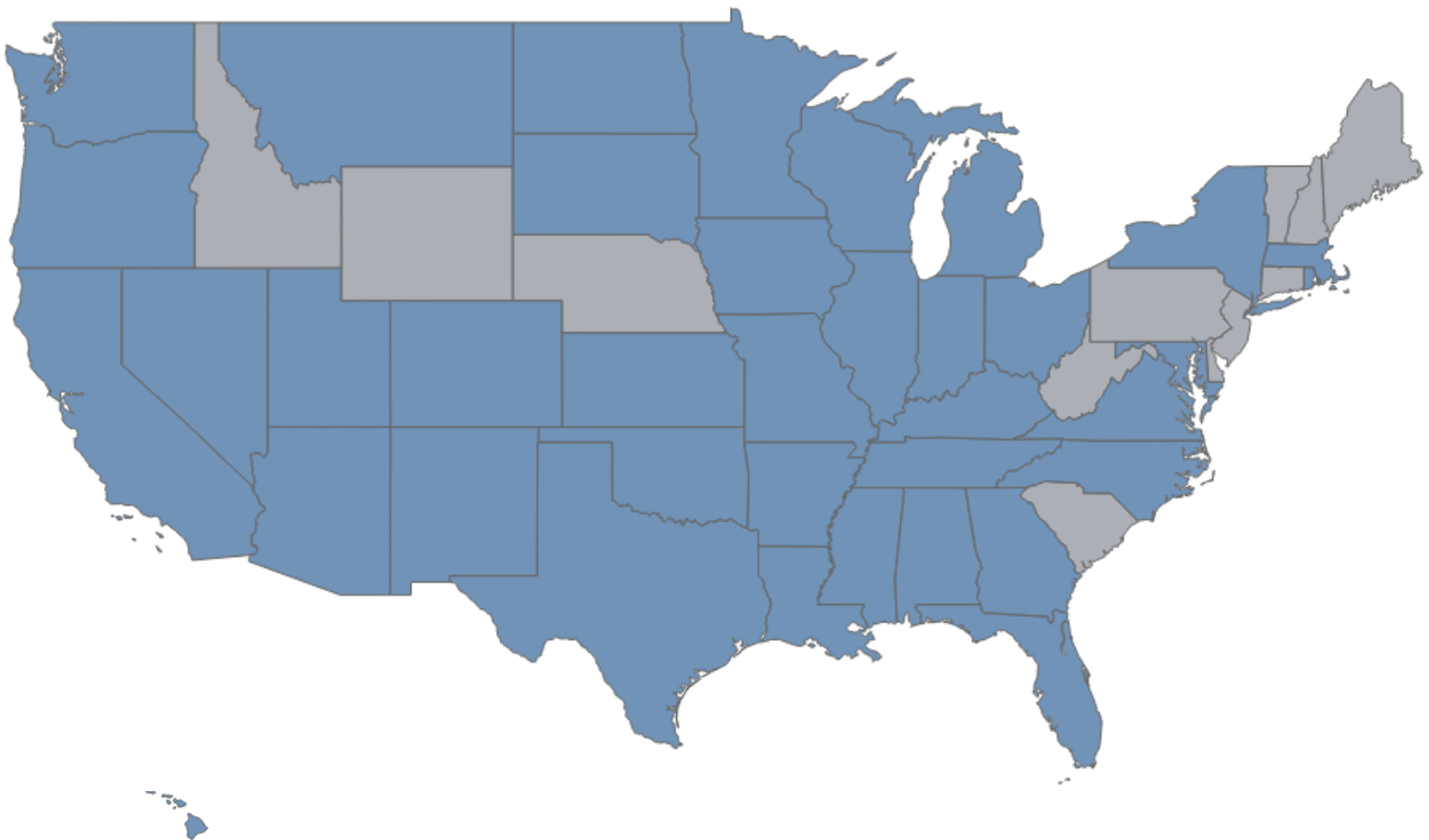


## CY 2021 Fentanyl Seizures—Tablets, continued

### Tablets Containing at Least 2 mg of Fentanyl

A lethal dose of fentanyl is postulated to be approximately 2 mg (0.002 grams); however in opioid-naïve users, a much lower amount of fentanyl could result in serious adverse effects, including death. Two hundred seven of the tablet exhibits examined (44%) contained at least 2 mg of fentanyl.

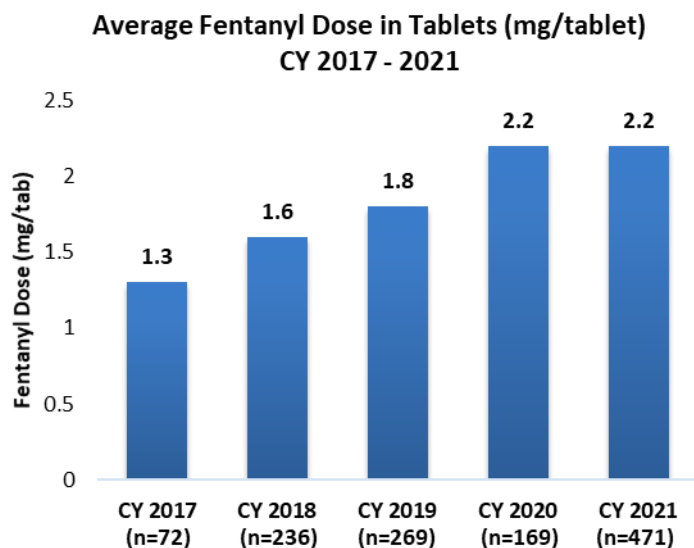
The following map summarizes the number of tablet samples and amount of fentanyl by state. States shaded in color indicate samples were analyzed by the FPP. Place your cursor on a state to preview the information.



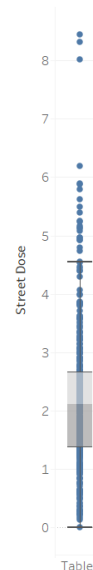


## Year-End Trends—Tablets

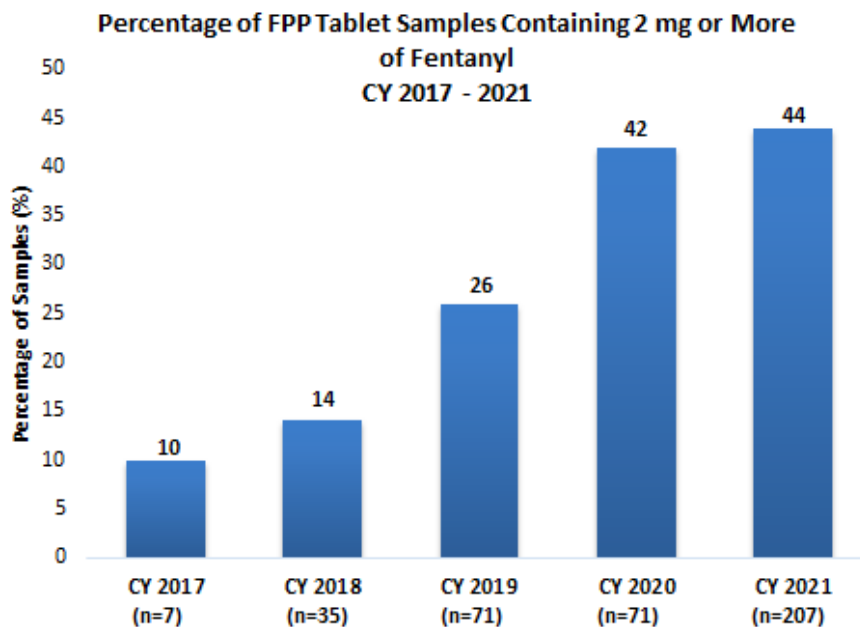
The average amount of fentanyl in tablets continued to increase steadily from CY 2017 to CY 2020. Since 2020, the average dose has remained steady at 2.2 mg of fentanyl per tablet.



## Fentanyl Tablet Dosage Distribution — CY 2021



The percentage of tablets containing lethal doses increased dramatically between CY 2019 and CY 2020. Since CY 2020, the percentage of tablets containing 2 mg or more of fentanyl has remained consistent. In CY 2021, 44% of the tablets tested contained at least 2 mg of fentanyl.







## CY 2021 Fentanyl Seizures—Tars

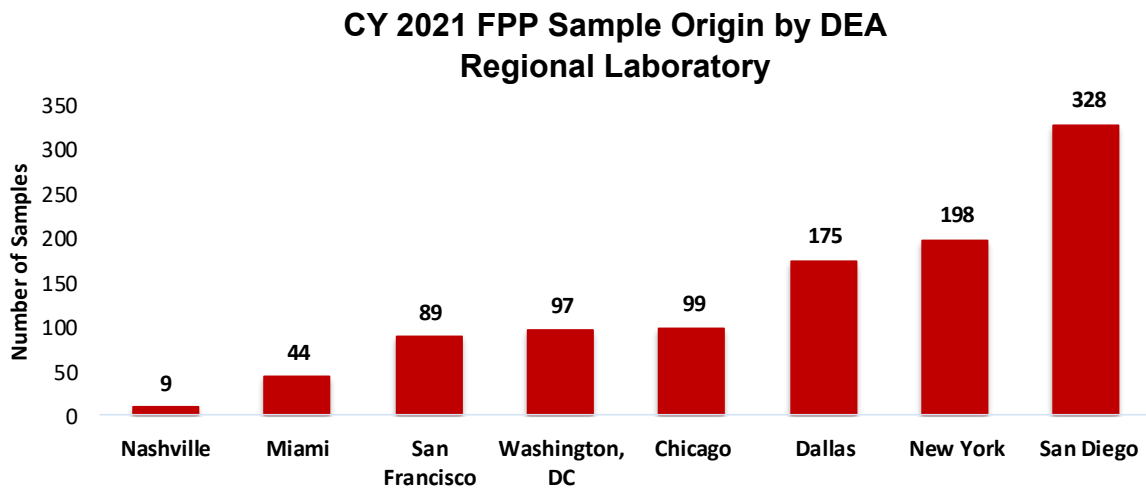
Thirty-six samples representing more than 30 kg were examined. The average fentanyl purity was 7.2%. Interestingly, 86% of these exhibits were seized in the second half of CY 2021.

Primary Fentanyl	Purity (%)	Description	Route
Fentanyl	0.9 - 9.8%	Black or Brown	Gupta = 24 Not Determined = 8 G-1 = 3 Mixed = 1

\*Nineteen of the 36 tar samples (52%) also contained heroin.

## FPP Sample Origin by DEA Laboratory

The majority of samples are submitted to the FPP from the eight DEA chemistry laboratories. The following graphic illustrates these submissions to SFL1 from DEA regional laboratories and is intended to show the distribution of examined samples throughout the U.S.



The FPP also analyzed samples from Customs and Border Protection (CBP), DEA's Foreign Offices, the United States Postal Inspection Service (USPIS) and direct submissions to the Special Testing and Research Laboratory.



## CY 2021 Foreign Submissions

The FPP continues to analyze exhibits seized in foreign countries. The results are summarized in the following tables.

### Country #1

Primary Fentanyl	Purity (%)	Description	Route
Fentanyl	2.3 (2.5 mg/tab)	Tablets = 1	Gupta = 1

### Country #2

Primary Fentanyl	Purity (%)	Description	Route
Fentanyl	Powder = 3.2-21.9	Powder = 27 (HCl = 16, Citrate = 9, ND = 2)	ND = 22 Janssen = 2 Mixed = 1 Gupta = 1 t-BOC = 1

## CY 2021 Fentanyl-Related Compound Submissions

Thirty-three exhibits containing fentanyl-related compounds as the primary fentanyl were examined. The following table summarizes data obtained from the analyses.

Fentanyl Related Compound	# Exhibits	Purity (%)	Description
Fluorofentanyl	201	Powder = 1.1-16.6 Tablets = 0.2-3.3 (0.2-3.5 mg/tab)	Powder = 114 Tablets = 87
t-BOC-4-AP	8	Powder = 96.0-99.4	Powder = 8
Carfentanil	6	Powder = 0.01-0.02	Powder = 6
Valeryl fentanyl	5	Powder = 0.1-0.3	Powder = 5

\*All t-BOC-4-AP and carfentanil samples were foreign submissions from Canada.

\*Five of the six carfentanil samples also contained fentanyl citrate.

\*Valeryl fentanyl seizures originated with USPIS and CBP.