CAM2038 – A new liquid-lipid crystal depot buprenorphine: A dose-ranging suite of weekly and monthly subcutaneous depot injections

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Disclosures

- Dr. Fredrik Tiberg is an employee of Camurus
- CAM2038 (Buvidal® weekly & monthly) is a suite of investigational medical products developed by Camurus for treatment of opioid dependence, and at the time of the presentation not approved for use on any market
- In Europe, the EMA's scientific committee, CHMP, recently recommended approval of Buvidal
- Regulatory reviews in Australia and the US are at the final stage with approval decisions expected before year end

Buvidal® (CAM2038) weekly and monthly buprenorphine depot formulations

Weekly and monthly formulations

- Multiple dose strengths

Individualised dosing based on clinical response and tolerability

- Aligns with treatment guidelines
- Multiple injection sites (buttock, abdomen, arm, thigh)

Low-volume, ready-to-use, pre-filled syringes with 23 gauge needles stored at room temperature

Administered by healthcare professional

SL BPN/NX used as an active comparator in Phase 3

Direct initiation with CAM2038 with no need for initiation with SL BPN

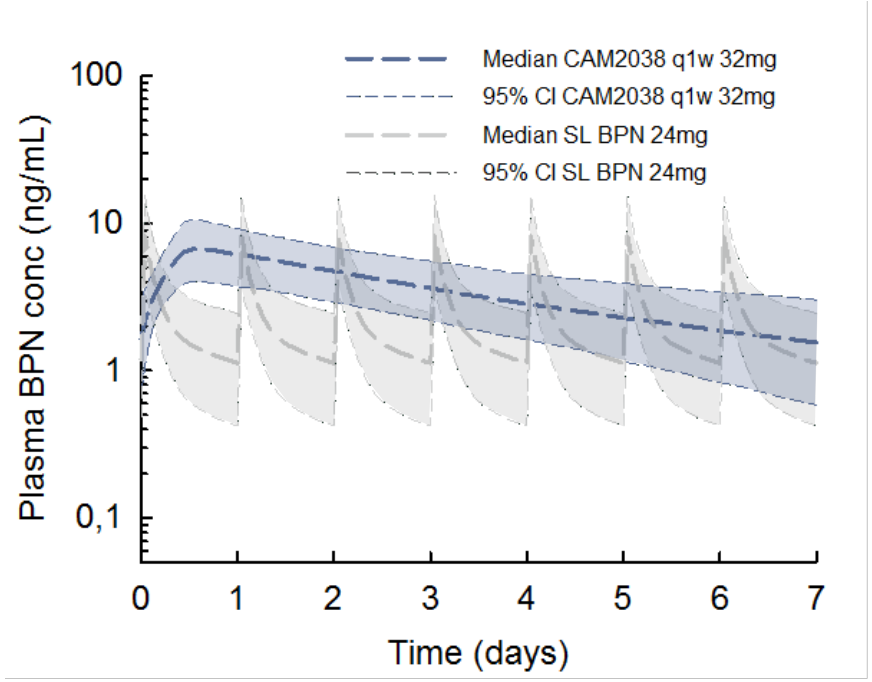
4 Weekly Doses

3 Monthly Doses

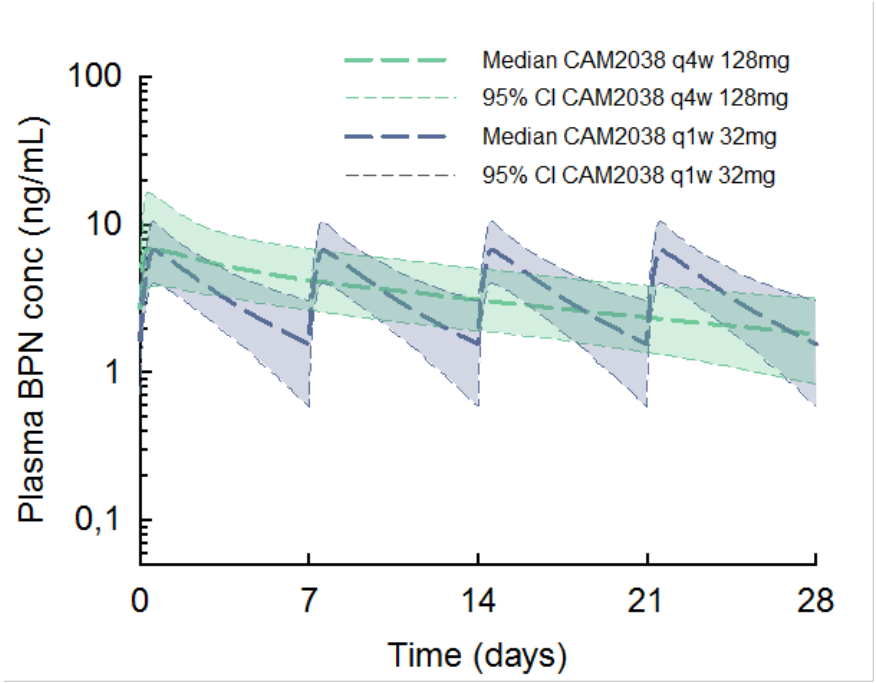
SL BPN/NX – sublingual buprenorphine/naloxone

Illustration of population pharmacokinetic profiles for CAM2038 and sublingual buprenorphine

Weekly CAM2038 – Daily SL BPN



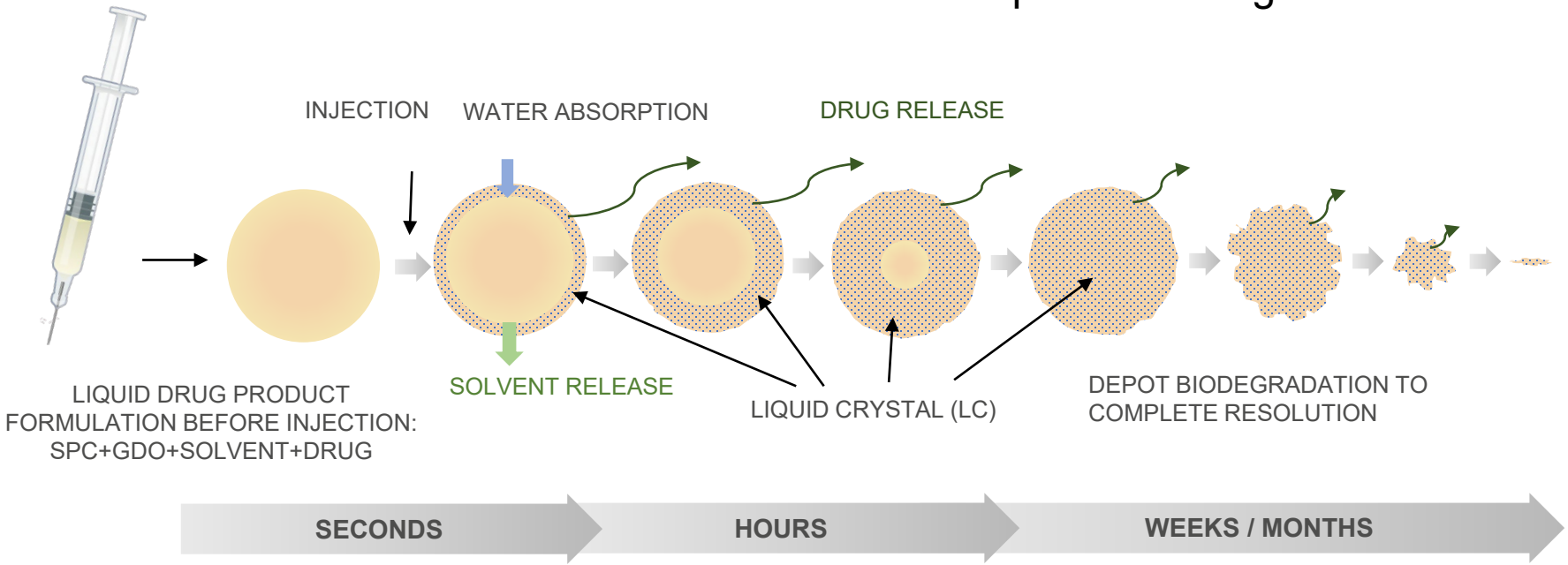
Monthly CAM2038 – Weekly CAM2038



Population PK analysis and modelling based on data from four clinical studies (N=236). Diagnostic testing demonstrated predictive BPN concentrations and good agreement between observed and predicted data percentiles,

CAM2038 is based on the FluidCrystal® technology

- ✓ Easy to administer
- ✓ Rapid onset & long-acting release
- ✓ Applicable across substance classes
- ✓ Biodegradable controlled release matrix of endogenous lipids
- ✓ Release rates determined by lipid composition and gel nanostructure



20
CLINICAL TRIALS

>2000
SUBJECTS HAVE RECEIVED >20,000 INJECTIONS IN CLINICAL TRIALS

Tiberg F, Johnsson M, Jankunec M et al., Chemistry Letters 2012; 41(10): 1090-1092; Tiberg F, Johnsson M., J. Drug Delivery Science Techn. 2011; 21 (1): 101-109.

Comprehensive clinical program for CAM2038

Non-inferior and superior efficacy in pivotal Phase 3 study versus standard daily SL BPN/NX[1]

Effective suppression of withdrawal and cravings[1,2,3]

Blockade of opioid effects from the first dose[2]

Pharmacokinetic profiles for weekly and monthly dosing[4]

Safety profile comparable to SL BPN/NX except for mild to moderate injection site reactions[1]

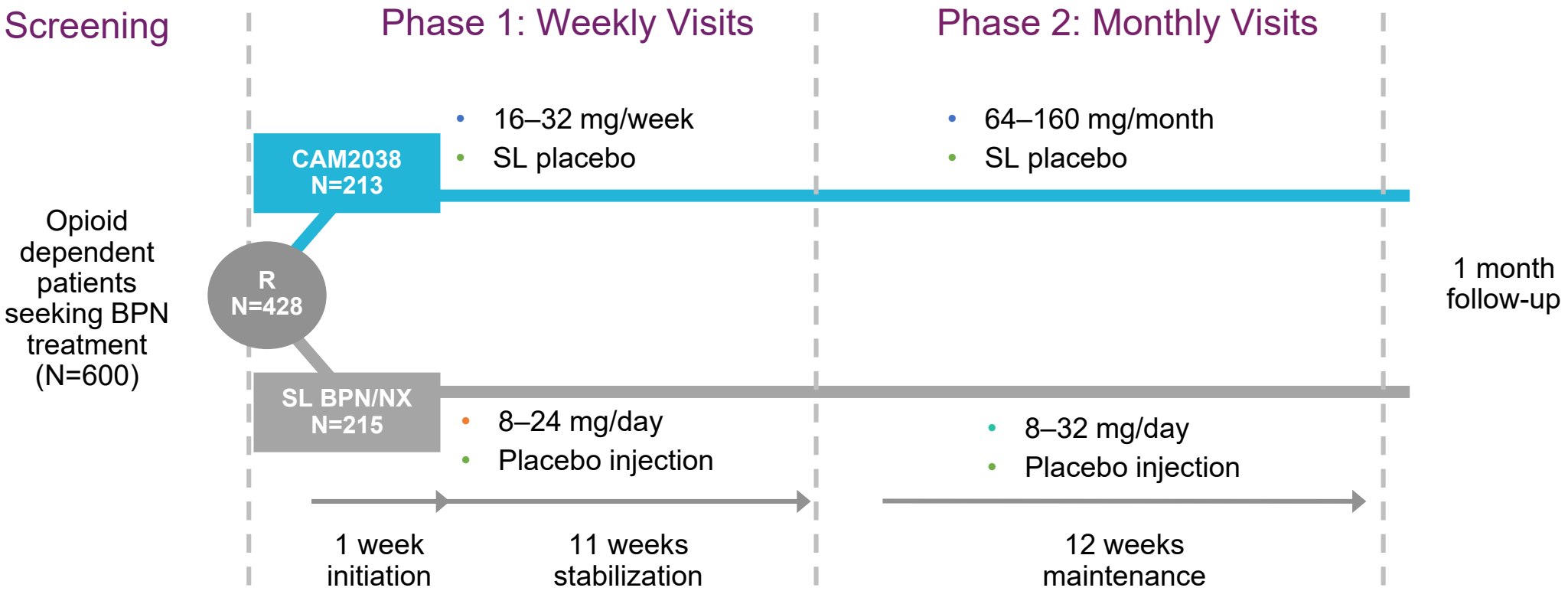
No opioid overdoses across clinical studies for participants treated with CAM2038[1,2,3,5]

High patient satisfaction including versus SL BPN[6]

Recent publications

[1]*Lofwall et al. JAMA Int. Med. 2018;178(6); 764-773;* [2]*Walsh et al, JAMA Psychiatry 2017;74(9):894-902;* [3]*Haasen, C, et al, J Subst Abuse Treat. 2017;78:22-29;* [4]*Albayaty M, et al, Adv Ther. 2017 34(2):560-575;* [5]*Lintzeris et al., Drug and alcohol review. 2017;36(S1):47-48,* [6]*Study HS-14-499, data on file*

Phase 3 design – pivotal study with active control and treatment initiation on Day 1



Lofwall M et al, JAMA Internal Medicine. 2018;178(6); 764-773

BPN, buprenorphine; SL, sublingual; BPN/NX, buprenorphine/naloxone

Representative demographics and baseline characteristics

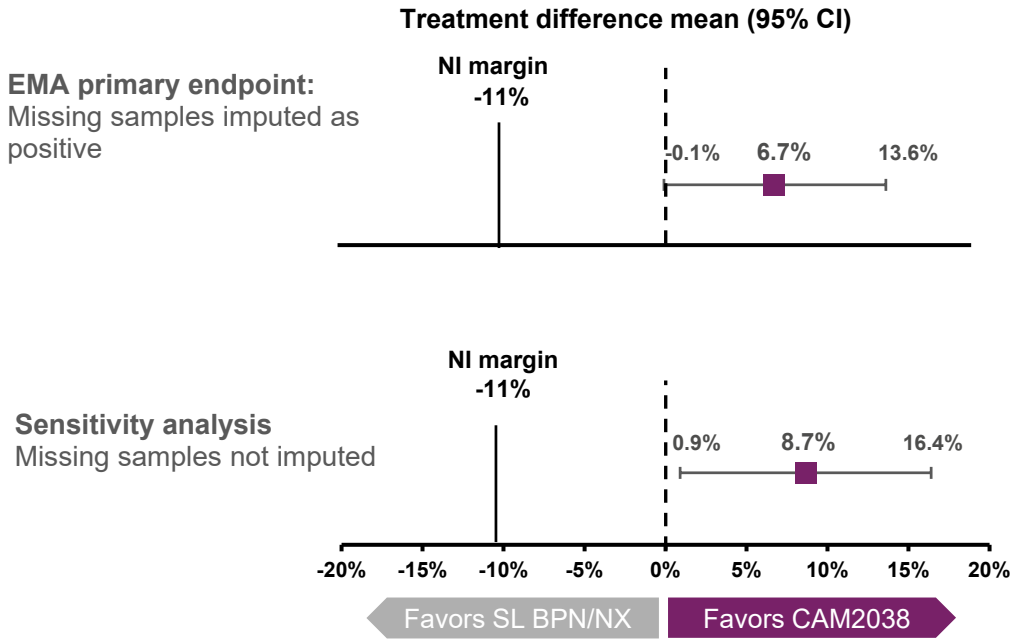
Characteristic	SL BPN/NX (n=215)	CAM2038 (n=213)
Age, y, mean (SD)	38.0 (10.9)	38.7 (11.2)
Male, No. (%)	142 (66.0)	121 (56.8)
White, No. (%)	164 (76.3)	159 (74.6)
BMI, mean (SD)	26.0 (5.6)	26.0 (5.0)
Employed, No. (%)	72 (33.5)	76 (35.7)
History of any arrest, No. (%)	144 (67.0)	130 (61.0)
Primary opioid of use, No. (%)		
Heroin	151 (70.2)	152 (71.4)
Prescription opioids	64 (29.8)	61 (28.6)
Injection use history, No. (%)	110 (51.2)	114 (53.5)
Hepatitis C antibody pos., No (%)	81 (37.7)	81 (38.0)

Characteristic	SL BPN/NX (n=215)	CAM2038 (n=213)
Non-opioid drug use screening, No. (%)	149 (69.3)	155 (72.8)
Amphetamine	32 (14.9)	38 (18.0)
Benzodiazepine	35 (16.3)	30 (14.2)
Cocaine	53 (24.7)	53 (25.1)
Marijuana	64 (29.8)	57 (27.0)
Baseline opioid craving and withdrawal scores, Mean (SD)		
Craving: need to use VAS (0–100)	76 (24.9)	77 (25.4)
Craving: desire to use VAS (0–100)	77 (25.4)	77 (26.2)
COWS score (0-48)	12 (6.0)	12 (5.4)
SOWS score (0-64)	31 (16.1)	32 (15.4)

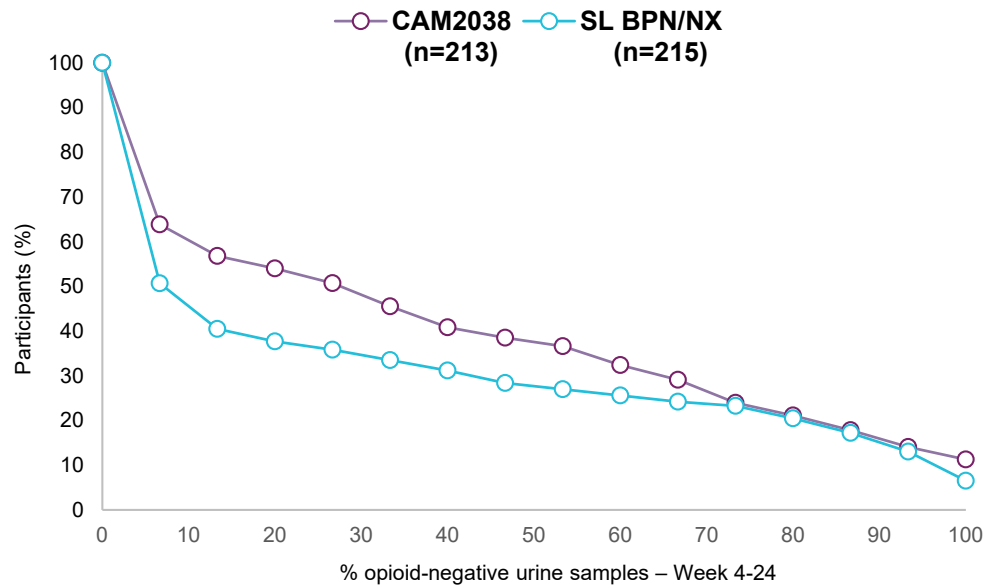
Lofwall M et al, JAMA Internal Medicine. 2018;178(6); 764-773

Primary and key secondary Phase 3 study endpoints were met

Non-inferiority for mean % urines negative for illicit opioids, p<0.001



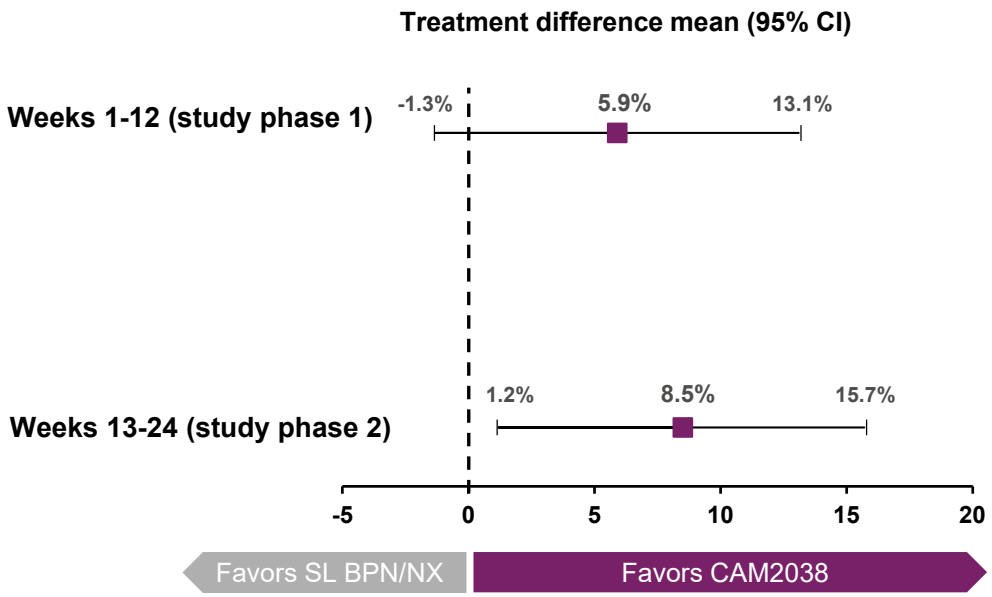
Superiority for the CDF for negative urines weeks 4-24*; median 26.7% vs. 6.7%, p=0.008



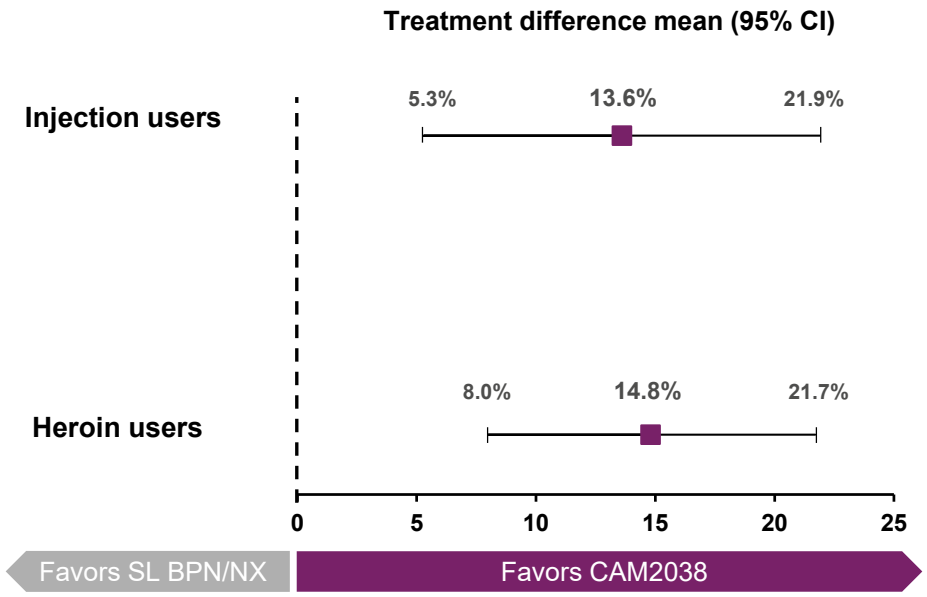
*Lofwall et al., JAMA Int. Med. 2018,178(6); 764-773; *Missing samples imputed as positive; CDF = Cumulative distribution function*

Treatment effects by study phase and subgroup

Mean % urines negative for illicit opioids by study phase

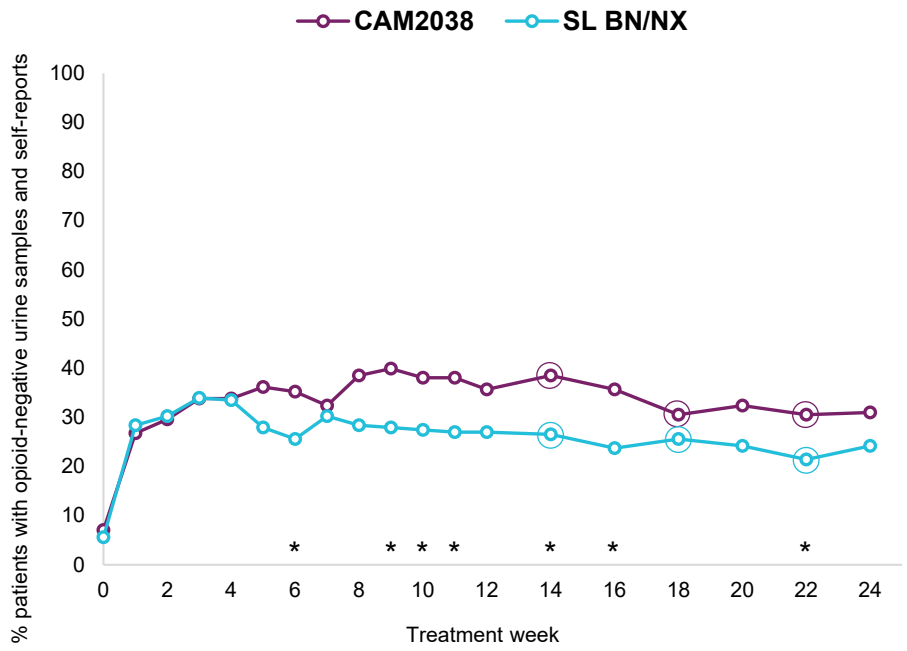


Mean % urines negative for illicit opioids by subgroup



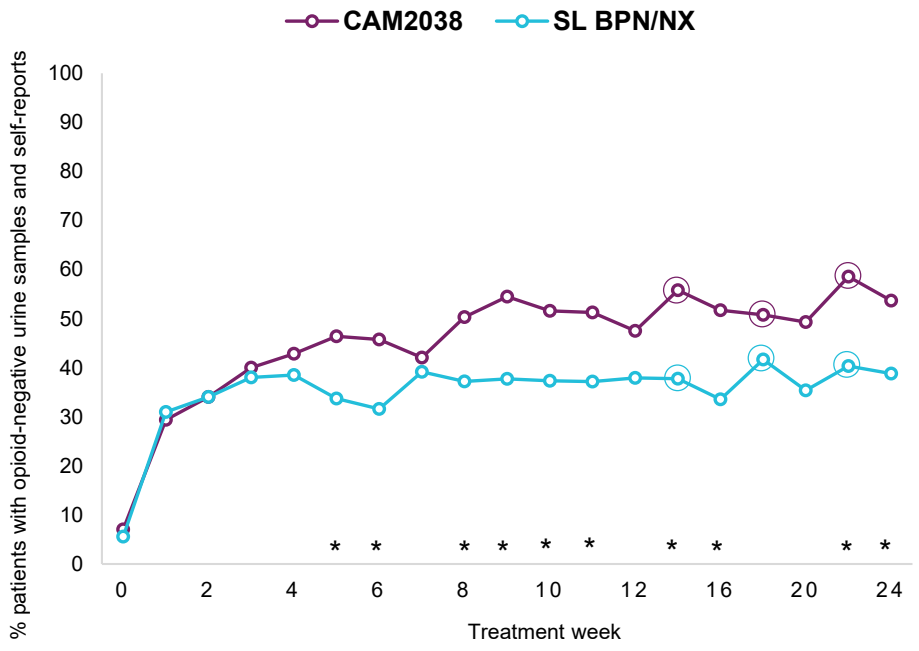
Lofwall et al., JAMA Int. Med. 2018,178(6); 764-773. Data on file for subgroups (Study HS-11-421)

Higher percentages negative urine tests with CAM2038 than with SL BPN/NX



***Missing urine samples imputed as positive**. *P<0.05*

Random urine samples collected during the month



***Missing urine samples not imputed**. *P<0.05*

Lofwall et al., JAMA Int. Med. 2018,178(6); 764-773

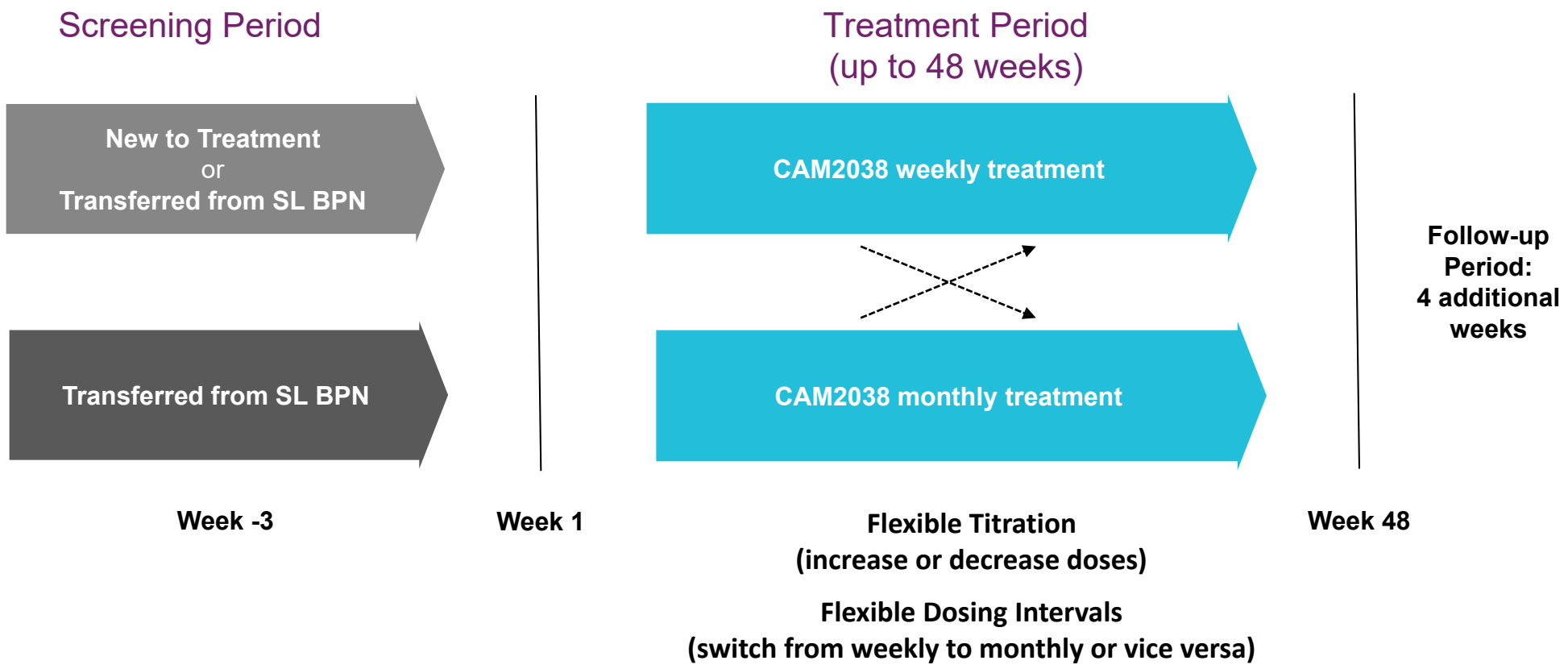
Comparable AE profiles for CAM2038 and SL BPN

Adverse Event Characteristic	Study Group, No. (%) of Participants		
	SL-BPN/NX (n=215)	CAM2038 (n=213)	All (n=428)
≥1 Any	119 (55.3)	128 (60.1)	247 (57.7)
≥1 Drug-related	64 (29.8)	70 (32.9)	134 (31.3)
≥1 Severe	**15 (7.0)**	**6 (2.8)**	**21 (4.9)**
Nonfatal serious	13 (6.0)	5 (2.3)	18 (4.2)
Deaths*	0	1 (0.5)	1 (0.2)
Hospitalizations	**12 (5.6)**	**3 (1.4)**	**15 (3.5)**
Drug overdoses	**5 (2.3)**	**0**	**5 (1.2)**
Led to discontinuation of treatment	3 (1.4)	7 (3.3)	10 (2.3)
Occurred in ≥5% of participants			
Injection-site pain	**17 (7.9)**	**19 (8.9)**	36 (8.4)
Headache	17 (7.9)	16 (7.5)	33 (7.7)
Constipation	16 (7.4)	16 (7.5)	32 (7.5)
Nausea	17 (7.9)	15 (7.0)	32 (7.5)
Injection-site pruritus	13 (6.0)	13 (6.1)	26 (6.1)
Injection-site erythema	12 (5.6)	12 (5.6)	24 (5.6)
Urinary tract infection	10 (4.7)	11 (5.2)	21 (4.9)
Insomnia	6 (2.8)	12 (5.6)	18 (4.2)

**1 patient, pedestrian hit by car*

Source: Lofwall MR, et al, JAMA Intern Med. 2018

Phase 3 long-term (48-week), open-label, safety study with flexible dosing regimen



Demographics and baseline clinical characteristics

Characteristic	Transferred from SL BPN treatment N=190	New to BPN treatment N=37	Overall N=227
Age, y, mean (SD)	41 (9.6)	42 (9.4)	41 (9.6)
Sex (Male)	119 (62.6)	24 (64.9)	143 (63.0)
Race			
White	183 (96.3)	20 (54.1)	203 (89.4)
Black or African American	3 (1.6)	17 (45.9)	20 (8.8)
Other	4 (2.1)	0 (0)	4 (1.8)
BMI, kg/m^2, mean (SD)	27 (5.8)	25 (5.3)	27 (5.8)
Region			
Australia	23 (12.1)	1 (2.7)	24 (10.6)
Europe	76 (40.0)	0 (0)	76 (33.5)
United States	91 (47.9)	36 (97.3)	127 (55.9)
Substance abuse history			
Time to first opioid abuse, y, mean (SD)	15 (8.5)	16 (9)	15 (8.5)
Time to first diagnosis, y, mean (SD)	10 (7.6)	10 (8.6)	10 (7.8)
Heroin as primary opioid of use	97 (51.1)	37 (100.0)	134 (59.0)
Baseline withdrawal and cravings, mean (SD)			
COWS at baseline	2 (2.7)	11 (3.7)	3 (4.3)
SOWS at baseline	5 (8.1)	27 (15.3)	8 (12.7)
Desire to use VAS at baseline	12 (24.2)	75 (24.8)	22 (33.7)
Need to use VAS at baseline	12 (23.8)	76 (24.9)	22 (33.8)

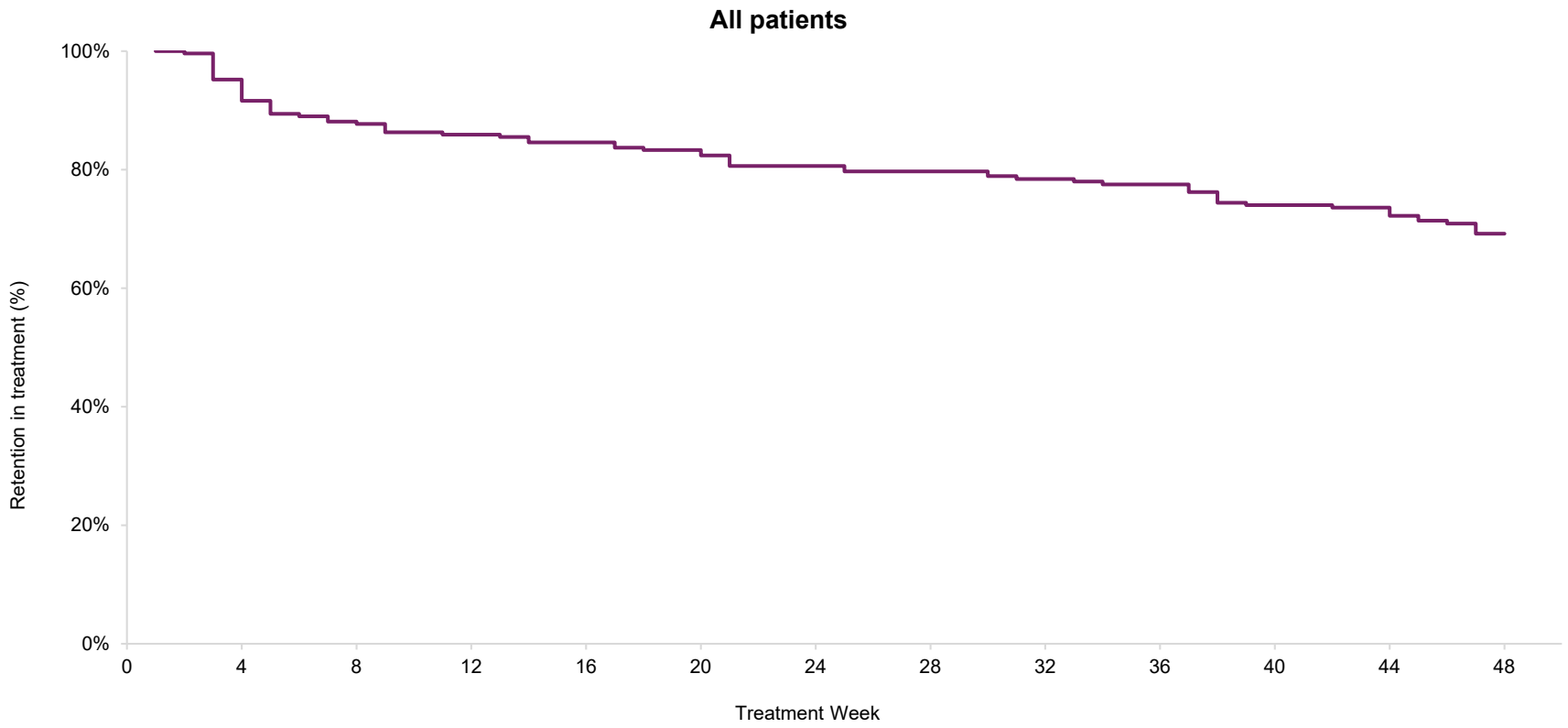
Unless otherwise noted, data presented as n (%).
BMI, body mass index; BPN, buprenorphine; COWS, clinical opioid withdrawal scale (0–48); SD, standard deviation; SL BPN, sublingual buprenorphine; SOWS, subjective opioid withdrawal scale (0–64); VAS, visual analogue scale (0–100 mm).

Long-term safety data

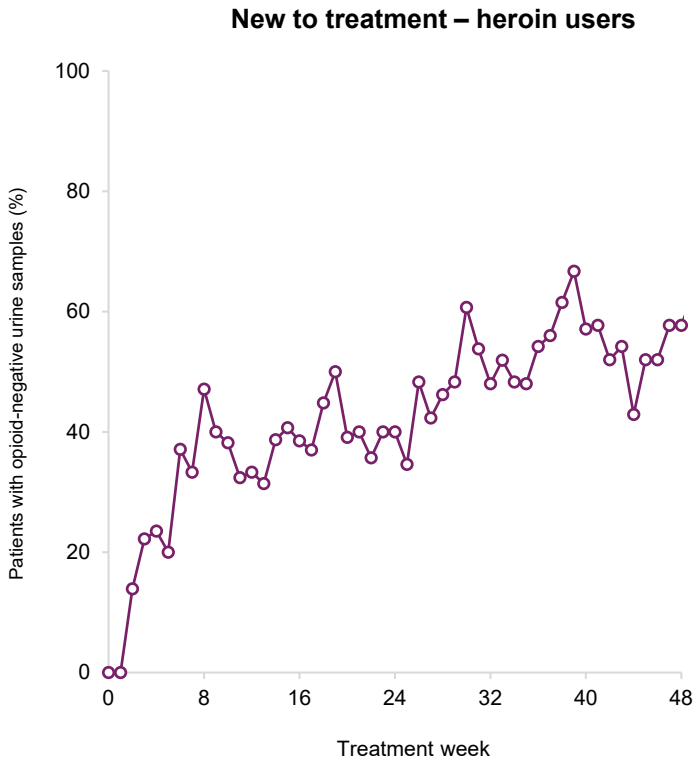
	Overall Safety Population		
Category	**Transferred from SL BPN (n, (%)) N=190**	**New to BPN treatment (n, (%)) N=37**	**Overall (n, (%)) N=227**
A least 1 AE	131 (68.9)	12 (32.4)	143 (63.0)
At least 1 drug-related AE	58 (30.5)	2 (5.4)	60 (26.4)
Injection site AE	43 (22.6)	2 (5.4)	45 (19.8)
Non-injection site AE	23 (12.1)	1 (2.7)	24 (10.6)
AEs leading to study drug discontinuation	3 (1.6)	0 (0)	3 (1.3)
At least 1 SAE	10 (5.3)	2 (5.4)	12 (5.3)
Hospitalisations	9 (4.7)	1 (2.7)	10 (4.4)
At least 1 drug-related SAE	0 (0)	0 (0)	0 (0)
Deaths	0 (0)	0 (0)	0 (0)

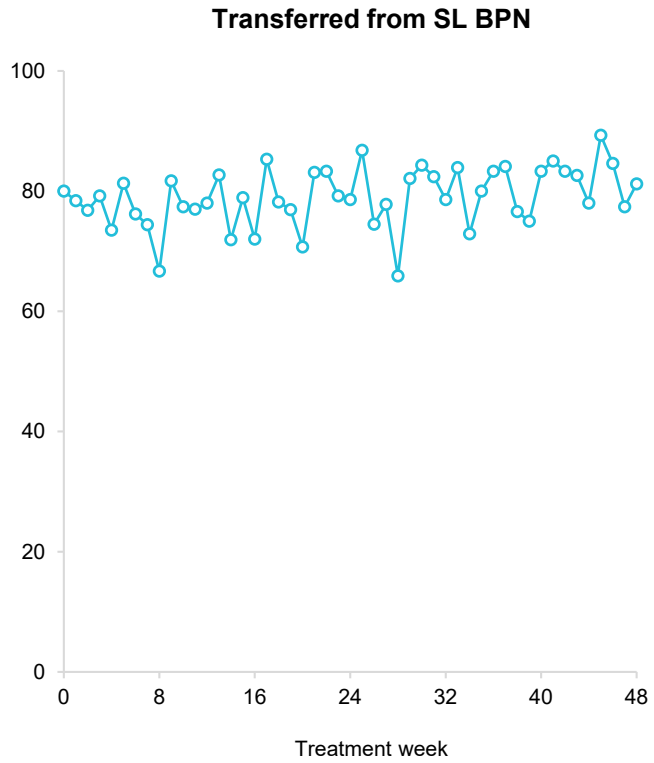
BPN, buprenorphine; SL BPN, sublingual buprenorphine; SAE, serious adverse event.

High treatment retention at 24 and 48 weeks for transfer and new to treatment patients



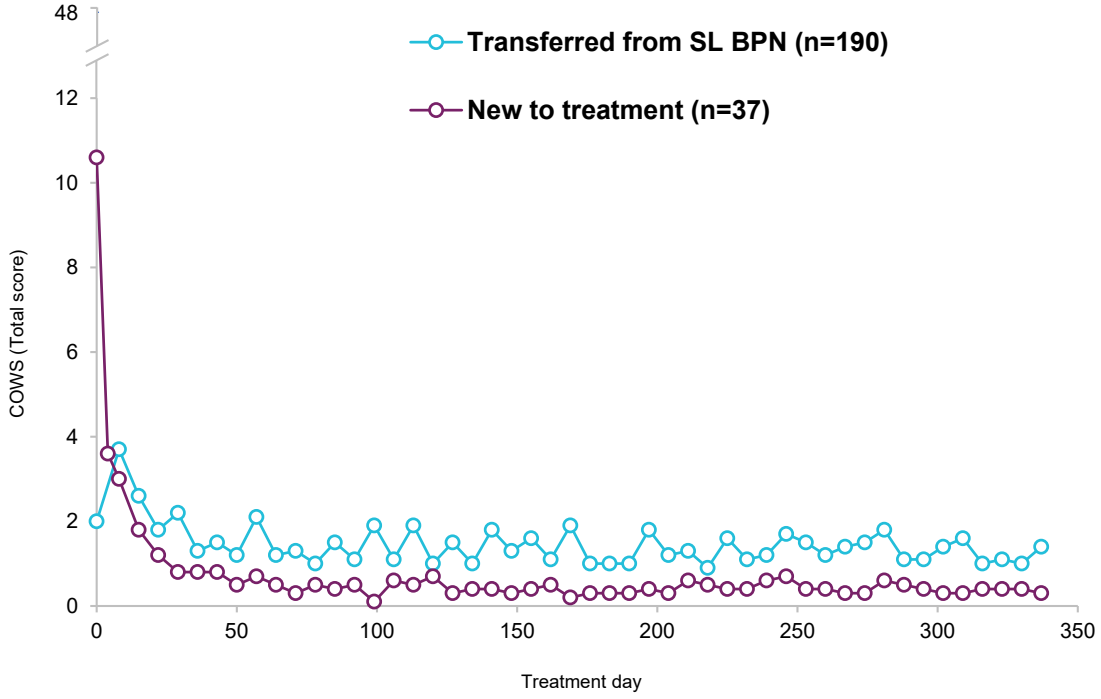
Percentage of patients with no illicit opioid use by time point

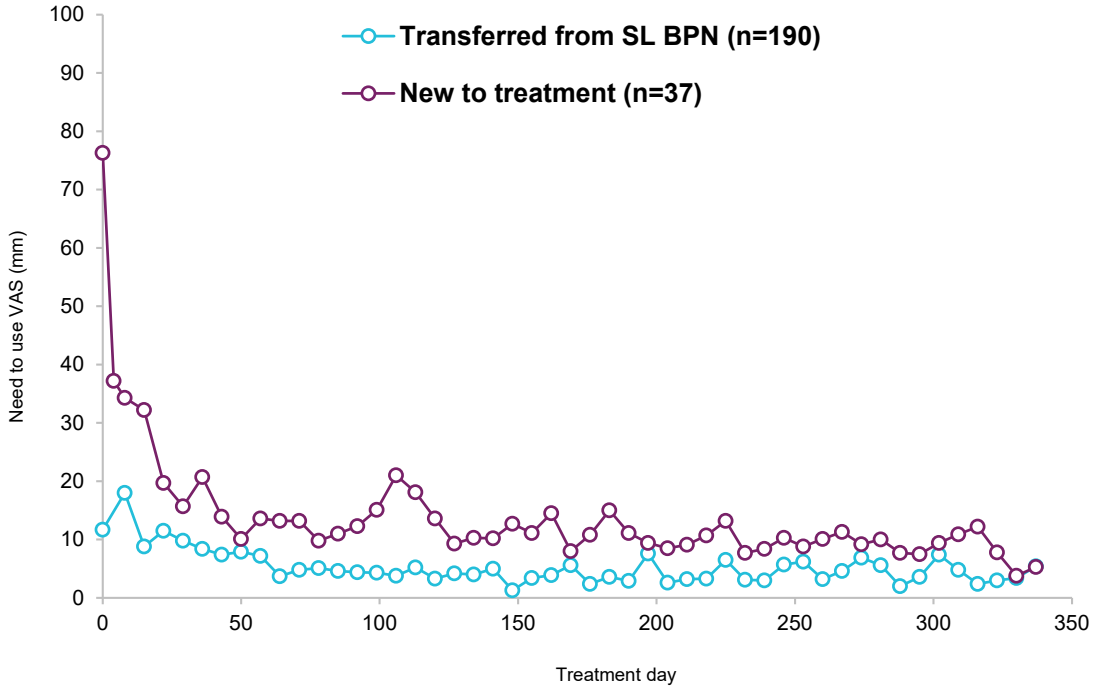




Data combines patients on weekly and monthly visit schedules. Missing values not imputed.

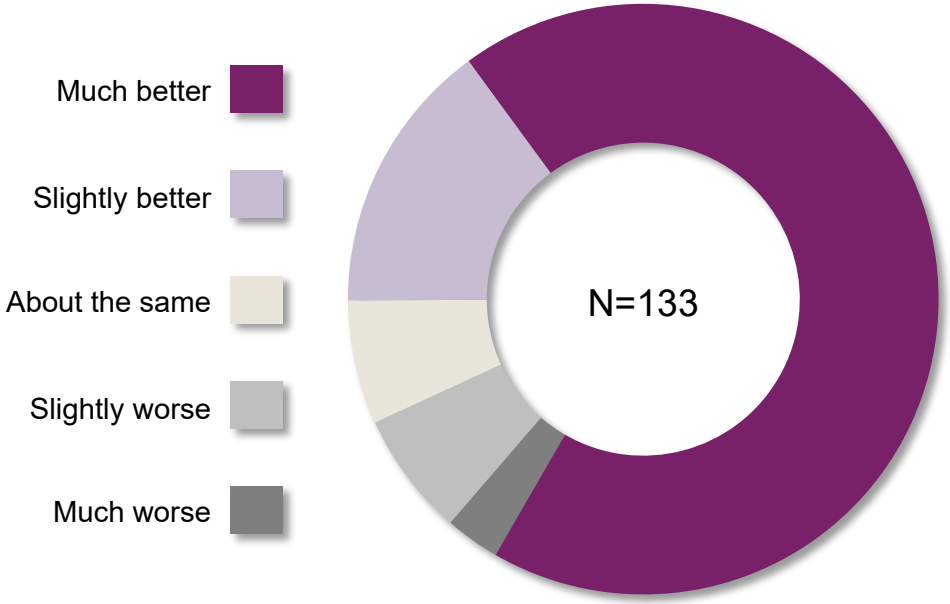
Clinical opiate withdrawal scale, COWS, score and opioid craving score, need to use VAS





High satisfaction amongst patients

“CAM2038 compared to my previously prescribed sublingual buprenorphine treatment”



83% POSITIVE

Source: Poster presentation ASAM 2018. Phase 3 Long-Term Safety Study.

CAM2038 (Buvidal®) weekly and monthly formulations – continuum of care

Multiple dose strengths for individualized dosing based on clinical response and tolerability

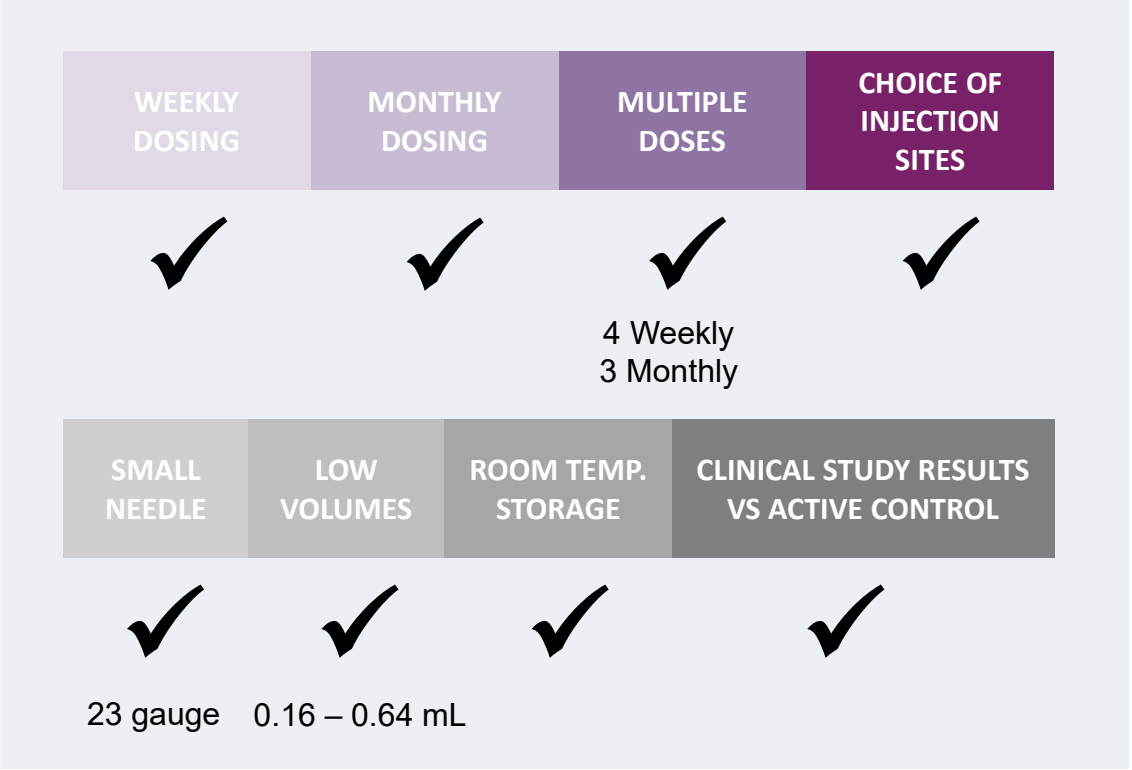
Robust evidence supporting efficacy and safety
Pivotal study versus standard of care

Treatment initiation. No need for detox. or pre-stabilisation on tablets or film

Flexible dosing to match patient needs. Allows for "dose matching" when switching patients to weekly or monthly depots

Removes burden and stigma of daily medication and increases adherence

HCP administration safeguards against diversion, misuse and pediatric exposure



Thank you

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Study participants

Investigators and scientific collaborators

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