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A single-dose, randomised, crossover study to assess the nicotine pharmacokinetics of oral nicotine products in healthy adult users of smokeless pouch products

Submission date
06/04/2022

Recruitment status
No longer recruiting

Registration date
22/04/2022

Overall study status
Completed

Last Edited
12/08/2025

Condition category
Other

[X] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
As smoking is the leading cause of numerous human disorders, the idea is to enable smokers to switch to modern oral products that have less harmful toxicants. The aim of this study is to assess the uptake of nicotine from modern oral smokeless pouches.

Who can participate?
Healthy volunteers aged 19-55 years who are snus or nicotine pouch users

What does the study involve?
Participants are confined to the clinic for 7 days to use all seven different variants of two nicotine pouches (11 and 20 mg) for 10-minute, 20-minute and 30-minute periods while giving blood and saliva samples and undergoing physiological measures.

What are the possible benefits and risks of participating?
There are no medical benefits but this study will provide suitable alternatives to smoking. The risks are low but the participants' safety and wellbeing are of the utmost importance. Participants will be compensated for their time.

Where is the study run from?
CTC Clinical Trial Consultants AB (Sweden)

When is the study starting and how long is it expected to run for?
April 2022 to October 2022

Who is funding the study?
British American Tobacco (UK)

Who is the main contact?
1. Nathan Gale, nathan_gale@bat.com
2. Dr Erik Rein-Hedin

Contact information

Type(s)
Principal Investigator

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Public

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Additional identifiers

EudraCT/CTIS number
Nil known

IRAS number

ClinicalTrials.gov number
Nil known

Secondary identifying numbers
BAT51121037

Study information

Scientific Title
Pharmacokinetics study assessing nicotine uptake of nicotine smokeless pouches

Acronym
Velo

Study objectives
Assessing the nicotine uptake of smokeless pouches.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 28/02/2022, Etikprovningsmyndigheten (Box 2110, 750 02 Uppsala, Sweden; +46 (0) 10-475 0800; registrator@etikprovning.se), ref: 2022-00703-01-245809

Study design
Randomized seven-way cross-over pharmacokinetic study

Primary study design
Interventional

Secondary study design
Randomised cross over trial

Study setting(s)
Other

Study type(s)

Other

Participant information sheet
See study outputs table

Health condition(s) or problem(s) studied
Nicotine uptake in harm reduction products

Interventions
7-way cross-over study where subjects will use one of two different nicotine pouches (11 and 20 mg) for 10-minute, 20-minute and 30-minute periods in a confined environment. Subjects will be randomised to one of five randomisation sequences according to a balanced Latin square design. Subjects will be confined for 7 days at the designated clinic and will have a follow up on day 14. Blood samples are taken at designated time periods pre, during and post product use. Physiological measures and questionnaire data will also be collected.

Intervention Type
Other

Primary outcome measure
Plasma nicotine maximum plasma concentration (Cmax), time to Cmax (Tmax) and area under the plasma concentration versus time curve 0 to 240 minutes (AUC0-240), analysed after collection of blood samples at pre-use, 5, 7, 10, 15, 20, 25, 30, 35, 40 min, 1 hour, 2 hours and 4 hours.

Secondary outcome measures
1. Overall product liking (OPL) and intent to use again (IUA) assessed with questionnaires using a visual analogue scale (VAS) (0-100 mm) at 4 hour post product use
2. Amount mg/unit and extracted fraction (%) of nicotine, sweeteners and major flavour components measured using saliva samples at 4 hours post product use

Overall study start date
06/04/2022

Completion date
06/10/2022

Eligibility

Key inclusion criteria
1. Willing and able to give written informed consent for participation in the study
2. Healthy male and female subjects aged 19-55 years inclusive
3. Body Mass Index (BMI) ≥ 18.5 and ≤ 30.0 kg/m2 and a minimum weight of ≥45 kg (females) or ≥52 kg (males)
4. Clinically normal medical history, physical findings, vital signs, electrocardiogram (ECG) and laboratory values at the time of screening, as judged by the Investigator. No abnormal results judged by the Investigator as clinically significant are allowed.
5. Daily snus and/or nicotine pouch user who must have used pouched products for at least 12 months and who use these pouch products under their upper lip. Subjects who use pouched snus and/or nicotine pouches should typically use at least five pouches per day, with pouch weights of

0.6 g or above. Subjects should be willing and able to use products with nicotine content ≥15 mg /g.
6. Stated willingness to abstain from nicotine and tobacco products (except for the IPs provided) from 12 hours prior to each study product administration until the end of each PK sampling
7. Successful completion of the product familiarisation session for study product use prior to the first study product administration (the subject is able to follow the instructions, can tolerate the product and does not experience any adverse effects different from what is expected from typical smokeless pouch use during the training session).
8. Positive urine cotinine test (≥200 ng/ml) at screening and at Day -1
9. Women of childbearing potential (WOCBP) must be willing to use a sufficient contraceptive method for the duration of the study, this includes mechanical barrier (e.g., a male condom or a female diaphragm), combined (oestrogen and progestogen containing) hormonal contraception associated with inhibition of ovulation (oral, intravaginal, transdermal), progestogen-only hormonal anticonception associated with inhibition of ovulation (oral, injectable, implantable), intrauterine device (IUD) or intrauterine system (IUS). Sexual abstinence is allowed when this is the preferred and usual lifestyle of the subject.
Women of non-childbearing potential are defined as pre-menopausal females who are sterilised (tubal ligation or permanent bilateral occlusion of fallopian tubes); or females who have undergone hysterectomy or bilateral oophorectomy; or post-menopausal defined as 12 months of amenorrhea (in questionable cases a blood sample with detection of follicle-stimulating hormone [FSH] 25-140 IE/l is confirmatory).

Participant type(s)
Healthy volunteer

Age group
Adult

Lower age limit
19 Years

Upper age limit
55 Years

Sex
Both

Target number of participants
35

Total final enrolment
35

Key exclusion criteria
1. History of any clinically significant disease or disorder which, in the opinion of the Investigator, may either put the subject at risk because of participation in the study, or influence the results or the subject’s ability to participate in the study
2. Any clinically significant illness, medical/surgical procedure or trauma within 2 weeks of the first administration of IP
3. Malignancy within the past 5 years with the exception of in situ removal of basal cell carcinoma
4. Any planned major surgery within the duration of the study

5. Any positive result on screening for serum hepatitis B surface antigen, hepatitis C antibody and Human Immunodeficiency Virus (HIV)
6. After 10 minutes supine rest at the time of screening, any vital signs values outside the following ranges:
6.1. Systolic blood pressure <90 or >140 mmHg, or
6.2. Diastolic blood pressure <50 or >90 mmHg, or
6.3. Pulse <40 or >90 bpm
7. Prolonged QTcF (>450 ms), cardiac arrhythmias or any clinically significant abnormalities in the resting ECG at the time of screening, as judged by the Investigator
8. Presence of braces, partials, dentures or any dental work that could, in the opinion of an Investigator, affect the conduct of the study (including missing molars)
9. Presence or history of significant form of oral and/or pharyngeal inflammation, oral lesions and/or gum disease or temporomandibular joint dysfunction
10. Existing signs of skin irritation or skin damage at the sites where the Equivital LifeMonitor device is to be located, as judged by the Investigator
11. Subjects with implanted defibrillators or pacemakers
12. Female subject who is pregnant or lactating
13. History of severe allergy/hypersensitivity or ongoing allergy/hypersensitivity, as judged by the Investigator, or history of hypersensitivity to drugs with a similar chemical structure or class to nicotine
14. Plan to quit using tobacco- or nicotine-containing products within 3 months of the end of the current study, or previously attempted to quit using tobacco- or nicotine-containing products in the 28 days prior to the first IP use
15. Planned treatment or treatment with an investigational medicinal product or another IP within 3 months prior to Day -1. Subjects consented and screened but not dosed in previous phase I studies are not excluded.
16. Positive screening result for drugs of abuse or alcohol at the time of screening or on admission to the unit prior to first use of IP. Positive results that are expected given the subject' s medical history and prescribed medications can be disregarded as judged by the Investigator.
17. History of alcohol abuse or excessive intake of alcohol, as judged by the Investigator
18. Presence or history of drug abuse, as judged by the Investigator
19. History of, or current use of, anabolic steroids
20. Plasma or platelet donation within one month of the first IP use or blood donation (or corresponding blood loss, ≥450 mL) during the three months prior to the first IP use
21. Employees or immediate relatives of the tobacco industry or the clinical site
22. Investigator considers the subject unlikely to comply with study procedures, restrictions and requirements

Date of first enrolment
25/04/2022

Date of final enrolment
30/05/2022

Locations

Countries of recruitment
Sweden

Study participating centre
CTC Clinical Trial Consultants AB
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Sponsor information

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Industry

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Funder(s)

Funder type
Industry

Funder Name
British American Tobacco

Alternative Name(s)

Funding Body Type
Private sector organisation

Funding Body Subtype

For-profit companies (industry)

Location
United Kingdom

Results and Publications

Publication and dissemination plan
Publication in a high-impact journal

Intention to publish date
31/03/2025

Individual participant data (IPD) sharing plan
The data-sharing plans for the current study are unknown and will be made available at a later date

IPD sharing plan summary
Data sharing statement to be made available at a later date

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Participant information sheet	version 1.0	10/02/2022	21/04/2022	No	Yes
Results article		09/08/2025	12/08/2025	Yes	No