

TOBACCO USE: ADDICTION & MANAGEMENT



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TOBACCO PLANT FAMILY: SOLANACEAE

GENUS: NICOTIANA RUSTICA



| Rank | Country | Production (Million Tonnes) |
|------|--------------|--------------------------------|
| 1. | China | 3.400 |
| 2. | India | .875 |
| 3. | Brazil | .810 |
| 4. | USA | .345 |
| 5. | Indonesia | .226 |
| 6. | Malawi | .151 |
| 7. | Argentina | .148 |
| 8. | Tanzania | .120 |
| 9 | Zimbabwe | .115 |
| 10. | Pakistan | .102 |
| . | TOTAL | 6.333 |

CONSUMABLE TOBACCO PRODUCTS

- ❑ **SMOKELESS** products used for: Chewing, Snuffing & Local application

Around 4000 chemicals found in smokeless tobacco (tobacco leaf).

- ❑ **SMOKING** is in

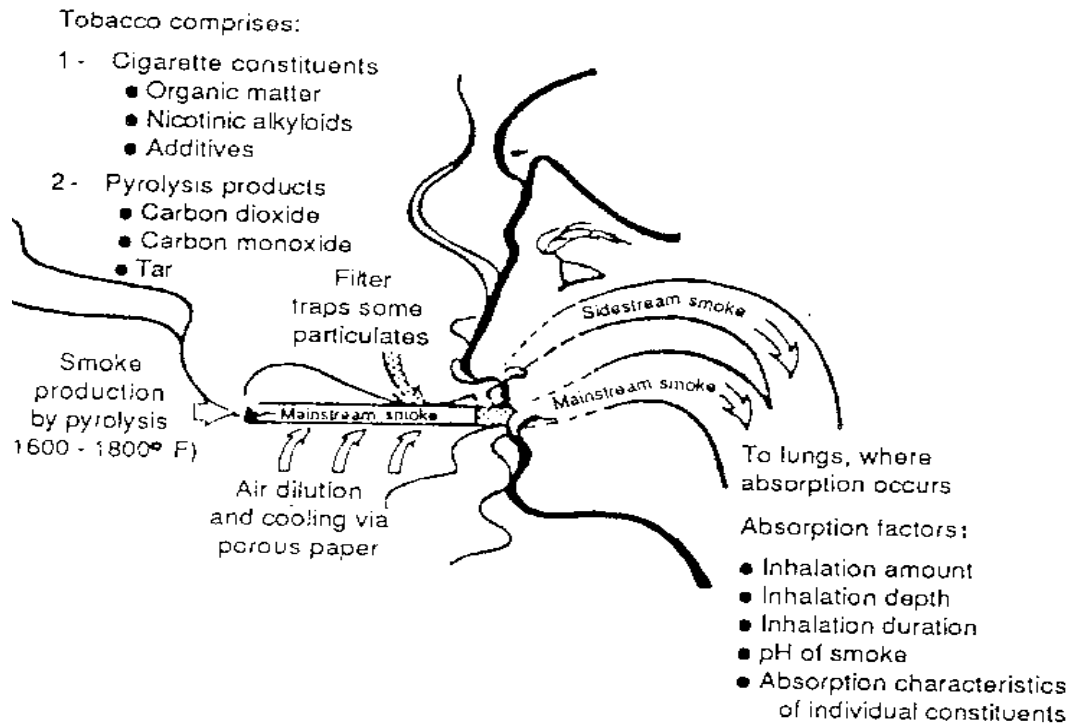
Form of:

- Cigarette/Beedi
- Chillum/Hukkah
- Cigar/Cheroot



TOBACCO SMOKING

- Lighted cigarette at 800oC gives the smoker, with each puff, hot potpourri of gases & many sized particles from main-stream smoke & side-stream smoke.



CONSTITUENTS OF TOBACCO SMOKE

ESTIMATED NUMBER OF CHEMICAL COMPOUNDS IN CIGARETTE SMOKE

7,357



70

NUMBER OF THESE COMPOUNDS WITH CONFIRMED CARCINOGENIC ACTIVITY

Many chemically active & most damaging

- ❑ **Nicotine** main chemical, highly addictive, causes many patho-physiological changes in the body.
- ❑ **Tar** suspended particulate matter & carcinogen.
- ❑ **Carbon monoxide** toxic gas, reduces oxygen carrying capacity of Hb.
- ❑ **Nitrogen oxide** damages lung tissue causing emphysema.
- ❑ **Hydrogen cyanide** allows toxic smoke ingredients accumulate in lung tissue.
- ❑ **Ammonias** damage lung tissue.
- ❑ **Metals** like arsenic, cadmium & lead. Some of these are carcinogenic.
- ❑ **Radioactive compounds** are carcinogenic.

CARCINOGENS IN TOBACCO SMOKE

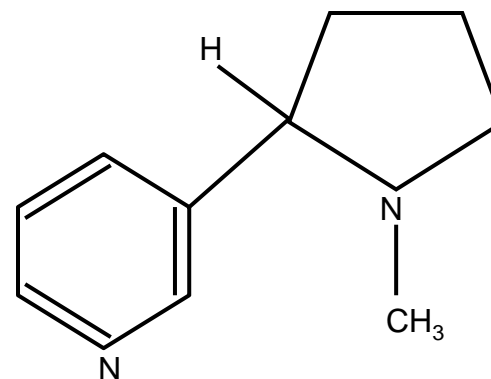
70 carcinogens identified.

- ❑ **N-Nitrosamines** cause DNA mutation. NNK (Nicotine-derived nitrosamine ketone) & NNN (nitrosonornicotine)
- ❑ **Benzene** causes chromosomal changes in bone marrow leading to anaemia
- ❑ **Aromatic amines**: high in side-stream smoke, confirmed human carcinogen.
- ❑ **Aldehydes**: Formaldehyde human carcinogen & acetaldehyde animal carcinogen
- ❑ **1,3-Butadiene** is human carcinogen & teratogen.
- ❑ **Acrolein** unsaturated aldehyde associated with lung cancer & DNA mutagen.
- ❑ **Polyaromatic hydrocarbons**, are carcinogenic, mutagenic & teratogenic. High PAH exposure in pregnant womb leads to low IQ in the child.

NICOTINE IN TOBACCO

- ❑ In pure form:
 - Colourless, volatile, alkaline liquid,
 - Turns pale yellow to dark brown on exposure to air giving tobacco smell.
- ❑ Isolated from leaves by Posselt & Reimanbasic in 1828.
- ❑ Highly toxic & lethal causing patho-physiological changes
- ❑ One-drop sufficient to kill dog (or a man) within minutes.
- ❑ In smokeless tobacco dissolved in moisture of tobacco leaf as water soluble salt,
- ❑ In burning cigarette volatilizes & suspended on tar droplets.

An alkaloid



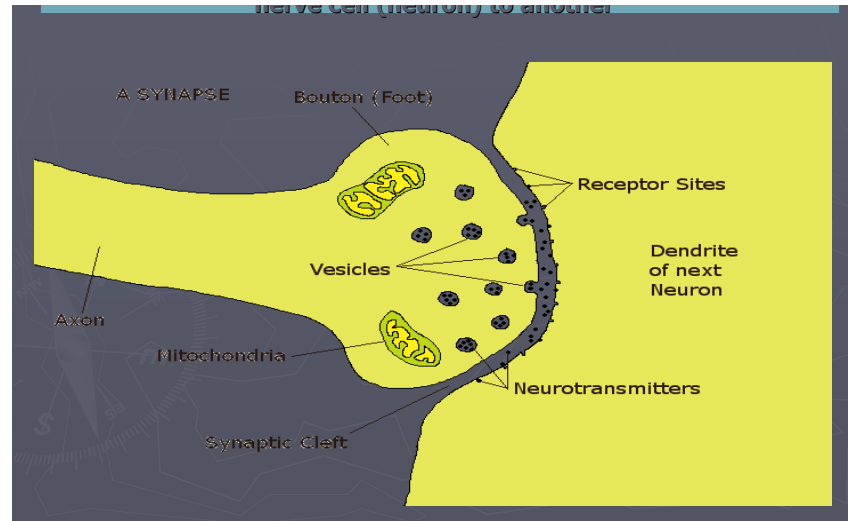
NICOTINE

1-methyl-2-[3-pyrodyl] pyrrolidine
 C_{10} , H_{14} & N_2 double ring structure

ABSORPTION OF NICOTINE

- ❑ Conveyed through lungs, skin, & mucous membranes.
- ❑ Pulmonary absorption commonest & fastest.
- ❑ Smokeless tobacco absorbed more gradually.
- ❑ Absorbed tobacco goes quickly to various body parts
- ❑ Nicotine intake from one cigarette varies widely, ranges from 10- 80 mg/day, or 0.4 -1.6 mg/cigarette
- ❑ After absorption, nicotine reaches brain within 7 seconds
- ❑ Psycho-active rewards of smoking occur quickly & is highly reinforced.

MECHANISM OF ACTION



- ❑ Nicotine binds to **nAChRs** in brain & influences cerebral metabolism & increases transmitter release .
- ❑ Chronic administration leads to **desensitization** & inactivation of nAChRs with subsequent up-regulation of nAChRs sites.

nAChRs & OTHER RECEPTORS

- ❑ **nAChRs** are concentrated in midbrain areas:
 - Mid-brain
 - Tegmentum,
 - Striatum,
 - Nucleus accumbens,
 - Ventral tegmental area (VTA),
 - Also muscles, adrenal glands, heart, & other organs.
- ❑ Nicotine also binds to **cholinergic receptors** in:
 - Autonomic ganglia, adrenal medulla,
 - Chemoreceptors of carotid bodies & aortic body & neuromuscular junction.
- ❑ Nicotine also binds to receptors in:
 - Nigrostriatal mesolimbic dopaminergic neurons.

NICOTINE-ACETYLCHOLINE RECEPTORS

- ❑ **Nicotine receptors have 12 subunits:**
 - 9 alpha (alpha₂ to alpha₁₀) &
 - 3 beta (beta₂ to beta₄) have central role in autonomic transmission.
- ❑ nAChRs complex has 5 subunits in peripheral & CNS system.
- ❑ Most abundant receptor subtypes are:
 - alpha₄-beta₂,
 - alpha₃-beta₄ &
 - alpha₇ (homomeric).
- ❑ Beta subunit has role in nicotine addiction.
- ❑ Alpha₄-beta₂ combination has greatest sensitivity to nicotine.
- ❑ Alpha₃-beta₄ & alpha₇(homomeric) mediate CVS nicotine effects.
- ❑ Alpha₇ also involved in rapid synaptic transmission & plays role in learning & sensory gating.

MID-BRAIN DOPAMINE REWARD PATHWAY

- ❑ Nicotine is one of **most potent stimulants of midbrain dopamine reward pathway** & when stimulated, there is release of
 - Acetylcholin,
 - Norepinephrine,
 - Dopamine
 - Serotonin,
 - Vasopressin,
 - Growth hormone and ACTH.
- ❑ Nicotine acts on **locus ceruleus regulating vigilance, arousal, concentration & stress reactions making tobacco users more alert.**
- ❑ Interaction between nicotine & nAChRs **affects learning, memory** and other functions.

NEUROTRANSMITTER RELEASE & BEHAVIOURAL EFFECTS

| Dopamine | Pleasure & Appetite suppression |
|-----------------|--|
| Norepinephrine | Arousal & Appetite suppression |
| Acetylcholine | Arousal & Cognitive enhancement |
| Glutamate | Learning & memory enhancement |
| Serotonin | Mood modulation & Appetite suppression |
| Beta-endorphin | Reduction of anxiety & Tension |
| GABA | Reduction of anxiety & Tension |

NICOTINE AS AN ADDICTIVE

- ❑ Nicotine leads to tolerance to its own action like other dependence producing drugs.
- ❑ Use of 4 cigarettes is sufficient to expose a person to the risk of becoming dependent
- ❑ Within few days symptoms of dependence start appearing.
- ❑ Because of addiction tobacco consumption continues, leads to high morbidity & mortality.

NICOTINE WITHDRAWAL SYMPTOMS

- ❑ Worst in first 24-48 hours gradually decline in intensity disappear in few weeks
- ❑ Symptoms may include 4 (or more) of the following within 24 hours of stopping of smoking, often causing significant distress.
 - Craving,
 - Depressed mood,
 - Increased appetite or weight gain,
 - Irritability, frustration, anger,
 - Anxiety, difficulty in concentration, restlessness.

TOBACCO SMOKING CESSATION

- ❑ Tobacco-related deaths are preventable.
- ❑ **“Nicotine dependence warrants medical treatment as does any drug-dependence disorder or chronic disease.”**(Fiore et al, 2000)
- ❑ Physicians can reduce morbidity & prevent mortality.
- ❑ Every visiting patient should be asked about smoking history & possibility of leaving it.
- ❑ Methods used for tobacco-cessation include:
 - Pharmacotherapy,
 - Behaviour therapy,
 - Counseling,independently or in combination

TOBACCO DEPENDENCE IS

Assess the following:

- ❑ Detailed history,
- ❑ Motivation to leave
- ❑ Physical & mental health status & co-morbidity
- ❑ Environmental factors working as re-inforcers
- ❑ Benefits of cessation and possible withdrawal symptoms be explained.
- ❑ Severity of addiction

ASSESSMENT OF NICOTINE DEPENDENCE

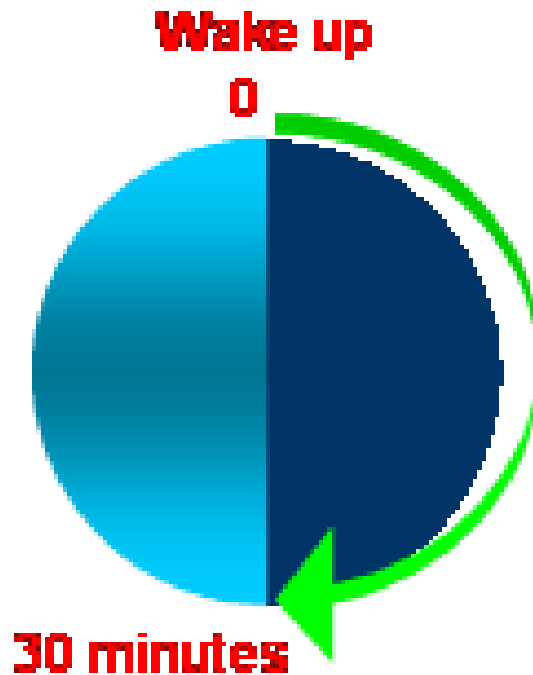
FAGERSTROM TEST FOR NICOTINE DEPENDENCE

- ❑ How soon after you wake up do you smoke your 1st cigarette?
(Within 5 min.=3; 5-30 min.=2; 31-60 min.=1 and beyond 60 min.=0)
- ❑ Do you find it difficult not to smoke at places where you should not? (Yes=1; No=0)
- ❑ Which cigarette would you most hate to give up?
(First cigarette in the morning=1; Any other one=0)
- ❑ How many cigarettes do you smoke each day?
(10 or fewer=0; 11-20=1; 21-30=2 and 30 and beyond=3)
- ❑ Do you smoke more during the first few hours of waking? (Yes=1; No=0)
- ❑ Do you still smoke if you are so sick that you are in bed most of the day? (Yes=1; No=0)

SCORING: 7-10 points=High dependence; 4-6= Moderate; Less than 4= Minimal

Time to first cigarette (TTFC)

TTFC
More than
30 minutes after
waking
= LOW
DEPENDENCE



TTFC
Less than or
equal to
30 minutes after
waking
= HIGH
DEPENDENCE

DIFFICULTIES IN TOBACCO CESSATION

❑ CUES TO SMOKING:

- Some people smoke when they work alone, others smoke in company. Sight of ashtray, other person smoking, some smoke when tense, frustrated, angry, some smoke to regulate their mood.

❑ BARRIERS TO SMOKING CESSATION:

➤ ADDICTION:

- Main barrier,— Irritability, restlessness, poor concentration, hunger, craving

➤ FEAR OF WEIGHT GAIN:

- Smoking increases metabolism, decreases serum leptin level, it decreases appetite and reduces body weight

➤ DEPRESSION:

- 2 times more common in women, smoking 4 times more common in depression, Nicotine improves mood, some smokers self-medicate to relieve depression.

➤ STRESS:

- Family environment, social relations, disadvantaged group of people.

MEDICATION FOR SMOKING CESSATION

| FIRST-LINE | DOSAGE | ADMINISTRATION |
|---|---|---|
| BUPROPIONE – non-nicotine, block dopamine & nor-adrenaline, & increases their level. | 150 mg | 150 mg daily for 3 days and then 150 mg twice a day for 7 – 12 weeks. Quit date 1-2 wks after start |
| NICOTINE GUM nicotine absorbed by oral mucosa, chewed, kept under tongue | 2 mg piece for 25cigarettes, 4 mg piece for more than 25cigarettes per day. | 1 piece every 1-2 hrs. for 6 wks, 1piece every 2-4 hrs. for 2 wks, 1 piece every 4-8 hrs for 2 wks, max. 24 piec. |
| TRANS-DERMAL PATCHES | 21 mg/24 hours, 14 mg/24 hours and 7 mg/24 hours | >10 cigarettes/day, 21 mg for 6 wks, then 14 mg for 2 wks & 7 mg/day for 2 wks |
| NICOTINE LOZENGE | 2mg pce if <25 cigarettes/per day, 4 mg pce if >25 are smoked. | 1 pce 1-2 hrs for 6 wks, pce every 4 hrs for 2 wks & then 1 piece every 4-8 hrs |
| NICOTINE SPRAY | 1 mg-spray each nostril | 1-2 spray/hr 40 doses/day & max. 3 months use. |
| NICOTINE INHALER | 6-16 cartridges | 4 mg metered spray. |

MEDICATION FOR SMOKING CESSATION

| SECOND-LINE | DOSAGE | ADMINISTRATION |
|---|-------------------|-------------------------------|
| CLONIDINE alfa-2 adrenergic receptor agonist, anxiolytic. Can cause hypotension & bradykinesia | 0.15 075 mg/day | 01, 02 and 0.3 mg tablets |
| NORTRIPTYLINE – TCA, blocks reuptake of norepinephrine | 75mg – 100 mg/day | 10, 25, 50 and 75 mg tablets. |

Non-nicotine agents

Varenicline:

- ❑ Has high & selective activity at $\alpha 4$ - $\beta 2$ receptor.
- ❑ A partial agonist at this receptor in vivo producing lesser response than that of nicotine (30-60%) but also blocks the effect of any nicotine added to the system.
- ❑ Maintains a moderate level of dopamine release, which reduces craving & withdrawal during abstinence.
- ❑ Blocks reinforcing effects of nicotine obtained from cigarette smoke in case of relapse.

Non-nicotine agents

NicVAX:

- ❑ It works by stimulating immune system to make antibodies that bind to nicotine molecules, making them too big to cross the blood-brain barrier & preventing them from reaching nicotine receptors & trigger pleasure sensation that smokers & users of nicotine experience & become addicted to.
- ❑ Data from pre-clinical trials suggest that injectable vaccine is effective not only in helping people quit smoking but also from relapsing back because the nicotine antibodies last a long time.

BEHAVIOURAL TREATMENT FOR NICOTINE DEPENDENCE

- ❑ Aversion therapy
 - Satiation
 - Rapid smoking
- ❑ Contingency contracting
- ❑ Social support
- ❑ Coping skills training
- ❑ Relaxation training

OTHER THERAPIES

- ❑ **Hypnotherapy:** is used to weaken the desire to smoke & strengthen will to stop smoking through post-hypnotic suggestions that:
 - Smoking is poison to your body
 - You need your body to live
 - You owe your body this respect and protection.
- ❑ **Acupuncture:** involves the use of needles or staple like attachments mainly at the pinna of ear.

PHYSICIAN'S COUNSELING

SMOKING CESSATION: STRATEGIES, "THE 5 A's" *

- ❑ **ASK** - Systematically identify all tobacco smokers at every visit. Implement an office-wide system that allows the inquiry and documentation of tobacco use for every patient.
- ❑ **ADVISE** - Strongly urge all smokers to quit in a strong, clear and personalized manner.
- ❑ **ASK** - every smoker if he or she is willing to make a quit attempt at this time.
- ❑ **ASSIST**- Aid the patient in quitting, help patient with the development of a quit plan. Encourage nicotine replacement therapy and/or bupropion.
- ❑ **ARRANGE**- schedule follow-up contact in person or via telephone.

TOBACCO: A DEADLY SUBSTANCE

- ❑ A **public health danger** of modern times.
- ❑ Tobacco smoke **kills** the smoker silently **much before** the actual age to exit.
- ❑ Smokers harm not only themselves, they **expose others** to the risk of morbidity and mortality.
- ❑ Smokers are unaware that they raising **sick and unhealthy children** in their houses.

What do these colourful packets look like? Poison sachets or mouth fresheners?



They are fooling the children of our country and we are allowing them to!

1 CIGARETTE
- 7 Minutes
of Your Life

THANKS

