

# SMOKING AND (not only) ORAL HEALTH

FOR DENTISTS

<https://is.muni.cz/www/2422/um>

# WHO:

- SMOKING IS THE MOST IMPORTANT
- SINGLE
- PREVENTABLE RISK FACTOR
- of MORBIDITY and
- PREMATURE MORTALITY

# FORMS of TOBACCO PRODUCTS

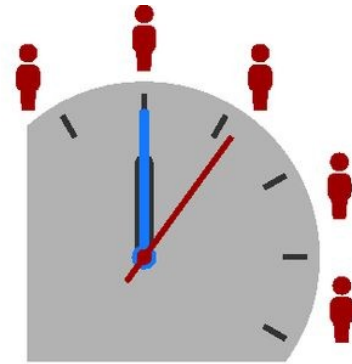
- COMBUSIBLE (cigarettes, cigars, pipes, water pipes)
- SMOKELESS (chewing, snuf)
- VAPORIZING (Electronic Nicotine Delivery Systems ENDS – e-cigarettes... JUUL)
- HEATED – NOT BURNED TOBACCO (I Quit Original Smoking iQOS)

# A global pandemic



The number of people killed globally by tobacco **EVERY YEAR**

**600,000**  
of these are killed by second-hand smoke



One person dies from tobacco every **6 SECONDS**



**100 MILLION**

The number of deaths from tobacco in the 20th Century



**72 MILLION**

The number of deaths from war in the 20th Century (including WW1 and WW2)

# MORTALITY

- TOGETHER 50 % of SMOKERS DIE DUE TO THEIR SMOKING
- HALF OF THEM BEFORE the age 70y;
- THUS THEY LOST 20-25 YEARS OF THEIR LIFE
- THE DIFFERENCES OCCURE AFTER
- 20 YEARS OF ACTIVE SMOKING

# CAUSES OF SMOKERS' DEATH

- SMOKING CONTRIBUTES TO 25 DIFFERENT DISEASES;
- ANNUAL MORTALITY WORLDWIDE:
  - CVD ..... 1,700.000
  - CHOPD ..... 970.000
  - LUNG CANCER..... 850.000

# CVD-MECHANISMS of ACTION

- \*Ac.: VASOCONSTRICTION,  
HYPOXEMIA (COHb)  
ACCELERATED HEART RATE
- \*Sub.chr: CHANGES IN SERUM LIPIDS  
HIGHER THROMBOGENIC  
ACTIVITY
- \*Chr. PROGRESSIVE ATHEROSCLEROSIS

# LUNG CANCER

- ACTIVE SMOKING .....90 %
- PASSIVE SMOKING ..... 4 %
- OCCUPATION ..... 5 %  
(azbest, radiation, nickel, chromium, PAH,  
additives for rubber industry, ...)
- ENVIRONMENT ..... 1 %



# SMOKING AND CANCER

- HEAD AND NECK – RR 10 – 12  
+ ALCOHOL – RR 40 - 135
- URINARY TRACT
- CERVIX UTERI
- STOMACH, INTESTINE, RECTUM
- LIVER, PANCREAS
- LEUKEMIA

# CANCER AMONG CHILDREN EXPOSED TO PS

- LEUKEMIE (ac.lymfatic) RR 2 - 3
- HEPATOBLASTOM
- BRAIN CANCER
- NEWBORNS OF SMOKING WOMEN  
have about 1,5 % cells with  
CHROMOSOMAL ABBERATIONS = like  
30y OLD ADULTS

# CIGARETTE SMOKE:

- Cca 5.000 – 7.000 CHEMICALS
- 67 CONFIRMED or HIGHLY PROBABLE HUMAN CARCINOGENS (out of the total list of 73 human carcinogens)
- 33 TOXIC CONTAMINANTS OF AMBIENT AIR
- 47 CHEMICALS - TOXIC WASTE

# CARCINOGENICITY

- **GENOTOXIC:**
- DIRECT (from human carcinogens)
- INDIRECT (from their biotransformation to oxidative radicals)
- **EPIGENETIC:** reduction of apoptosis, support of pro-carcinogenic factors, revascularization of tumor tissue, lost of cells adherence => metastases

# TYPES of TOBACCO:

- Classic tobacco products:
- CIGARETTES

RISK FOR LUNG CANCER

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- CIGARS, PIPES
- SMOKELESS (chewing, snus)

RISK FOR HEAD AND NECK CANCER

# WATER PIPE

- Cca 30% TOBACCO, MOLASSES, GLYCERIN, HONEY, FRUIT
- SMOKER INHALE 70 l OF SMOKE =  
100-200 times more  
than from cigarette
- **WATER DOES NOT „PURIFICATE“  
THE SMOKE, but COOLS IT**

# WATER PIPE CONTAINS:

- 30-100 time MORE of TAR
- 17- 50 time MORE of CO
- 6 time MORE of NICOTINE
- And OTHER TOXIC SUBSTANCES  
FROM EMBERS espec. BENZENE

# CONSEQUENCES:

- DEPENDENCE (nicotine)
- CANCER: LUNG .....OR 2 – 6
- ORAL .....OR 4 – 5
- OESOPHAG.....OR 1.8
- ORAL DYSPLASIA ..... OR 8.3
- PARODONTITIS ..... OR 3 - 5
- POST-EXTRACTION DRY BED   3



# CONSEQUENCES:

- RESPIRATORY DIS. ....OR 2.3
- CARDIOVASCUL. D. ....OR 2.3
- METABOLIC SY. .... OR 3.2
- INFECTIONS – common use of mouthpiece
- RISK FOR PASSIVE SMOKERS

# THE RESEARCH

- IS QUITE NEW, DUE TO
- RISING PREFERENCE IN DEVELOPED COUNTRIES, mainly among
- UNIVERSITY STUDENTS

# ELECTRONIC NICOTINE DELIVERY SYSTEMS

- 2003 - China
- Now „BIG TOBACCO“ Companies with false advertising of SAFE SMOKING=>
- FOR SMOKING ON PUBLIC PLACES
- FOR SMOKING CESSATION

**SUPERSMOKER**  Bluetooth™



# E-CIGARETTES

- BATTERY,
  - CARTRIDGE: NICOTINE,  
GLYCEROL,  
PROPYLENGLYCOL  
ADITIVES (honey, fruit,  
chocolate, alcohol, ....)more than 7000
- \*TEMPERATURE 60° C

# QUICK PROGRESS:

- 1st generation – simple, for one use
- 2nd generation – liquid, self filling
- 3rd generation – tank = liquid + possibility to enhance the power of battery
- APPROX. EVERY MONTHS A NEW PRODUCT - JUUL
- MORE THAN 7000 ADDITIVES

# NICOTINE

- MAIN PSYCHOACTIVE DRUG
- VOLUME .....5, 10, 20 ml
- CONCENTRATION ..... 0 – 20 mg/ml
- EVEN THE SMALLEST CARTRIDGE =  
100 mg of NICOTINE
- LETAL DOSES: 10 mg (children)  
30-60 mg (adults)

# POISONING:

- By transdermal absorption (fillers)
- By ingestion (small children)
- Nausea, vomiting, palpitations, headache
- Number of victims raises annually
- 51 % children  $< 6$  y
- 43 % young  $> 15$  y
- 6 % children 6 – 15 y



# EMITED CHEMICALS:

- DI-ETHYLEN GLYCOL
- NANOPARTICLES (Cr, Ni, Sn, Ag, Al...)
- NITROSOAMINES
- ACETALDEHYDE, FORMALDEHYDE
- PAH
- CHLORINATED POLYCYCLIC H.

# HEALTH CONSEQUENCES:

- Ac. Similar as of classic CIGARETTES
- Due to NICOTINE
- CARRIOGENIC EFFECT OF SWEET ADITIVES
- Chr. and late – NOBODY KNOWS
- MAY BE DIFFERENT KINETIC and PHYSIOLOGIC PATHWAYS

# NEW „MYSTERY DISEAS“

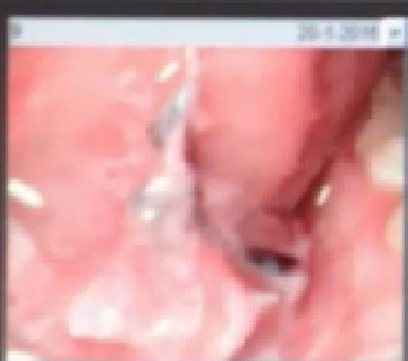
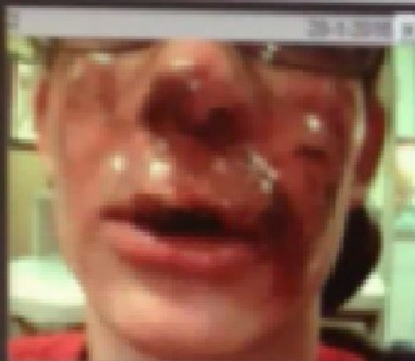
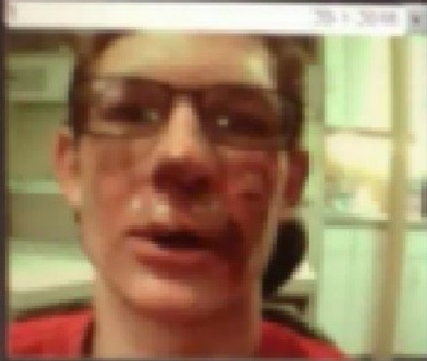
- MORE THAN 500 CASES (even >800),
- 2/3 at age 18-34y, 16% < 18 y
- 12 deaths in USA, + 1 in Canada
- „steril pneumonia“, GIT problems, fever
- NOBODY KNOWS THE CAUSE: fruit additives, THC, oil-E vit, black market, home made additives

# BAN of VAPING

- IN SEVERAL STATES and
- STRONG WARNING AGAINST ADVERTISING ABOUT SAFETY OF e-CIGARETTES
- The use of these products is creating a new generation of young people who are addicted to nicotine and will spend the rest of their life buying nicotine in some form

# BURNING

- EXPLOSIVE EVENT of LITHIUM BATTERY
- FIRES, BURNS, INJURY
- Air force recommendations => e-cigarettes as dangerous products (like arms)
- In US airlines are banned



# STATEMENT (WHO, EU, US)

- NOT DRUG FOR TREATMENT, but
- ANOTHER TOBACCO PRODUCTS
- RISK OF POISSONING
- KEEPING both PHYSICAL and BEHAVIORAL DEPENDENCE
- URGENT NEEDS FOR FURTHER RESEARCH OF CHRONIC OUTCOMES

# EXPOSURE TO NICOTINE IS OUT OF CONTROL

- Some smokers tell about several puffs every 10 minutes
- One „pod“ in JUUL => as 20 cigarettes
- VERY FAST DEVELOPED ADDICTION



# REPRODUCTION - MEN

- IMPOTENCE (sympatricotonus)
- LESS AMOUNT of EJACULATE
- LESS COUNT of SPERM
- LESS of MOTILE SPERMS =>  
INFERTILITY/STERILITY
- MORE of ANEUPLOID SPERMS =>  
HEREDITARY MALFORMATIONS

# REPRODUKTION-WOMEN

- HORMONAL DYSBALANCY=>  
MENSTRUAL DYSREGULATION,  
EARLIER MENOPAUSE (5-8 y)
- INFERTILITY, STERILITY
- EXTRAUTERINE GRAVIDITY
- PLACENTA PRAEVIA
- ABORTION, STILL BIRTHS

# PRENATAL EXPOSURE

- FETAL TOBACCO SYNDROME =>
- RISK FOR HEALTH IN POSTNATAL, CHILDHOOD and ADULTHOOD (programming)
- CONGENITAL MALFORMATIONS
- NEUROPSYCHICAL DISORDERS (ADHD, conduct disorders, dependence, criminality)
- GENOTOXIC DAMAGES =>CANCER

# OTHER DISEASES

- GASTRIC ULCER, POLYPOSIS, CROHN'S DISEASE
- IMMUNITY IMPAIRMENT: INFECTIOUS DIS., ALLERGIC DIS.
- VISUS (cataract, macular degeneration)
- SKIN DIS.
- PSYCHIATRIC DIS. (suicides, depression,) x protective in Parkinson dis.
- LOST OF MEMORY AND COGNITION =>senile dementia, AD

# SMOKING AND ORAL HEALTH

- LONGER HUMAN LIFE EXPECTANCY  
NEEDS LONGER WELL-PRESERVED  
HEALTH TEETH
- Food intake, speaking, mimicking
- THE MAIN CAUSE OF TEETH LOST  
ARE CARRIES and PARODONTITIS

# THE RISK FACTORS

- MALNUTRITION (DEFICIT Ca, F, vit. C)
- ALCOHOL, SWEETS
- Body Mass Index (overweight, obesity)
- POOR DENTAL HYGIENE
- SMOKING
- SOCIAL DETERMINANTS (education)

# SMOKERS ARE OFTEN:

- LESS EDUCATED
- WITH POORER NUTRITION
- WITH ABUSE OF ALCOHOL
- WITH POOR ORAL HYGIENE

# ORAL HYGIENE

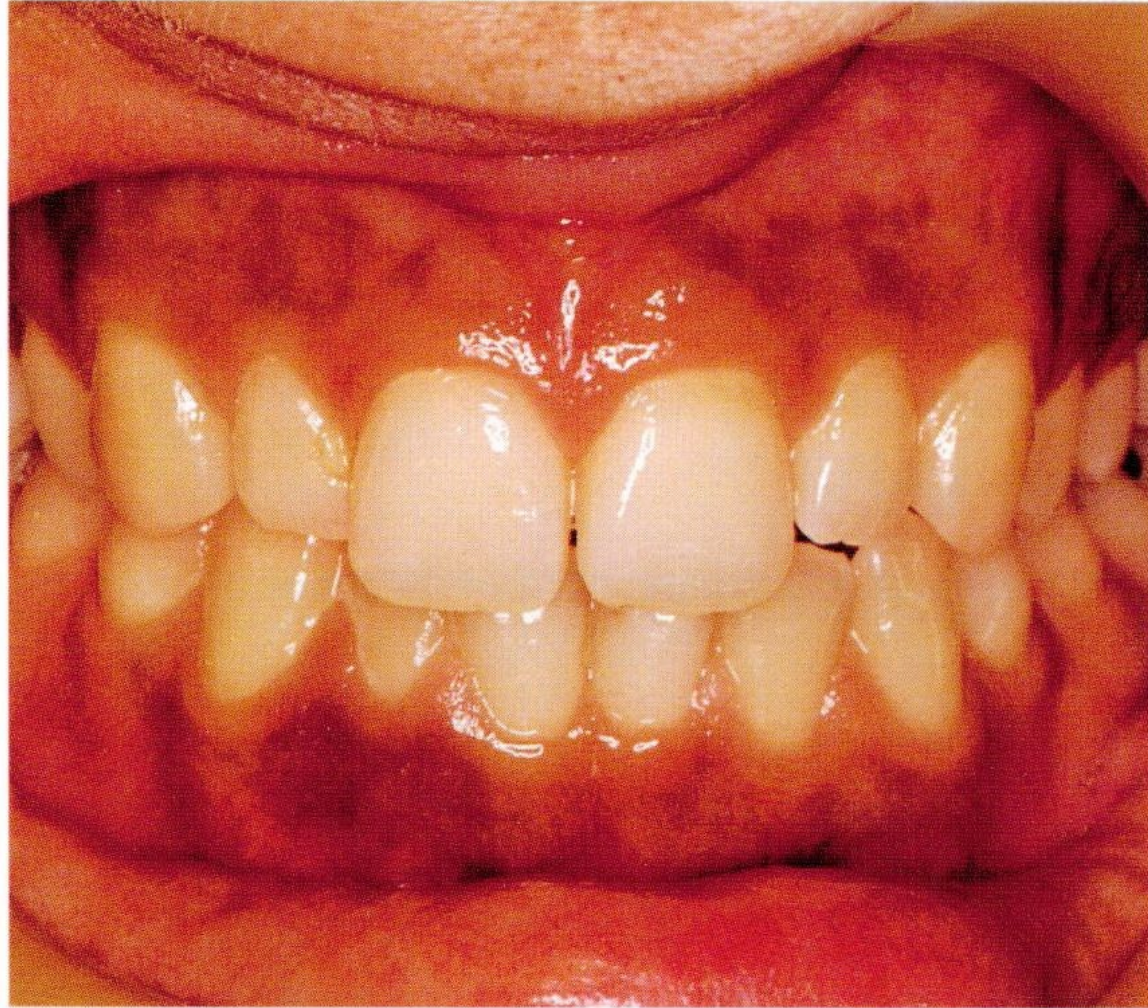
- IS WORSE EVEN AMONG HIGHLY MOTIVATED SMOKERS – DENTISTS STUDENTS :
- 9 times MORE NO-SMOKERS DECLARED HIGHER DAILY FREQUENCY OF TEETH BRUSHING than THEIR SMOKING COLEAGUES



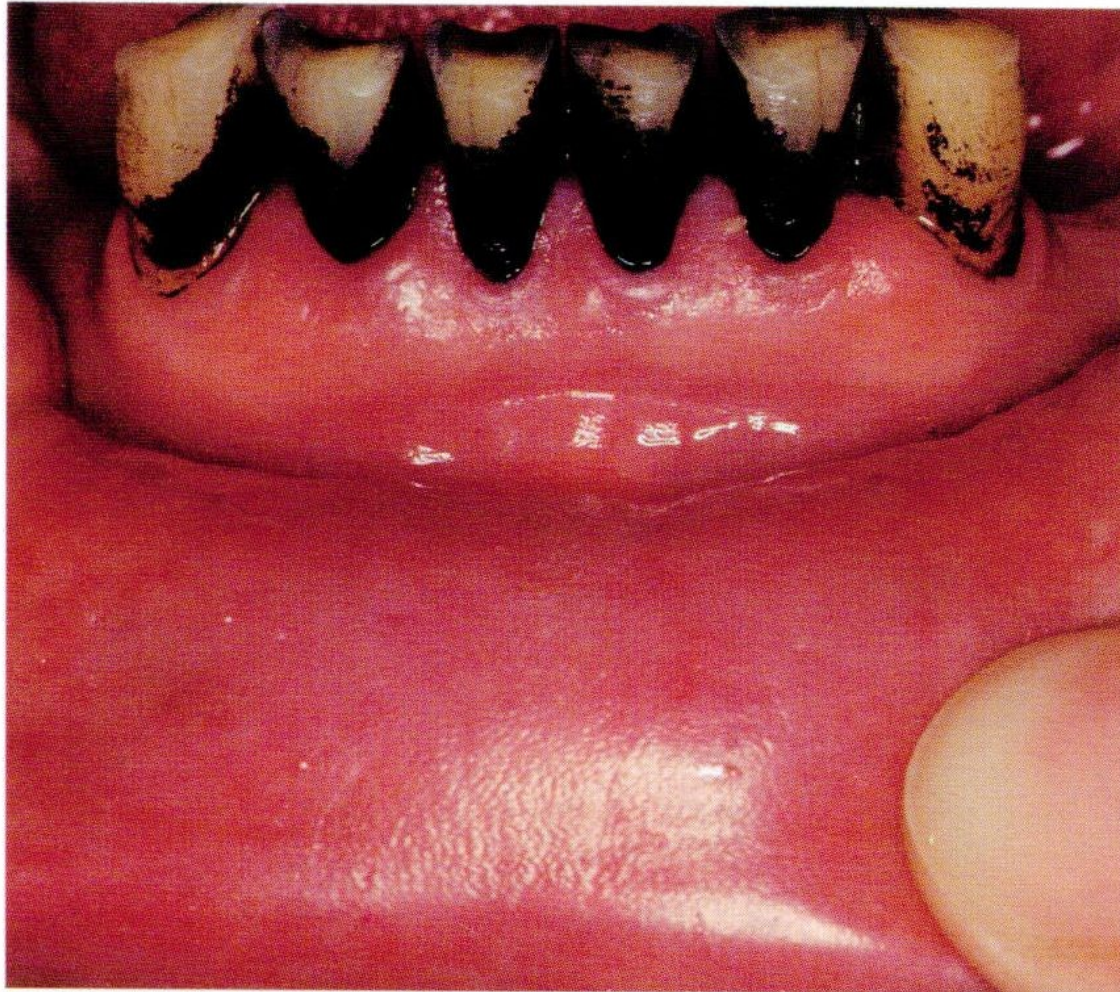
# NIKOTINOVÁ STOMATITIS



# KUŘÁCKÁ MELANÓZA



# TABÁKOVÉ SKVRNY



# ABRASE ZUBŮ



# CHLUPATÝ JAZYK



# JAPANESE STUDY

- EXPOSURE TO SMOKING AND CARIES AT THE AGE 3 YEARS:
  - Only during 1st trimester.....OR 1.37
  - During the whole pregnancy.....OR 1.70
  - Postnatally .....OR 1.23
  - Prenatally + postnatally ..... OR 1.62

# POSSIBLE MECHANISMS

- Mineralization of primary teeth at 13th week; NICOTINE:
  - affects cells proliferation and differentiation
  - inhibites odontoblasts' mineralization
  - promotes biofilm formation and
  - metabolic activity of Str-mutans
  - vit.D deficiency (due to poor smoker's diet)

# SMOKING and CARRIES

- HIGHER KPE (DMFt) SCORE AMONG SMOKERS
- HIGHER kpe (dmft) SCORE (AMONG EXPOSED CHILDREN to PS
- DOSE-RESPONSE ASSOCIATIONS  
(salivary cotinine, years of active smoking, number of cigarettes/day)



# PATHWAYS:

- POORER NUTRITION HABITS
- POORER ORAL HYGIENE
- POORER SECONDARY PREVENTION
- HIGHER AMOUNT of LACTOBACILs a Str.MUTANS
- LOWERED PROTECTIVE SALIVARY FUNCTION (lower pH, lower production)

# PRIMARY PREVENTION

- OF DENTAL CARIES STARTS PRENATALY:
  - - RIGHT MATERNAL NUTRITION
  - - PREVENTION OF STR. MUTANS TRANSFER (kissing, common spoon)
  - - GOOD CHILD'S NUTRITION
  - - DENTAL HYGIENE
  - - EARLY VISITS IN DENTIST'S OFFICE

# WHO GUIDELINES

- dmft 0 among at least 60 % of children aged 5-6 years
- RESTORATIVE INDEX near 100 %

# PARODONTAL DISEASES

- ORIGIN: G neg., anaerobe and micro-aerofil bacteria =>
- ENHANCING of PRO-INFLAMMATORY PROSTAGLANDINS and CYTOKINS =>
- DESTRUCTION of TISSUES

# VASOCONSTRICTION

- LOWER GUMs OXIDATION =>
- BETTER CONDITIONS FOR GROWTH  
of ANAEROBES

# SMOKERS HAVE

- 3 – 4 times MORE OFTEN SEVERE FORMS of PARODONTITIS:
  - DEEPER TRUNKS,
  - HEAVIER LOST of BONE MASS
  - MORE SUBGINGIVAL DEPOSITS of DENTAL CALCULUS
  - QUICK PROGRESSION of LOST of TEETH FIXATION (27 years)

# PARODONTAL DISEASES:

- OCCURE MORE OFTEN EVEN AMONG SMOKING YOUTH and YOUNG ADULTS
  - IZRAEL STUDY
  - CARDIFF DENTAL STUDY
- LESS SUCCESSFUL TREATMENT of SMOKERS

# PARODONTITIS

- Can serve as a risk factor for Alzheimer's disease due to dissemination of infectious agents in circulatory system, release of pro-inflammatory cytokines and CRPs;
- The inflammatory is also characteristic for AD (not only amyloid plaques and neurofibrillary tangles).



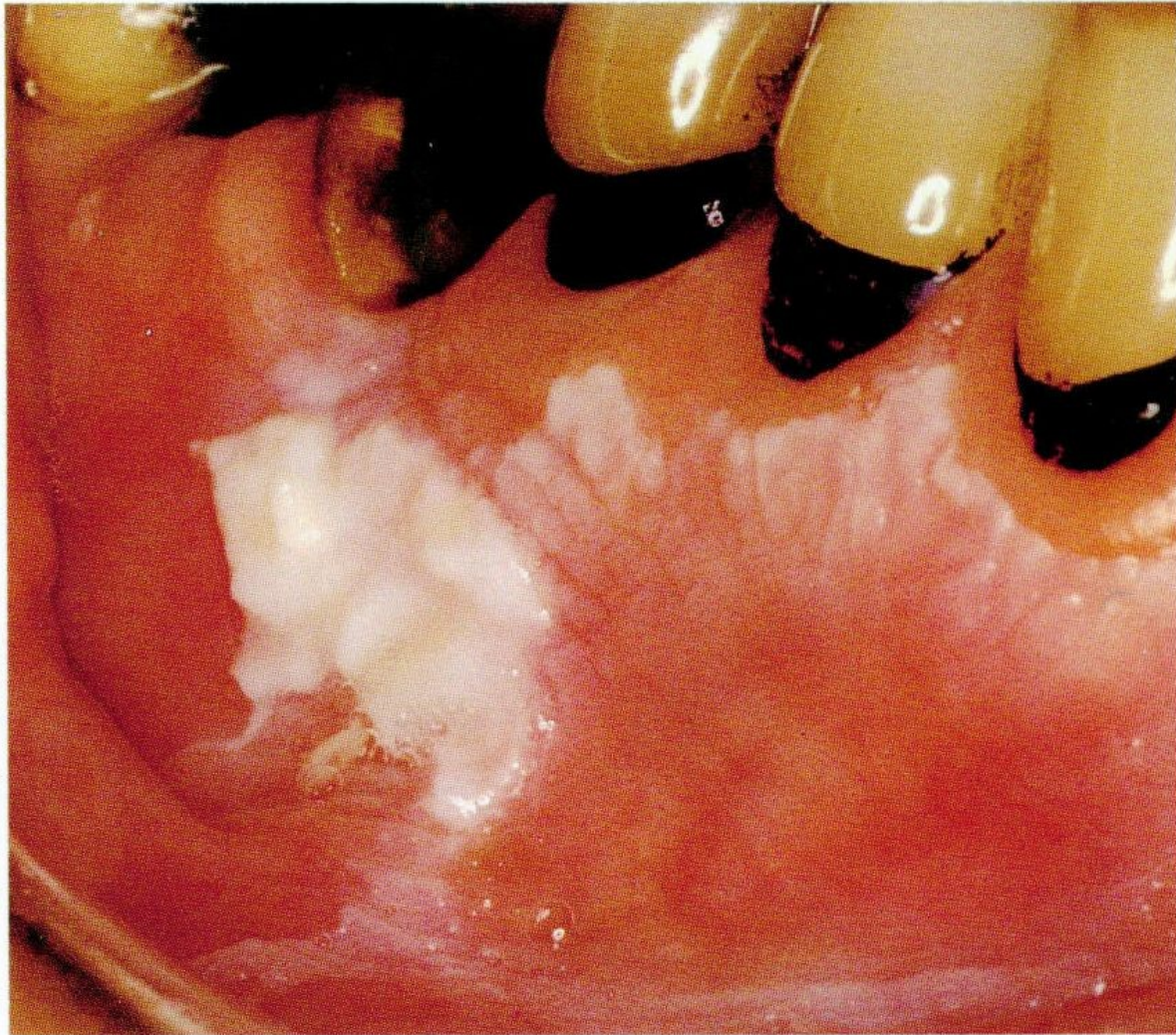
# TEETH LOST

- MORE THAN 8 TEETH HAVE NOT AT AGE 45-69 YEARS:
  - 30% NO - SMOKERS
  - 29% EX- SMOKERS (abstinence >31 y.)
  - 33% EX-SMOKERS (abstinence 21-30 y)
  - 42% EX-SMOKERS (abstinence 11-20 y)
  - 49% EX-SMOKERS (abstinence < 10 y)
  - 50% CURRENT SMOKERS

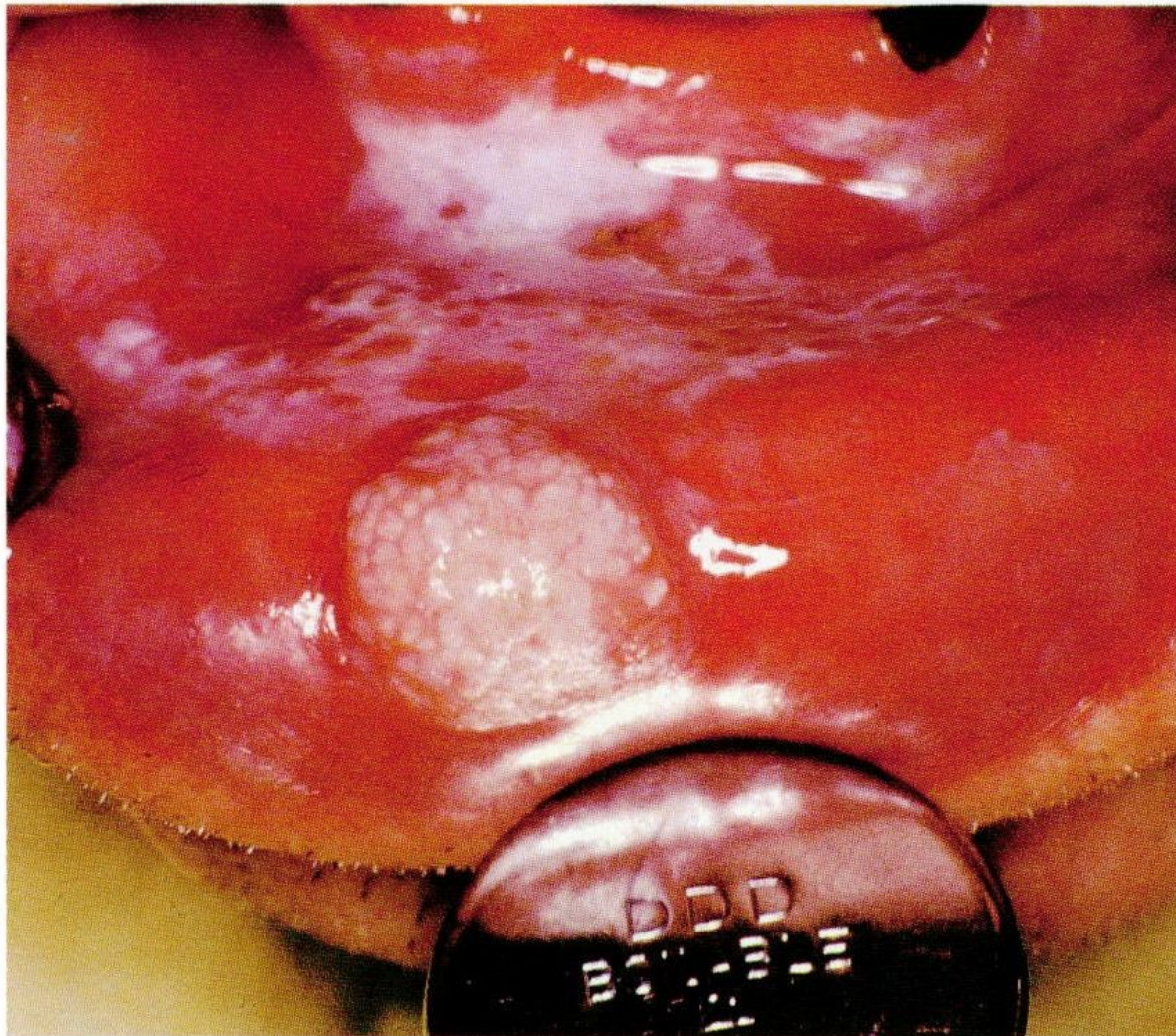
# LEUKOPLAKIE

- 6 times MORE OFTEN AMONG SMOKERS
- SIDE:
  - BUCCAL – CIGARETTES
  - PALATAL – PIPES, CIGARES
  - LIPS, BUCCAL – SMOKELESS TOB.

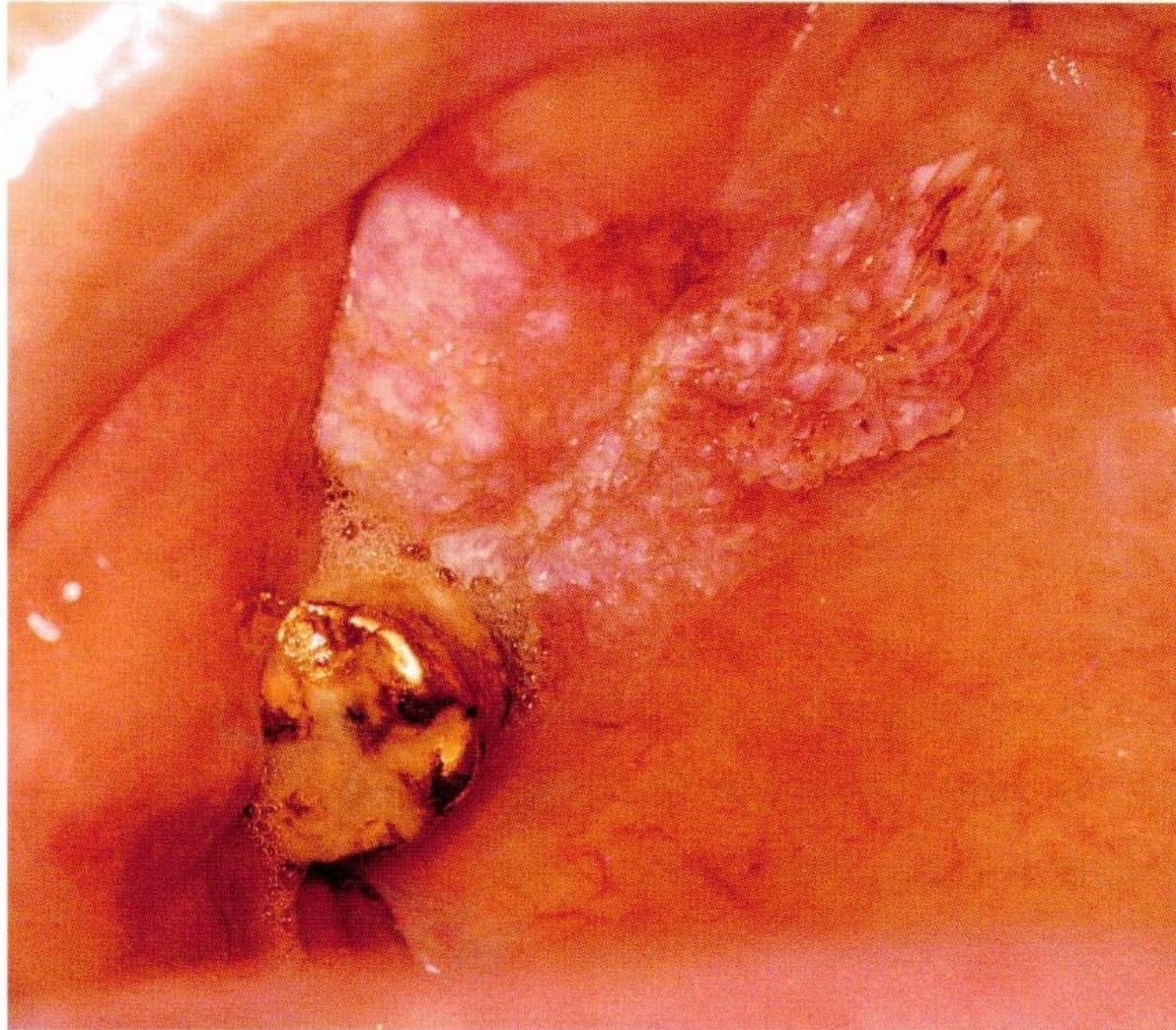
# Homogenní leukoplakie



# Verukózní leukoplakie



# Nodulární leukoplakie



# ORAL CANCER

- RELATIVE RISK 2 – 18
- ALCOHOL + SMOKING even 100
- OTHER RISKS ASSOCIATED with SMOKING:

Malnutrition,

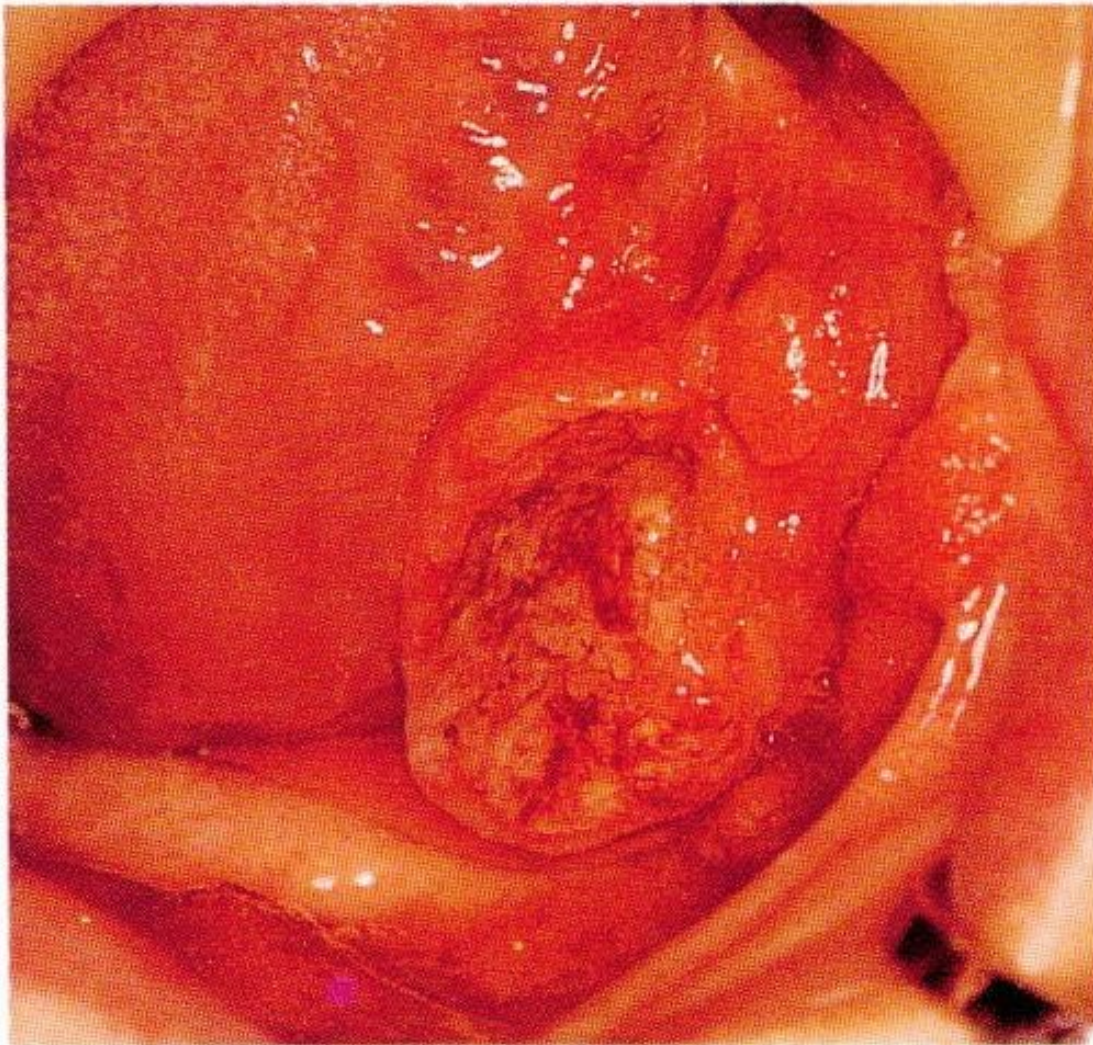
chr. Candidosis,

viral infections (human papiloma v., herpes simplex)

# EPIDEMIOLOGY

- MEN:WOMEN RATE 6:1, NOW 2:1
- MOST OFTEN AMONG 45 + y
- AMONG YOUNG SMOKELESS TOBACCO USERS
- TONGUE – 20%
- GUMS – 18%
- LOWER ORAL LAYER + SALIVARY GLANDS – 20%
- LIPS – 11%

# Nádor jazyka





# SMOKING IS A DISEASE

- DEPENDENCE = PSYCHIC and BEHAVIOURAL DISORDERS as CONSEQUENCES OF USING TOBACCO  
– dg F 17
- PHYSICAL PART – NICOTINE
- BEHAVIORAL PART – AUTOMATIC MANNERS

# SMOKING as STRONG DRUG

- 80 – 85 % of daily smokers will be dependent
- Like regular users of heroine/cocaine
- Even 30 % of occassional smokers will develop addiction on smoking

# PATHWAYS:

- ACTIVATION of BRAIN  
ACETYLCHOLINE RECEPTORS =>
- RELEASE OF NEUROTRANSMITTERS  
(dopamine, serotonin) and
- HORMONES (ACTH, adrenaline)

# SMOKER'S REWARD

- PLEASURE MOOD (dopamine)
- COPING THE STRESS (ACTH)
- BETTER SHORT-TERM PERFORMANCE (adrenaline)

# ALL THESE STIMULS

- FOR THE RECEPTORS' ACTIVATION
- CAN OFFER MANY DAILY EVENTS:  
FOOD, SEX, MUSIC  
TRAINING, WORKING, PHYSICAL  
ACTIVITIES,  
FRIENDLY ENVIRONMENT, SELF-  
SATISFACTION

# DEPENDENCE on SMOKING

- IS A PEDIATRIC PROBLEM
- MAJORITY OF SMOKERS STARTED IN CHILDHOOD AGE
- VERY OFTEN AS UNHAPPY – UNSUCCESSFUL PEOPLE or
- CURIOSITY SEEKING, LAZY PEOPLE

# CHARACTERISTICS

- FOR DEPENDENCE – PSYCHIATRIC SOCIETIES – 9 markers
- TOLERABILITY (needs for higher doses)
- WITHDRAWAL SYMPTOMS during the abstinence

# LEVEL OF ADDICTION:

- FAGERSTROM'S QUESTIONNAIRE:  
6 QUESTIONS  
10 „PENALTY“ POINTS  
  
4 LEVELS OF DEPENDENCE



# SMOKING CESSATION – 5 A

- ASK
- ASSESS
- ADVICE
- ASSIST
- ARRANGE FOLLOW-UP

# THERAPEUTIC HELP:

- NICOTINE REPLACEMENT THERAPY  
gums, patches, inhalator, tablets
- Antidepressive drug BUPROPION: Zyban,  
Wellbutrin
- Nicotine Agonist VARENICLIN: Champix
- VACCINATION

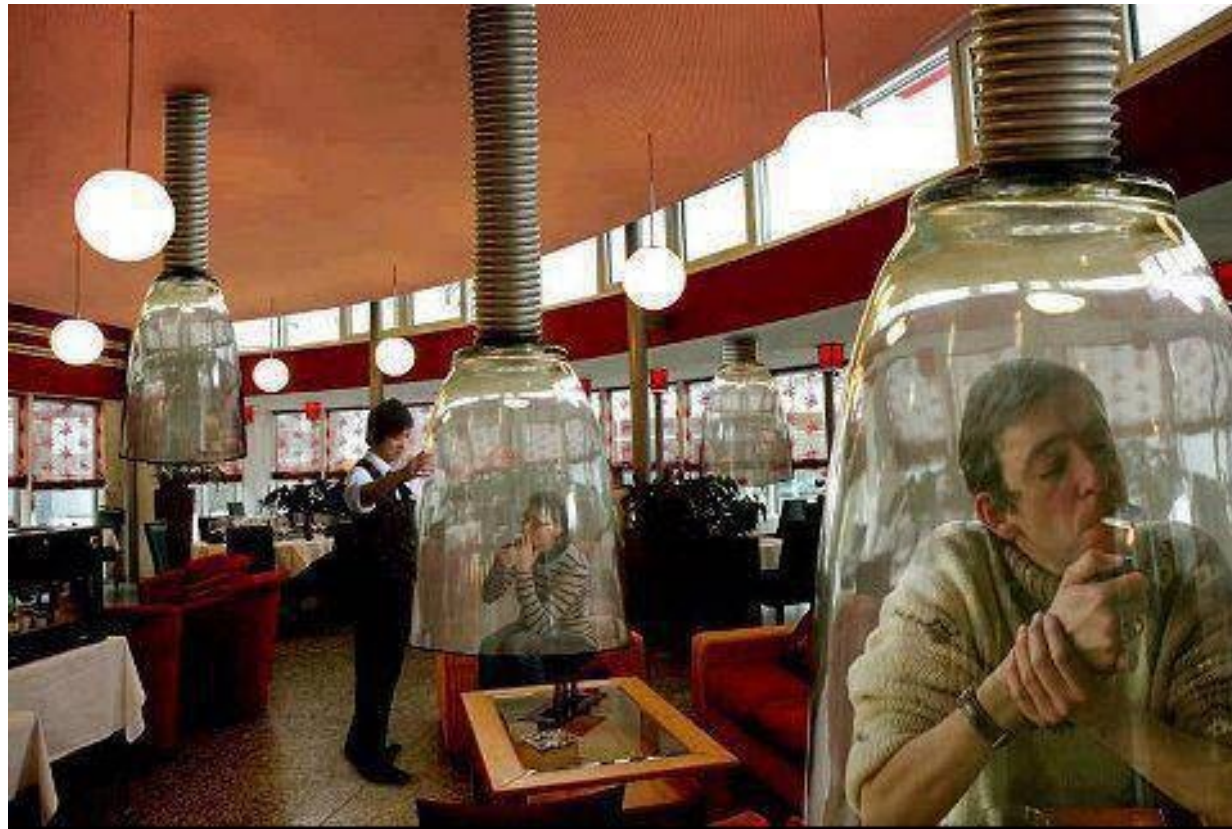
# INVOLUNTARY SMOKING

- MAIN STREAM and SIDE STREAM of TOBACCO SMOKE: different burning conditions: perfect/imperfect => **higher chemicals levels in side stream**
- DANGER FOR NO-SMOKERS, esp. Children (respiratory and CV diseases, cancer)

# POLICY

- BAN OF SMOKING IN PUBLIC PLACES
- EDUCATION
- SMOKE-FREE HOMES/ CARS = voluntary decision of smokers to do not smoke **when** children are present (secondhand smoke) and
- **Where** children are present (thirdhand smoke)

# IN JAPAN



# CONCLUSSIONS:

- SMOKING IS A SERIOUS RISK
- IT DAMAGES ALSO ORAL HEALTH
- IN MANY COUNTRIES  
DENTISTS ARE ACTIVE IN MAKING  
BARRIERS  
LIMITING TOBACCO PANDEMY