



1. LÉKAŘSKÁ FAKULTA  
UNIVERZITY KARLOVY V PRAZE

# Kouření a imunita

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ÚIM 1.LF UK a VFN v Praze

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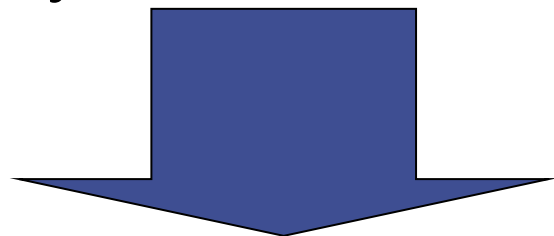
## Funkce a poruchy IS

- \* obrana proti působícím mikrobiálním podnětům,
  - \* rozpoznávání a tolerance vlastních buněk,
  - \* dohled nad jejich případnými změnami
- 
- \* **imunodeficience**
  - \* **alergická onemocnění**
  - \* **autoimunitní onemocnění**



## Kouření a IS

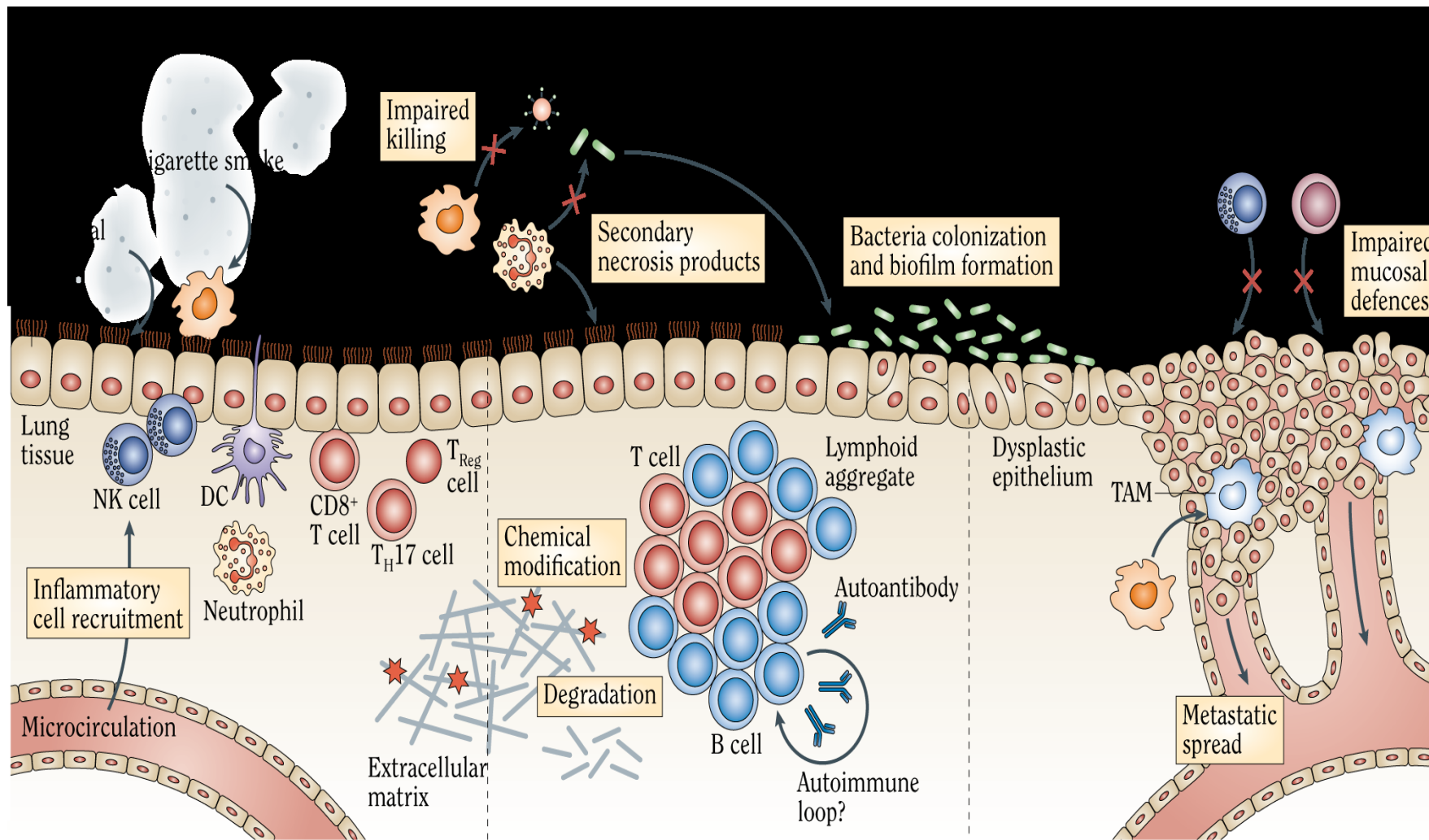
Nikotin, dehet, tabákové glykoproteiny, CO,  
NO<sub>x</sub>, vinylchlorid, nitrosaminy, kyanidy, PAH,  
kovy, radioaktivní látky



Častější nemocnost  
Onemocnění parodontu  
Onemocnění GIT



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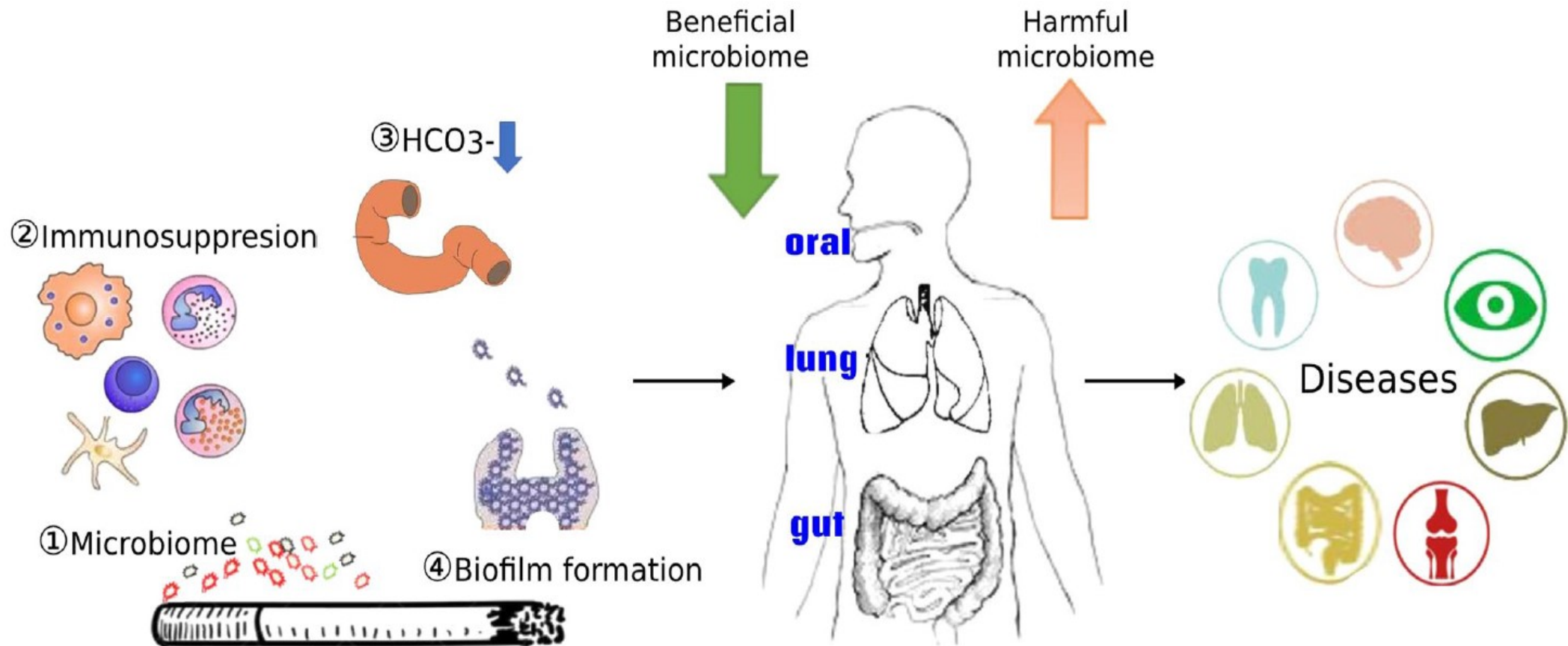
## Kouření a záněty



- Lokální zánět
  - poškození fyziologických bariér
  - dysbióza
  - parodontitis, gingivitis
  - záněty HCD
- Systémový zánět
  - faktor NF- $\kappa$ B
  - prozánětlivé cytokiny
  - potlačení Th1 odpovědi



Huang and Shi: Smoking and microbiome in oral, airway, gut and some systemic diseases. *J Transl Med* (2019) 17:225







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**Table 1 Alterations of microbiome in healthy smokers**

Reference	Origin	Sample	Enriched microbes	Depleted microbes
[37]	Human	Subgingival plaque	Species: <i>Fusobacterium nucleatum</i> , <i>F. naviforme</i> , <i>Filifactor docii</i> , <i>Dialister microaerophilus</i> , <i>Desulfobubus</i> sp. clone R004, <i>Megasphaera suecensis</i> , <i>M. geminatus</i> , <i>M. eb denii</i> , <i>M. micronudiformis</i> , <i>Adinetobacter johnsonii</i> , <i>A. guillouiae</i> , <i>A. schindleri</i> , <i>A. baumannii</i> , <i>A. haemolyticus</i> , <i>Pseudomonas pseudoalcaligenes</i> , <i>Pseudoramibacter alataolyticus</i>	Species: <i>Streptococcus sanguinis</i> , <i>S. parasanguinis</i> , <i>S. oralis</i> , <i>Granulicatella elegans</i> , <i>G. adiacens</i> , <i>Actinomyces viscosus</i> , <i>A. israelii</i> , <i>A. dentalis</i> , <i>Neisseria subflava</i> , <i>Haemophilus parainfluenzae</i>
[191]	Human	Oral wash samples	Genera: <i>Atopobium</i> , <i>Bifidobacterium</i> , <i>Lactobacillus</i> , <i>Streptococcus</i>	Phylum: Proteobacteria, Fusobacteria, SR1, GN02 and Cyanobacteria
[192]	Human	Mouth wash sample	Phylum: Spirochaetes, Synergistetes and Tenericutes, Bacteroidetes and Actinobacteria Genera: <i>Treponema</i> , TGS and <i>Mycoplasma</i> , <i>Megasphaera</i> , <i>Dialister</i> , <i>Paludibacter</i> , <i>Porphyromonas</i> , <i>Prevotella</i> , <i>Atopobium</i>	Genera: <i>Neisseria</i> , <i>Eikenella</i> , <i>Aggregatibacter</i> , <i>Actinobacillus</i> , <i>Haemophilus</i> , <i>Lautropia</i> , <i>Fusobacterium</i> , <i>Leptotrichia</i>
[193]	Human	Nasopharyngeal swab, oropharyngeal swabs	Oropharynx Genera: <i>Megasphaera</i> , <i>Veillonella</i> spp Nasopharynx Genera: <i>Eggerthella</i> , <i>Erysipelotrichaceae</i> IS, <i>Dorea</i> , <i>Anaerovax</i> , <i>Eubacterium</i> spp.	Oropharynx Genera: <i>Capnocytophaga</i> , <i>Fusobacterium</i> , <i>Neisseria</i> spp. Nasopharynx Genera: <i>Shigella</i> spp.
[194]	Mice	Lung sample	Genera: <i>Tetococcus</i> , <i>Escherichia-Shigella</i> , <i>Oxalobacteraceae</i>	Genera: <i>Oxenospirochetes</i> , <i>Lactobacillus</i> , <i>Lactobacillaceae</i> , <i>Enterobacter</i> , <i>Acidimicrobiales</i> _no rank, <i>Caulobacteraceae</i> , <i>Phyllobacteriaceae</i> _uncultured, <i>Raoultella</i> , <i>Caulobacteraceae</i> _unclassified
[88]	Human	BALF	Virome: <i>Prevotella</i> , <i>Xanthomonas</i> , <i>Actinomyces</i> , <i>Aeromonas</i> , <i>Capnocytophaga</i> , <i>Haemophilus</i> and <i>Rhodospirillum</i> phages	Virome: <i>Lactobacillus</i> , <i>Gardnerella</i> phages, <i>Erhydrobacter</i> , <i>Enterobacter</i> , <i>Holospira</i> , <i>Morganella</i> , <i>Erhydrobacter</i> , and <i>Spiroplasma</i> phages
[124]	Rat	Caecal contents	Not reported	Genera: <i>Bifidobacterium</i> sp.
[125]	Mice			
[175]	Mice			

**Table 2 Influence of smoking on the microbiome in some diseases**

Diseases	Reference	Origin	Sample	Enriched microbes	Depleted microbes
Periodontitis	[60]	Human	Subgingival plaque sample	Genera: <i>Fusobacterium</i> , <i>Fretibacterium</i> , <i>Streptococcus</i> , <i>Veillonella</i> , <i>Corynebacterium</i> , TM7, <i>Filifactor</i>	Genera: <i>Prevotella</i> , <i>Campylobacter</i> , <i>Aggregatibacter</i> , <i>Veillonellaceae</i> GQ422718, <i>Haemophilus</i> , <i>Prevotellaceae</i>
Asthma	[104]	Human	Subgingival plaque sample	Genera: <i>Fusobacterium</i> , <i>Prevotella</i> and <i>Selenomonas</i>	Not reported
Crohn's disease	[128]	Human	Subgingival plaque sample	Genera: <i>Anaeroglobus</i> , <i>Bulleidia</i> , <i>Corynebacterium</i> , <i>Granulicatella</i>	Genera: <i>Veillonella</i> , TM7



# Kouření a alergická onemocnění

- Zvýšená koncentrace imunoglobulinu IgE
- Prenatální expozice kouři
- Th2 typ odpovědi
- Astma





# Kouření a autoimunitní onemocnění

- **Revmatoidní artritida**
  - Dostatečný průkaz kauzality kouření a RA
  - Kouření cigaret snižuje efekt terapie inhibitory TNF- $\alpha$
- **SLE**
  - Nedostatečný průkaz kauzality vzniku nemoci, závažnosti a ovlivnění terapie kouřením
- **IBD**
  - Předpoklad kauzálního vztahu kouření a vzniku Crohnovy choroby
  - Předpoklad kauzálního vztahu kouření a ochrany před rozvojem ulcerózní kolitidy



## Laboratorní nálezy

- Imunita humorální:

↓ IgG a IgM,

↑ IgA a IgE,

↑ autoprotilátky

- Imunita buněčná :

↑ počtu T ly,

↓ proliferace ly,

↓ aktivity NK



## Parry H. et al., 1997

- 684 dobrovolníků
- Leuko, lymfo,
- T ly, CD4+, CD8+, B ly
- Kotinin v moči
- Zvýšení všech populací (leu o 27%)
- Exkuřáci:
- Méně než 5 let – stejné nálezy (leu o 14%)
- Více než 5 let – jako nekuřáci

Alkohol: zvýšení lymfo o 9% (8-10g/den)





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**STRES?**





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The infographic compares the chemical composition of a cigarette and an e-cigarette. On the left, a lit cigarette is shown with lines pointing to various chemical components. On the right, a Koolsh e-juice bottle is shown with lines pointing to its components. The cigarette list includes numerous toxic substances, many with skull and crossbones icons, while the e-juice list is significantly shorter and less harmful.

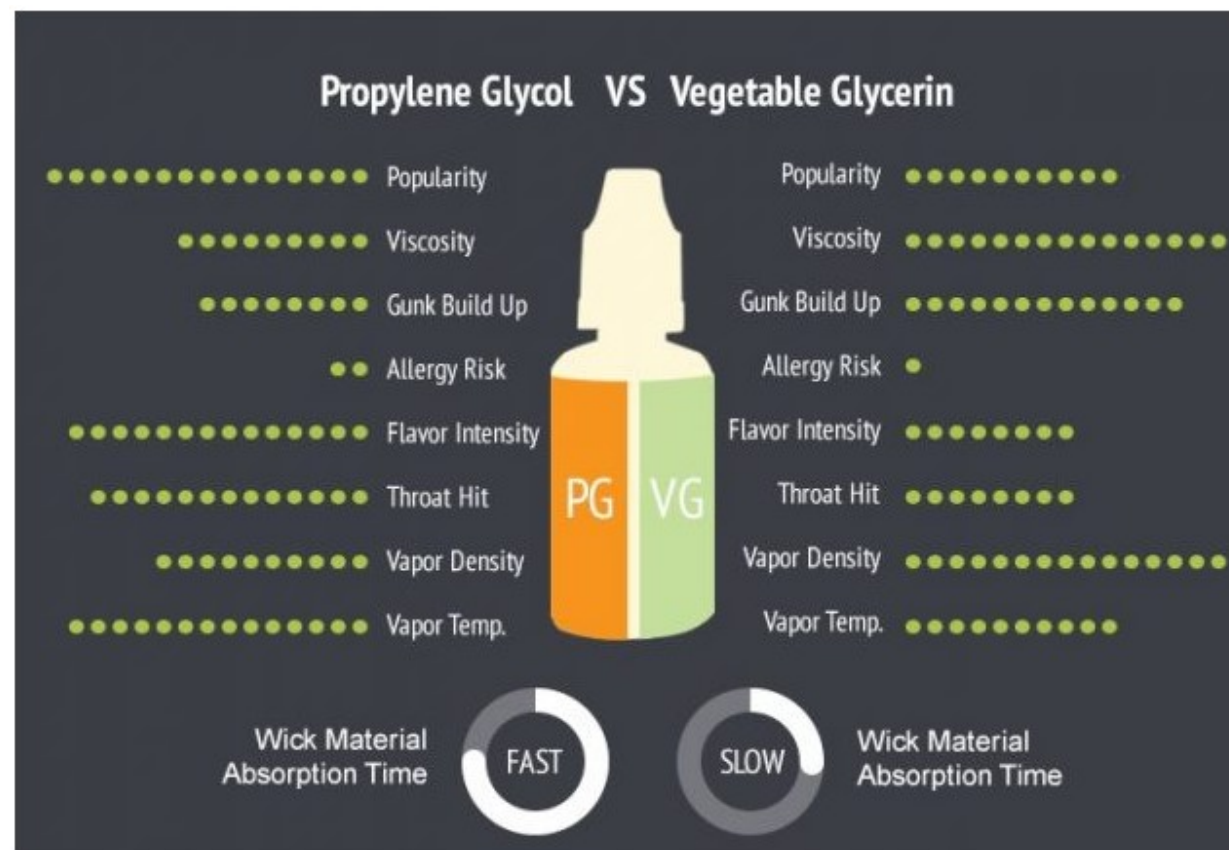
Chemical Component	Source
ACÉTALDÉHYDE (irritant des voies respiratoires)	Cigarette
ACROLÉINE (irritant des voies respiratoires)	Cigarette
ACÉTONE (dissolvant)	Cigarette
NAPHTYLAMINE (skull and crossbones icon)	Cigarette
MÉTHANOL (carburant pour fusée)	Cigarette
PYRÈNE (skull and crossbones icon)	Cigarette
DIMÉTHYLNITROSAMINE	Cigarette
NAPHTALÈNE (antimite)	Cigarette
NICOTINE (utilisée comme herbicide et insecticide)	Cigarette
CADMIUM (skull and crossbones icon) (utilisé dans les batteries)	Cigarette
MONOXYDE DE CARBONE (gaz d'échappement)	Cigarette
BENZOPYRÈNE (skull and crossbones icon)	Cigarette
CHLORURE DE VINYLE* (utilisé dans les matières plastiques, diminution de la libido)	Cigarette
MERCURE (thermomètre)	Cigarette
ACIDE CYANHYDRIQUE (était employé dans les chambres à gaz)	Cigarette
TOLUIDINE (skull and crossbones icon)	Cigarette
AMMONIAC (détergent)	Cigarette
URÉTHANE (skull and crossbones icon)	Cigarette
TOLUÈNE (solvant industriel)	Cigarette
ARSENIC (poison violent)	Cigarette
DIBENZACRIDINE (skull and crossbones icon)	Cigarette
PHÉNOL	Cigarette
BUTANE	Cigarette
POLONIUM 210 (élément radioactif)	Cigarette
STYRÈNE	Cigarette
DDT (insecticide)	Cigarette
GOUDRONS (les plus cancérigènes)	Cigarette
PLOMB (essence et gaz d'échappement)	Cigarette
NICOTINE (avec ou sans)	E-juice
EAU PURIFIÉ	E-juice
ALCOOL	E-juice
PG / VG (produits alimentaires)	E-juice
ARÔMES (naturels dans nos eJuices)	E-juice





# Složení e-liquidu

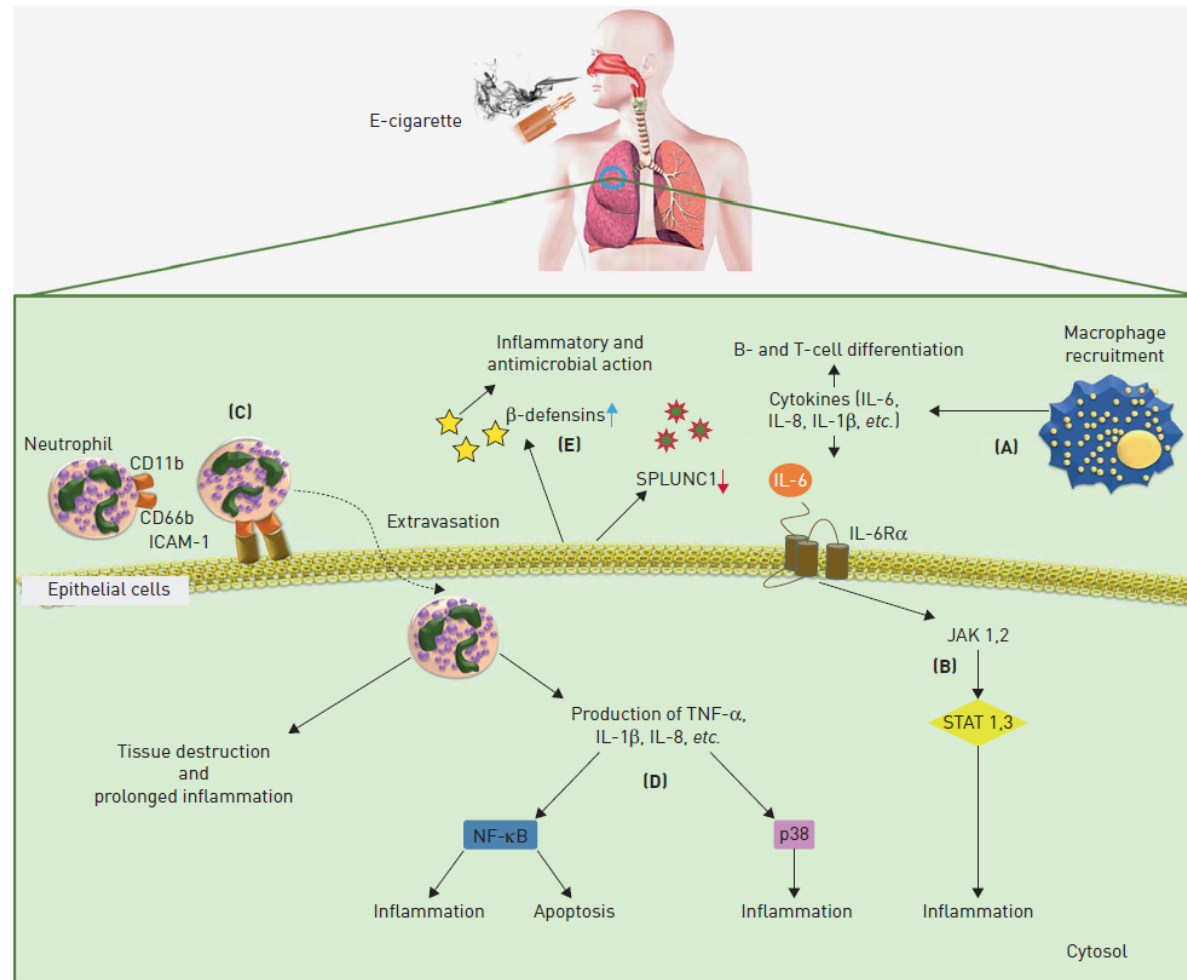
- Propylenglykol
- Glycerol
- Nikotin





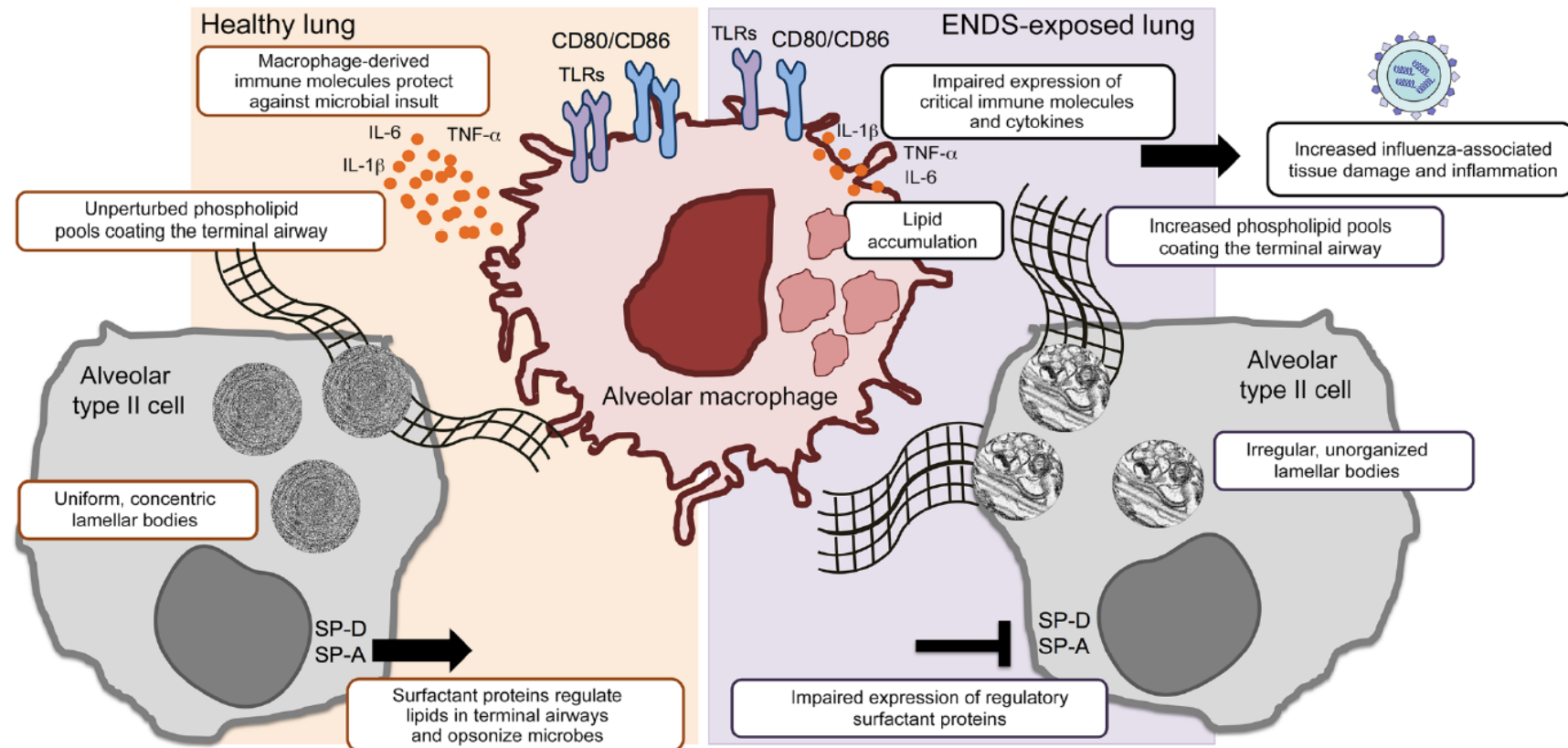


# Kaur G. Et al.: Immunological and toxicological risk assessment of e-cigarettes. Eur Respir Rev 2018; 27: 170119





Matthew C. Madison et al.: Electronic cigarettes disrupt lung lipid homeostasis and innate immunity independent of nicotine. *J Clin Invest.* 2019;129(10):4290–4304







# Petanová J. et al.: Immunological findings in patients with recurrent aphthous stomatitis. ECI 2018, Amsterdam.

**P.C1.06.14** Immunological findings in patients with recurrent aphthous stomatitis

General University Hospital in Prague

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**Introduction**  
Recurrent aphthous stomatitis (RAS) is one of the most common diseases of oral mucosa.  
\* Frequency: 10-25% of population  
\* Ulcerative disease: circumscribed margins of a dissolved circular or oval shape ulcers with floors slightly descended under the level of surrounding mucosa, covered by white fibrose through which contrasts with the reddish edge.  
\* Clinical variants: minor RAS (80%), major RAS (10-15%) and herpetiform ulceration.  
\* Etiology: local trauma, injury, galvanisation, reaction to dental metal materials, medications, stress, nutritional factors, allergy, association with other immunopathologic states (infection, autoimmune disease).  
\* Therapy: local antimicrobial and anti-inflammatory treatment, systemic immunomodulation.

**Aim**  
Evaluation of the immunological status of patients with RAS

**Methods**  
73 patients with recurrent aphthous stomatitis (28 men, 45 women, aged 18-72 years)  
\* evaluation of clinical status  
\* personal history, family history, medication

**Laboratory tests**  
\* humoral immunity (serum concentration of immunoglobulin IgG, IgA, IgM, IgE, IgG subclasses, complement components C3 and C4, acute phase protein CRP, selected autoantibodies), antibodies against desmogleins (tested in 48 patients)  
\* cellular immunity (total number of lymphocytes, T lymphocytes subpopulations, B lymphocytes, natural killer cells)

**Results**  
Tab. 1-2. Results of clinical and laboratory evaluation

Results of clinical immunological evaluation		
clinical form	minor	70
	major	3
	herpetiform u.	0
smoking	active	10
	exsmoker	7
	non-smoker	56
allergy	total	36
	pollens	15
	drugs	8
	food	7
	cat, dog	7
	metals	5
	insects venom	2
	physical factors	2
other diseases	thyropathy	12
	hypertension	6
	digestive disord.	5
	recurrent infections	5

**Results of immunological laboratory tests**

humoral immunity	slightly decreased	increased	IgA / IgG / IgM
serum concentrations			6 / 4 / 3
C3 complement component	decreased		2
C4 complement component	decreased		1
elevated levels			total IgE 14
anti-nuclear antibodies ANAb	slightly pos./positive		15
antibodies to desmogleins	slightly positive		18
cellular immunity			lymphocytes subsets in normal ranges 73

**Conclusions**  
\* high inter-individual variability in anamnestic and laboratory data in the group of patients with RAS  
\* the positivity of antibodies to desmogleins is not specific, positive results can be found in different inflammatory mucosal or cutaneous states - the clinical periodontal finding and in some cases mucosal biopsy with histopathological findings excluded autoimmune blistering diseases in all tested patients  
\* more specific tests have to be performed together with specialized periodontal clinical findings

**Author Disclosure Information:**  
J. Petanová, R. Cermaková, M. Libánská, J. Bartová, Z. Jirásková - Zakostelská, Z. Stehliková, H. Tlaskalová-Hogenová, L. Izakovicová-Hollá, S. Slezáková, P. Borilova Linhartová, P. Kuklínek

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Děkuji  
za pozornost

