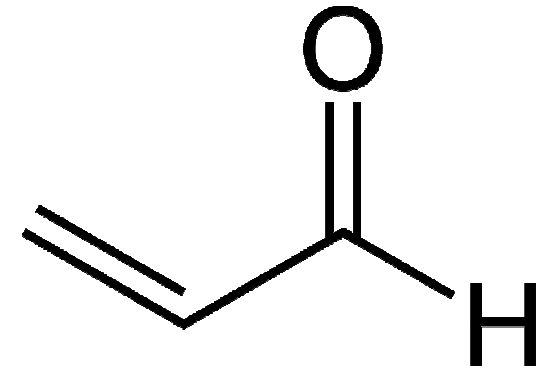


Einfluss von Acrolein in Rauch auf unser Immunsystem

Priv. Doz. Dr. Franziska Roth-Walter

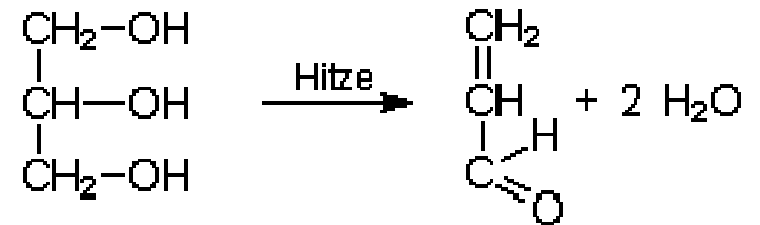
Acrolein



- α,β - ungesättigte Aldehyde
- Unvollständige Verbrennung von
 - Öl
 - Holz
 - Kohle
 - Zigaretten

Acrolein

- Menge – abhängig von Glyceringehalt:
 - 220µg Acrolein/Zigarette
 - Sidestream-smoke



Daher N., et al. 2010;44(1):8-14.

Herrington JS, Myers C.. *J Chromatogr A*. 2015.

Goniewicz ML, et al. *Tob Control*. 2014;23(2):133-139.

Oh AY, Kacker A. *Laryngoscope*. 2014;124(12):2702-2706.

CHEMICAL COMPOUNDS IN CIGARETTE SMOKE

THIS GRAPHIC OFFERS A SUMMARY OF A SELECTION OF HAZARDOUS COMPOUNDS IN CIGARETTE SMOKE & THEIR EFFECTS

ESTIMATED NUMBER OF CHEMICAL COMPOUNDS IN CIGARETTE SMOKE

7,357

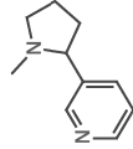


70

NUMBER OF THESE COMPOUNDS WITH CONFIRMED CARCINOGENIC ACTIVITY

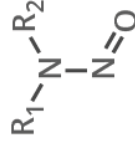
The compounds shown below are all found in cigarette smoke. The mass figures, given in µg, take into account both mainstream (inhaled) and sidestream smoke. 1 µg is equal to 1 millionth of a gram. Amounts of these compounds vary in different brands of cigarettes - these figures are approximate.

NICOTINE



- Approx. 919µg per cigarette
- Addictive
- Increases heart rate
- Increases blood pressure
- Increases blood glucose
- Lethal dose: around 500-1000mg

N-NITROSAMINES



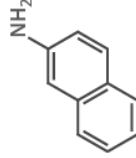
- Large class of compounds
- Several are tobacco-specific
- **Known human carcinogens**
- Most carcinogenic: NNK & NNN
- NNK: approx. 0.3µg per cigarette
- NNN: approx. 2-50µg per cigarette
- May cause reproductive damage

BENZENE



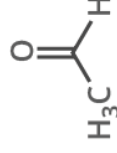
- Approx. 46-272µg per cigarette
- **Known human carcinogen**
- Damages bone marrow
- Lowers red blood cell count
- May harm reproductive organs

AROMATIC AMINES



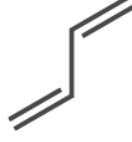
- Large class of compounds
- Includes 2-aminonaphthalene:
- **Known human carcinogen**
- Linked with bladder cancer
- Approx. 0.04µg per cigarette

ACETALDEHYDE



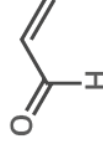
- Approx. 680-1571µg per cigarette
- **Known animal carcinogen**
- **Probable human carcinogen**
- Irritant to skin & eyes
- Irritant to respiratory tract

1,3-BUTADIENE



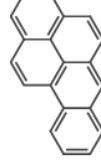
- Approx. 36-191µg per cigarette
- **Known human carcinogen**
- **Suspected human teratogen**
- Irritant to eyes & skin
- Irritant to upper respiratory tract

ACROLEIN



- Approx. 69-306µg per cigarette
- **Possible human carcinogen**
- **Known DNA mutagen**
- Irritant to skin & nasal passages
- May contribute to heart disease

POLYAROMATICS



- Large class of compounds
- Includes benzo[a]pyrene:
- **Known human carcinogen**
- **Known DNA mutagen**
- Affects reproductive capacity
- Up to 0.14µg per cigarette



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Acrolein

- Acrolein-gehalt in Shisha 5x höher als bei konventionellen Zigaretten.



Daher N., et al. 2010;44(1):8-14.
Herrington JS, Myers C.. *J Chromatogr A*. 2015.
Goniewicz ML, et al. *Tob Control*. 2014;23(2):133-139.
Oh AY, Kacker A. *Laryngoscope*. 2014;124(12):2702-2706.

Zigarettenrauch

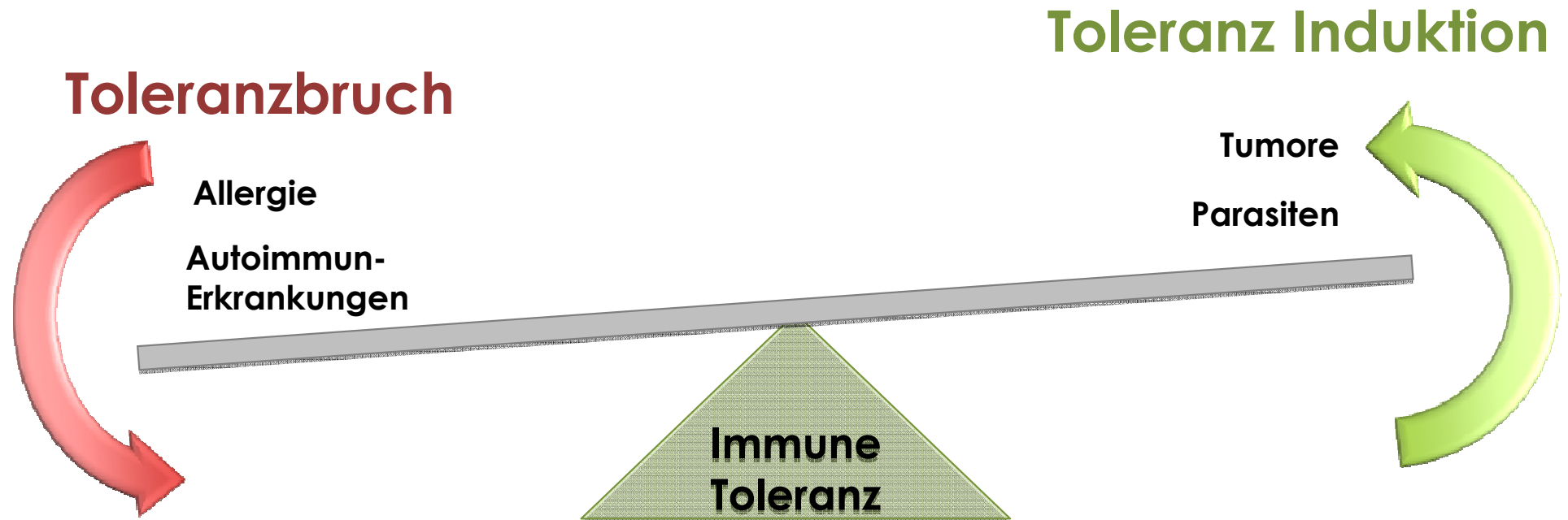
- Hohe Kosten (2,6% des polnischen BIP)
- Vorzeitiger Tod (11 min/Zigarette)
- Krankheiten:
 - obstruktive Lungenerkrankungen,
 - Herzinfarkte
 - Tumore

Zigarettenrauch

- Günstige Auswirkungen auf:
 - Colitis ulcerosa
 - Parkinson
 - Allergische Sensibilisierung

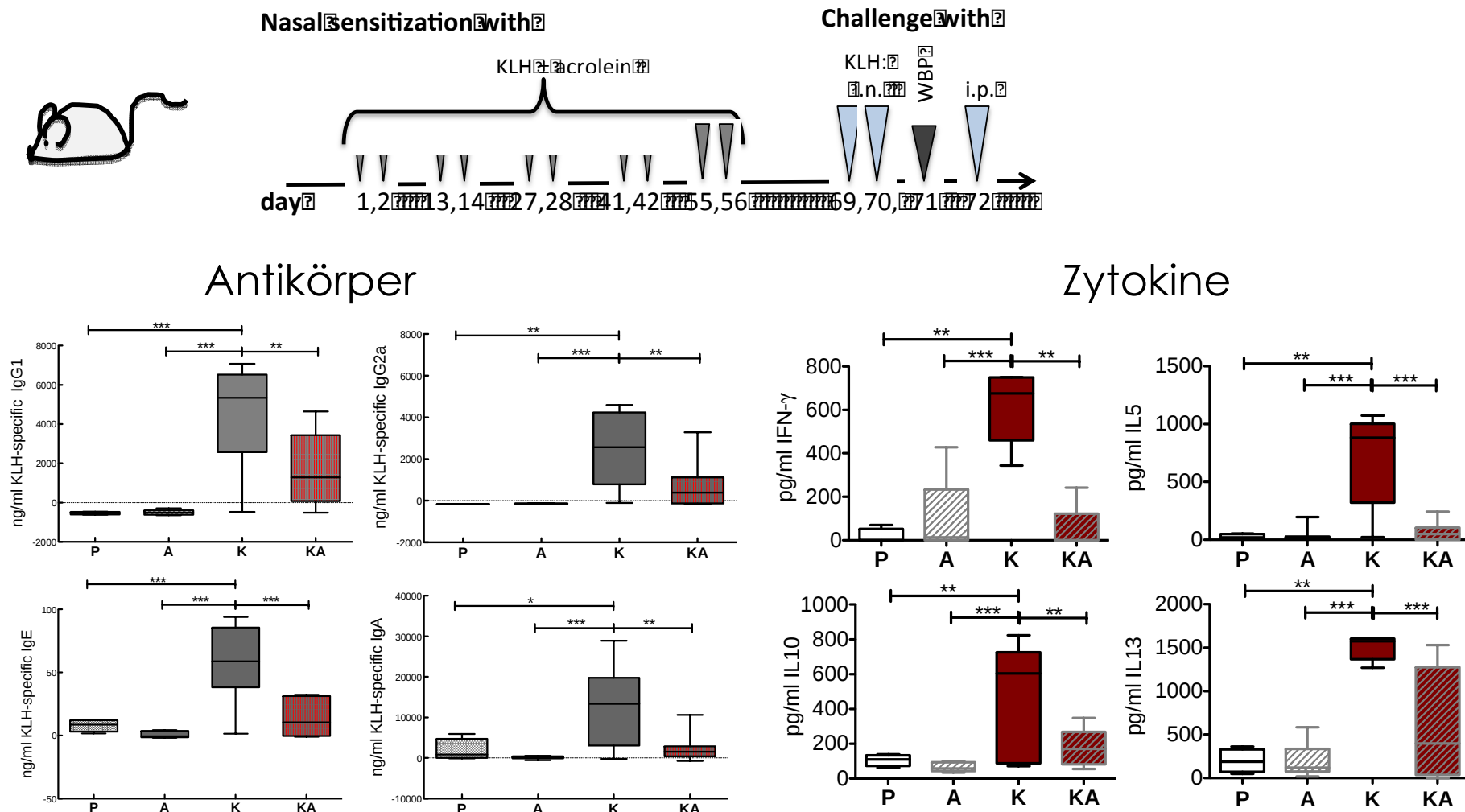
Zijlstra FJ. Mediators Inflamm. 1998;7(3):153-155
Quick M et al. Mov Disord. 2012 Jul;27(8):947-57.
Shargorodsky J, et al. Int Forum Allergy Rhinol. 2015;5(6):471-476.
Havstad SL, et al. Respirology. 2012;17(7):1068-1072.
Vonk JM, et al. J Allergy Clin Immunol. 2004;114(2):270-276.
Shargorodsky J, et al. PLoS One. 2015;10(7):e0131957.

AllergoOncology



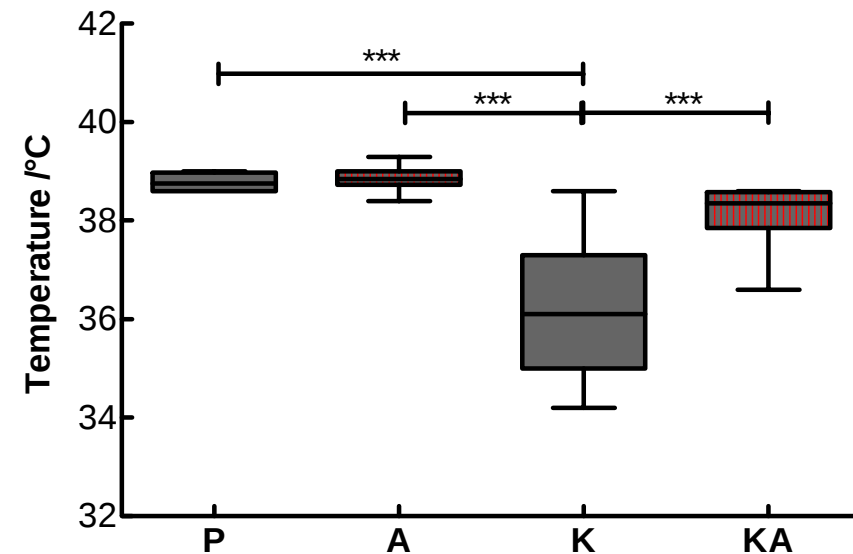
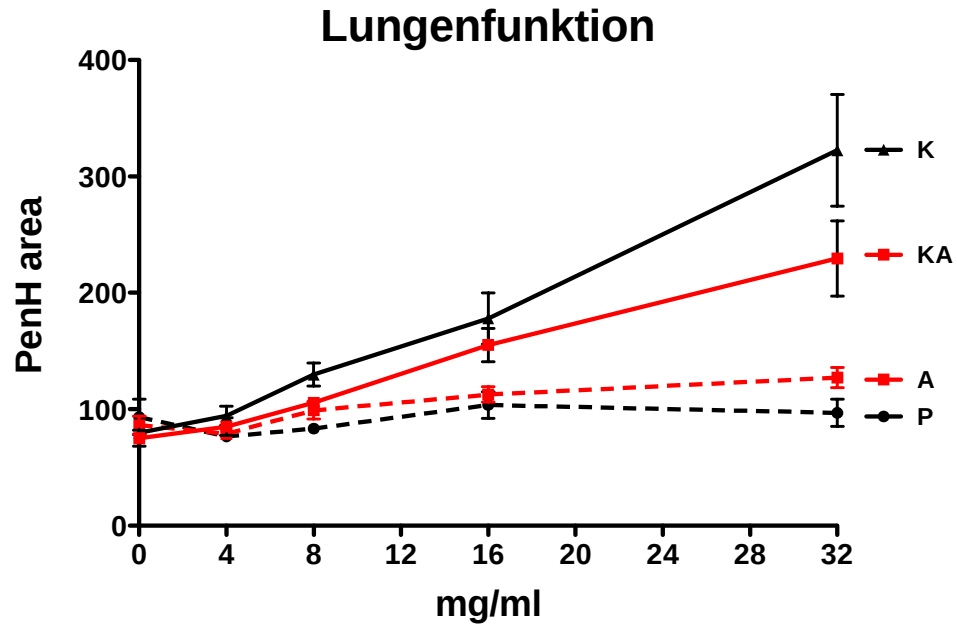
Turner MC. G.Cancer Immunol Immunother. 2012;61(9):1493-1510.
Jensen-Jarolim E, et al.Cancer Immunol Immunother. 2012;61(9):1355-1357.

Acrolein in der Allergieentstehung

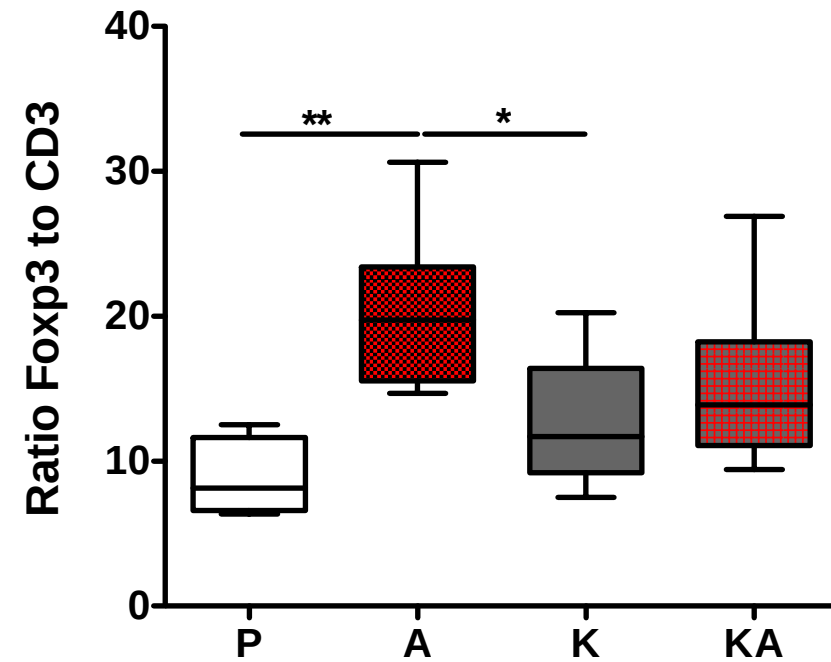
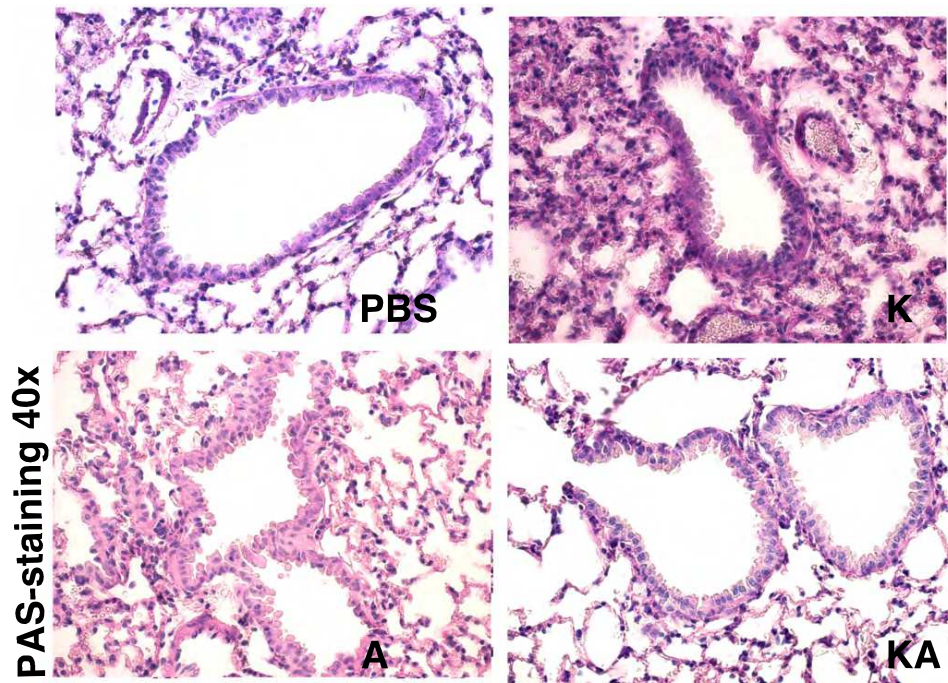


Geringe Dosen Acrolein verhindern die Entstehung von Allergie

Acrolein in der Allergieentstehung

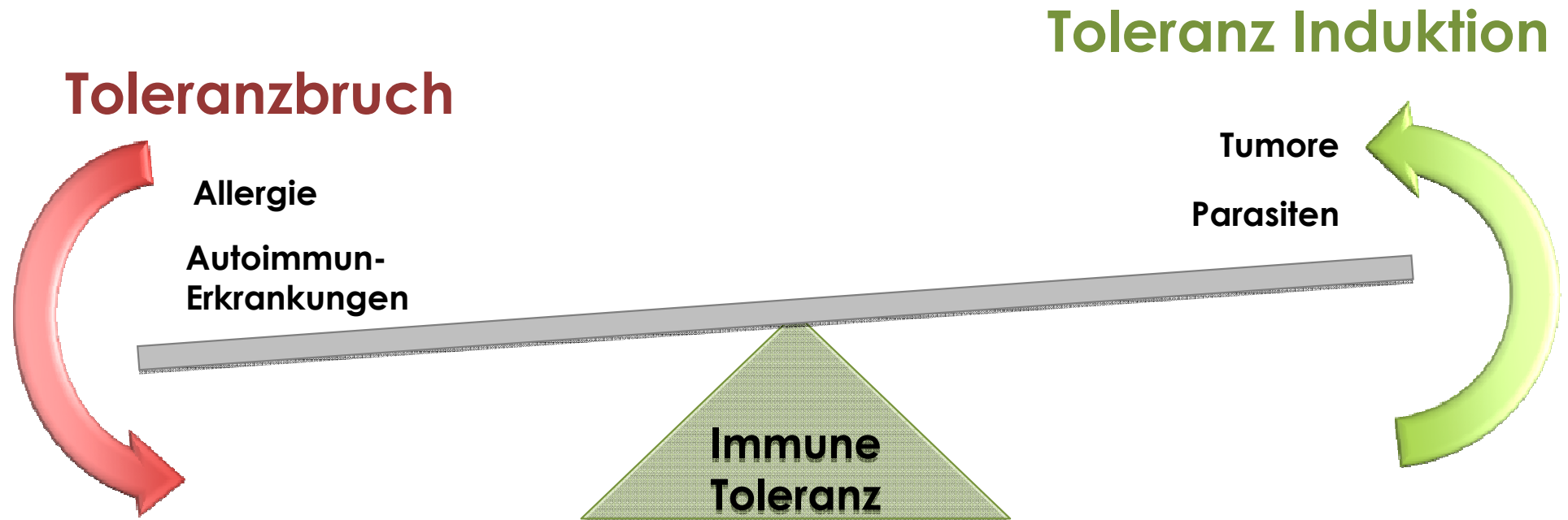


Lunge



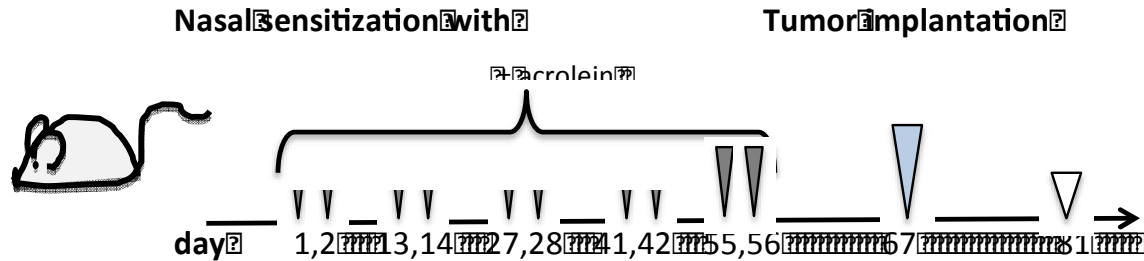
Mehr regulatorische T-Zellen in der Acrolein-exponierten Gruppe

AllergoOncology

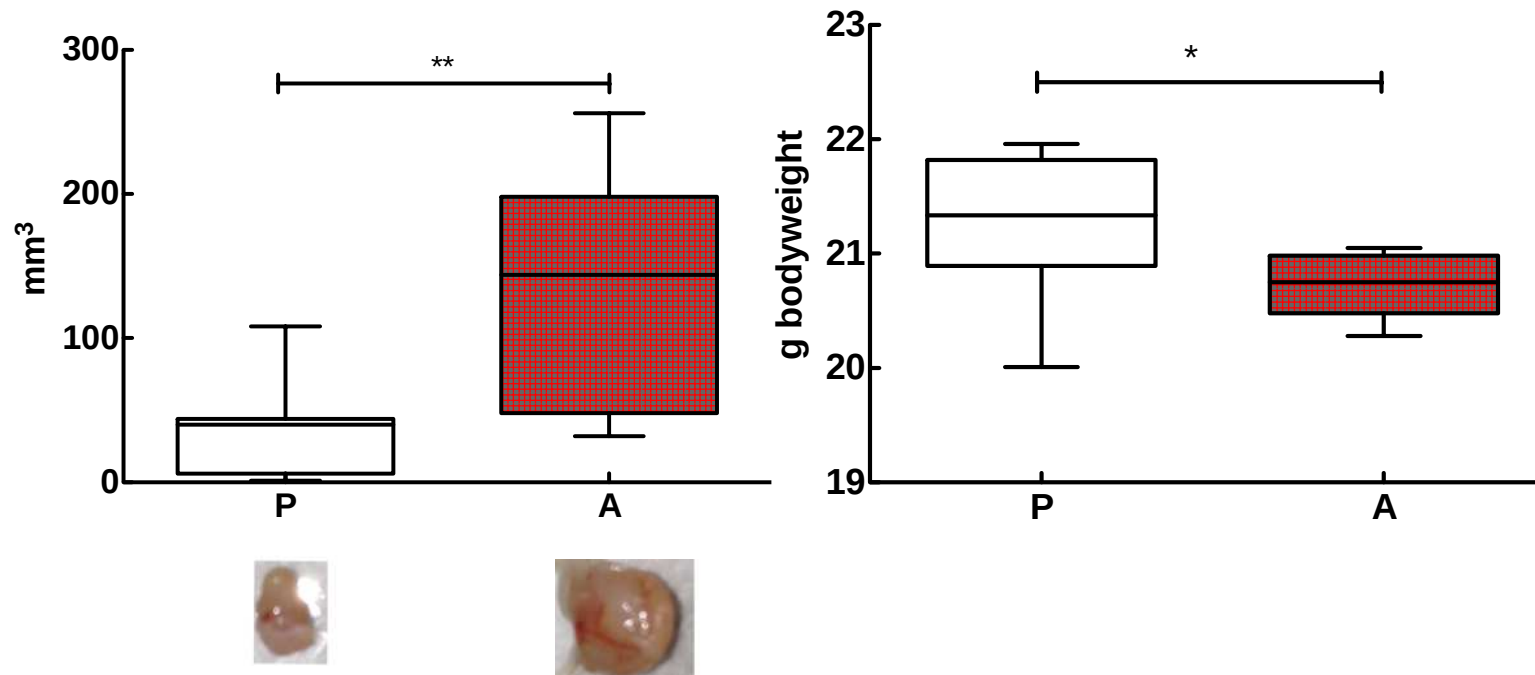


Turner MC. G.Cancer Immunol Immunother. 2012;61(9):1493-1510.
Jensen-Jarolim E, et al.Cancer Immunol Immunother. 2012;61(9):1355-1357.

Acrolein und Tumore

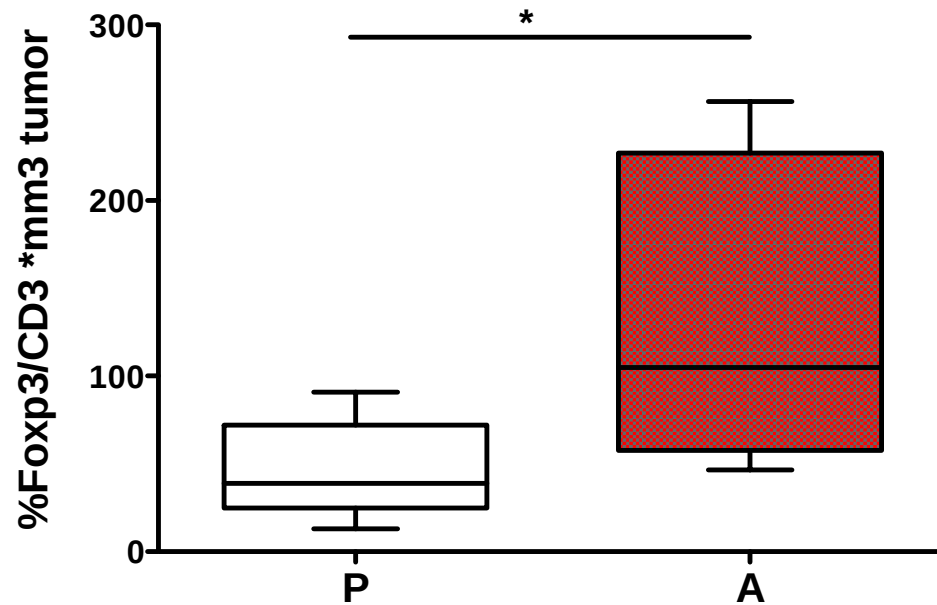


Tumorwachstum



Acrolein fördert das Tumorwachstum

Acrolein und Tumore



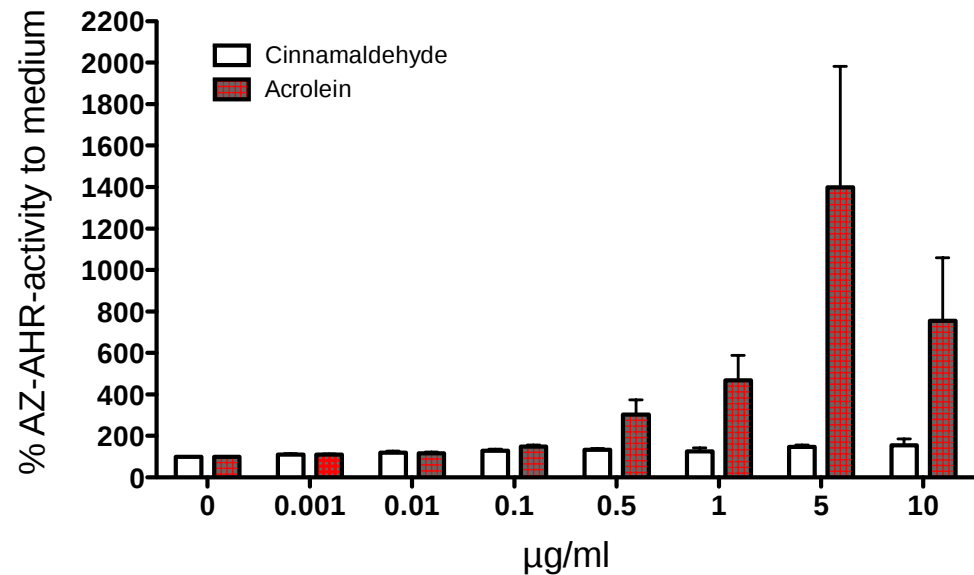
Mehr regulatorische T-Zellen in Tumoren von Acrolein-exponierten Tieren

Acrolein fördert das Tumorwachstum

Wirkweise von Acrolein

Arylhydrogencarbon rezeptor

- Protein im Cytosol und Zellkern
- Kontrolliert Zellwachstum und Differenzierung
- Bekannte Liganden (z.B. Dioxine, Biphenyle)
- In dendritischen Zellen führt Aktivierung zur Kynureninbildung
- Generiert regulatorische T-Zellen

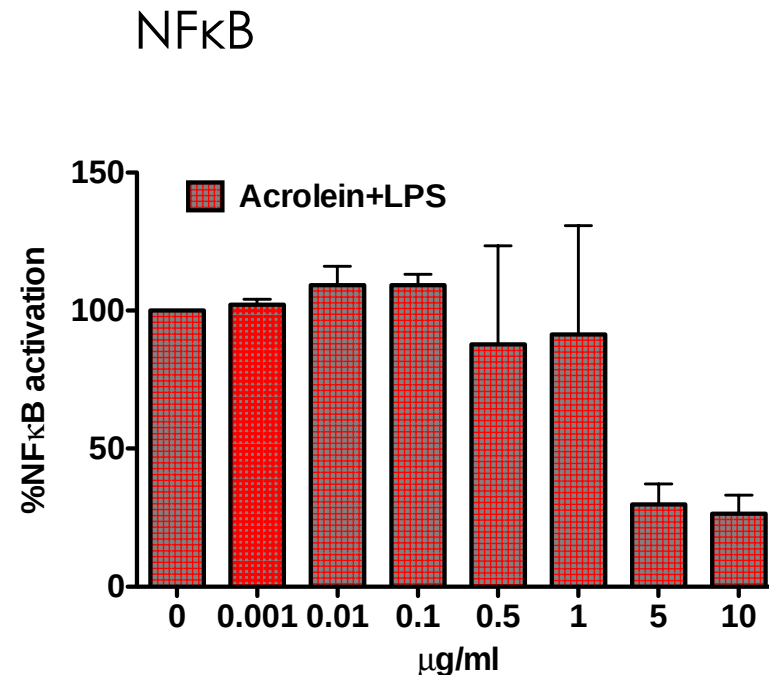


Apetoh L. et al. Nat. Immunol. 11 (2010) 854-861
Gandhi R. et al. Nat. Immunol. 11 (2010) 846-853

Wirkweise von Acrolein

NFκB

- nuclear factor 'kappa-light-chain-enhancer' of activated B-cells
- Kritisch für Entzündungsreaktionen
- Handelt sich nicht um 5 bzw. 7 verschiedene Proteine
- Ist konstitutiv in B-Zellen und Dendritische Zellen im Zellkern vorhanden



Acrolein aktiviert den Arylhydrogen Rezeptor und hemmt den NFκB-pathway

Conclusio

Acrolein :

- ist in Rauch vorhanden
- Schützt in geringen Dosen vor allergischen Sensibilisierung
- Fördert Tumorwachstum

Mechanismus:

- Aktivierung des Ah-Rezeptor führt zur Entstehung von regulatorischen T-Zellen
- Keine Hilfe für B-Zellen zur Antikörper-produktion
- Entzündungsreaktionen werden über den NFkB-pathway unterbunden

DANKE

messerli
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Erika Jensen-Jarolim

