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Sigarette elettroniche a riscaldamento del tabacco: effetti tossicologici *in vivo*

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FORUM

NUOVI MESSAGGI

MARKETPLACE

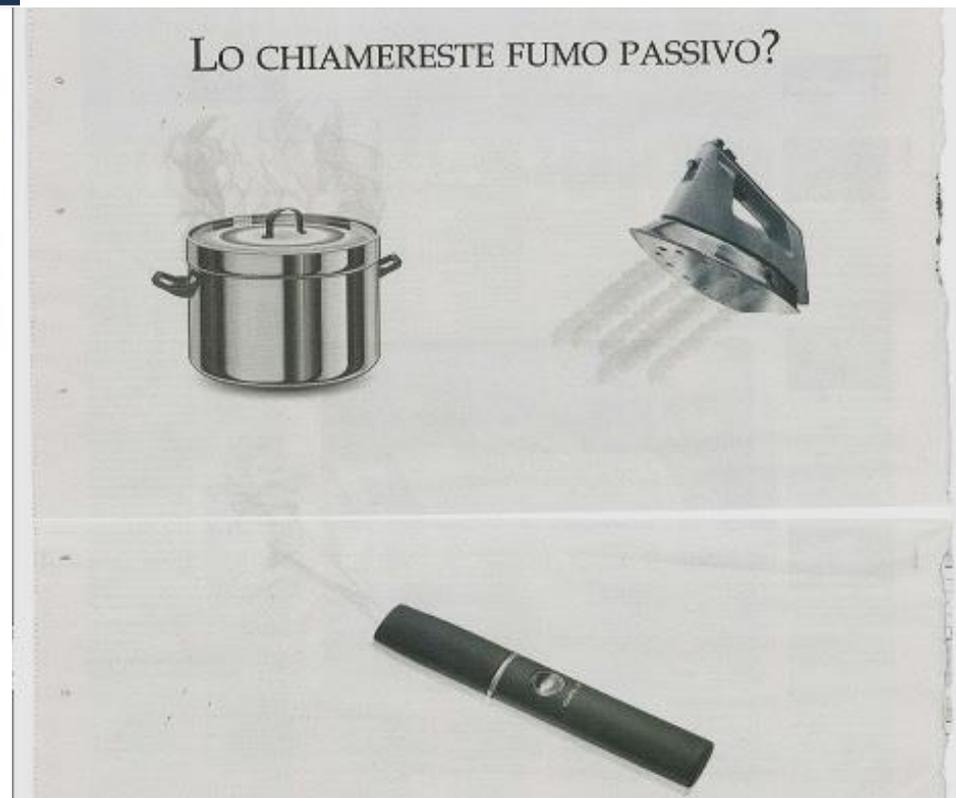
MERCATINO USATO

CALCOLATORI



— NEWS —

SIGARETTE ELETTRONICHE. "ZERO RISCHI"



DIFFERENCE BETWEEN

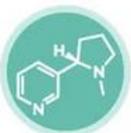
HEATS TOBACCO



USES REAL
TOBACCO



NICOTINE
NATURALLY
PRESENT IN
TOBACCO



NO ASH,
NO SMOKE



HEATED
TOBACCO

VS



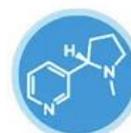
E-CIGARETTE



VAPORIZES E-LIQUID



NO TOBACCO



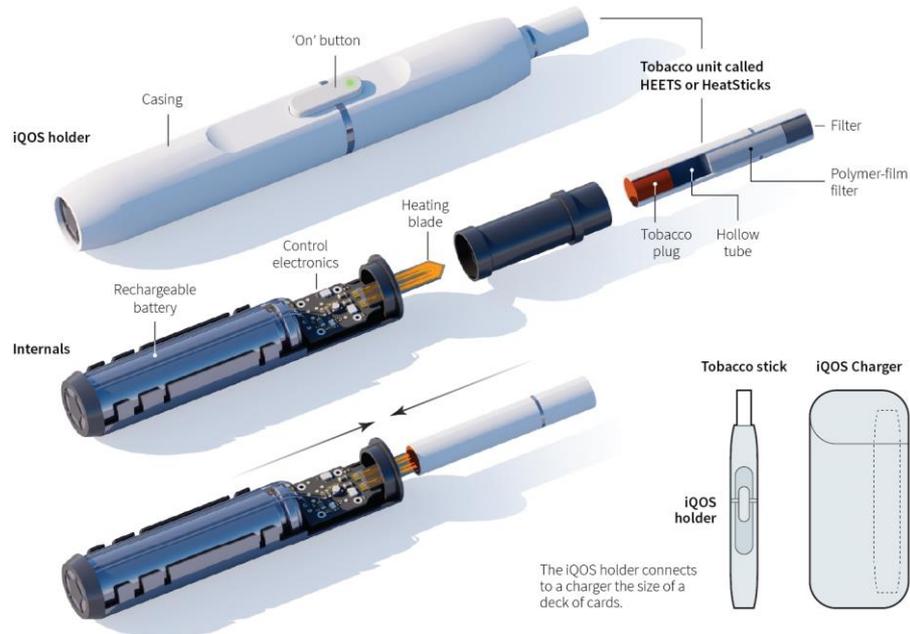
NICOTINE
DERIVED FROM
TOBACCO ADDED
IN E-LIQUID



NO ASH,
NO SMOKE

Philip Morris' iQOS

Philip Morris International's iQOS heats tobacco instead of burning it, releasing nicotine-laced vapor. The company says that means the device avoids subjecting smokers to the same levels of carcinogens and other toxic substances found in a regular cigarette.



Sources: Philip Morris International; TechInsights Inc



iQOS is an electronic device that heats up **REAL TOBACCO** instead of burning it

iQOS 是款加热不燃烧产品, 将烟草加热而不燃烧烟草
iQOS merupakan peranti elektronik yang memanaskan tembakau sebenar dan bukan membakar



Temperatura di riscaldamento 300 – 350°C

FDA Authorizes Marketing of the IQOS Tobacco Heating System as a Modified Risk Tobacco Product

The modified risk tobacco product

«Exposure to harmful chemicals is reduced if a user switches completely to IQOS from combustible cigarettes» FDA



Table. Concentrations of 8 Volatile Organic Compounds, 16 Polycyclic Aromatic Hydrocarbons, 3 Inorganic Compounds, and Nicotine in Mainstream Aerosol and Temperature of the HNB IQOS Cigarette and Conventional Cigarettes

| Analyzed Compound | HNB Cigarette | | Conventional Cigarette | | Proportion of the Chemical in HNB and Conventional Cigarettes, % |
|---|-------------------|------------------------------------|------------------------|------------------------------------|--|
| | Amount, Mean (SD) | No. of Replications for Each Assay | Amount, Mean (SD) | No. of Replications for Each Assay | |
| Volatile organic compounds, µg per cigarette ^a | | | | | |
| Acetaldehyde | 133 (35) | 5 | 610 ^b | 1 | 22 |
| Acetone | 12.0 (12.9) | 5 | 95.5 (13.5) | 2 | 13 |
| Acrolein | 0.9 (0.6) | 2 | 1.1 | 1 | 82 |
| Benzaldehyde | 1.2 (1.4) | 5 | 2.4 (2.6) | 2 | 50 |
| Crotonaldehyde | 0.7 (0.9) | 5 | 17.4 | 1 | 4 |
| Formaldehyde | 3.2 (2.7) | 5 | 4.3 (0.4) | 2 | 74 |
| Isovaleraldehyde | 3.5 (3.1) | 5 | 8.5 (10.8) | 2 | 41 |
| Propionaldehyde | 7.8 (4.3) | 5 | 29.6 (36.6) | 2 | 26 |
| Polycyclic aromatic hydrocarbons, ng per cigarette ^a | | | | | |
| Naphthalene | 1.6 (0.5) | 4 | 1105 (269) | 7 | 0.1 |
| Acenaphthylene | 1.9 (0.6) | 4 | 235 (39) | 7 | 0.8 |
| Acenaphthene | 145 (54) | 4 | 49 (9) | 7 | 295 |
| Fluorene | 1.5 (0.6) | 4 | 371 (56) | 7 | 0.4 |
| Anthracene | 0.3 (0.1) | 4 | 130 (18) | 7 | 0.2 |
| Phenanthrene | 2.0 (0.2) | 4 | 292 (44) | 7 | 0.7 |
| Fluoranthene | 7.3 (1.1) | 4 | 123 (18) | 7 | 6 |
| Pyrene | 6.4 (1.1) | 4 | 89 (15) | 7 | 7 |
| Benz[a]anthracene | 1.8 (0.4) | 4 | 33 (4.2) | 7 | 6 |
| Chrysene | 1.5 (0.3) | 4 | 48 (6.2) | 7 | 3 |
| Benzo[b]fluoranthene | 0.5 (0.2) | 4 | 24 (2.9) | 7 | 2 |
| Benzo[k]fluoranthene | 0.4 (0.2) | 4 | 4.3 (2.8) | 7 | 9 |
| Benzo[a]pyrene | 0.8 (0.1) | 4 | 20 (2.9) | 7 | 4 |
| Indeno[1,2,3-cd]pyrene | ND | 4 | NA | NA | NA |
| Benzo[ghi]perylene | ND | 4 | NA | NA | NA |
| Dibenzo[a,h]anthracene | ND | 4 | NA | NA | NA |
| Inorganics, ppm in the mainstream smoke ^d | | | | | |
| Carbon dioxide | 3057 (532) | 5 | >9000 | 3 | NA |
| Carbon monoxide | 328 (76) | 5 | >2000 | 3 | NA |
| Nitric oxide | 5.5 (1.5) | 5 | 89.4 (71.6) | 3 | 6 |
| Other measures | | | | | |
| Nicotine, µg per cigarette ^a | 301 (213) | 4 | 361 | 1 | 84 |
| Temperature, °C | 330 (10) | 2 | 684 (197) | 1 | NA |
| Puff total count | 12.6 (2.4) | 32 | 13.3 (3.1) | 6 | NA |

Abbreviations: HNB, heat-not-burn; NA, not analyzed; ND, not detected.

^aWe applied the methods described previously in Varlet et al⁴ to analyze volatile organic compounds and nicotine.^bBecause there was only 1 replication, no SD can be computed.^cWe present values reported from Vu et al⁵ for the ISO smoking regimen and

for a mean of the 35 top-selling US cigarette brands.

^dCarbon dioxide was measured with a Testo 535 (Testo), and carbon monoxide and nitric oxide were measured with a Pac 7000 that detected carbon monoxide (Dräger). The apparatus measured the smoke when it was released from the syringe pump.

Research Letter

July 2017

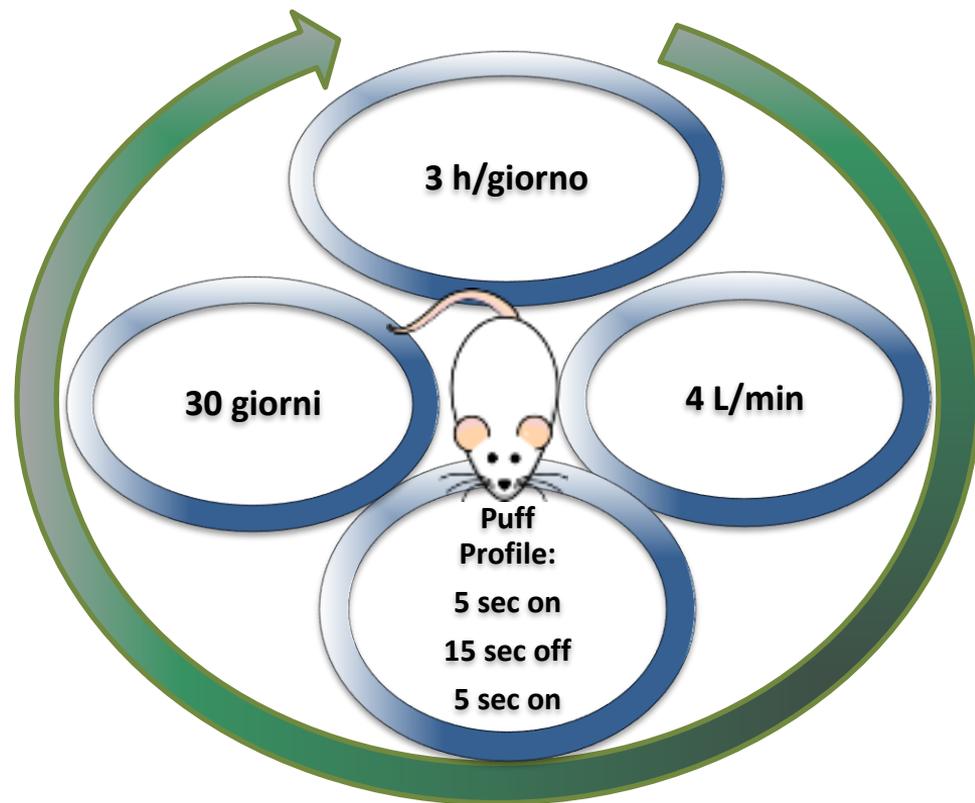
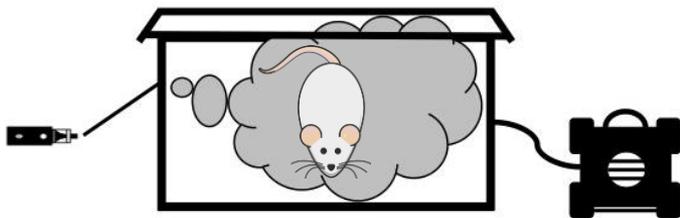
Heat-Not-Burn Tobacco Cigarettes
Smoke by Any Other NameReto Auer, MD, MAS^{1,2}; Nicolas Concha-Lozano, PhD³; Isabelle Jacot-Sadowski, MD²; et al

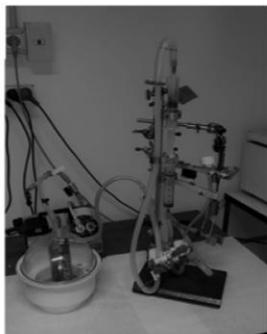
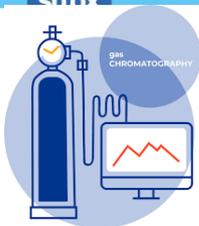
» Author Affiliations | Article Information

JAMA Intern Med. 2017;177(7):1050-1052. doi:10.1001/jamainternmed.2017.1419

Auer R et al., 2017 JAMA Intern Med

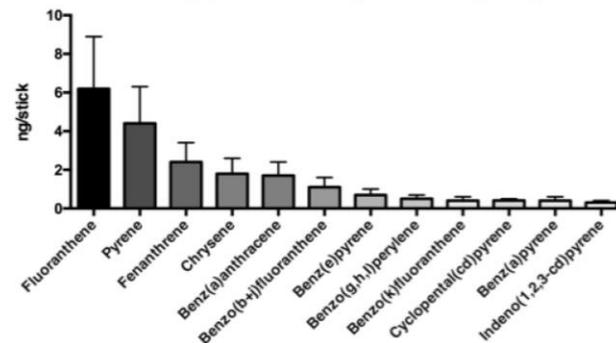
Total-body exposition



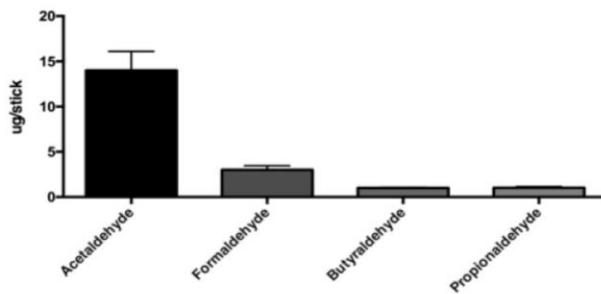


| Parameter | Method |
|--|--|
| Powders - inhalable fraction | M.U. 1998:13 |
| Nitrogen oxides (such as NO ₂) | NIOSH 6014 1994 |
| Nicotine | NIOSH 2513 1998 |
| Aldehydes | EPA 8315A 1996 |
| Phenols and Cresols | NIOSH 2546 1994 |
| Volatile Organic Compounds (VOCs) | UNI EN ISO 14617-1:2002 |
| BTEX | UNI EN ISO 14617-1:2002 |
| Metals | UNI EN 14902:2005/EC1:2008 + UNI EN ISO 17294-2:2016 |
| Polycyclic Aromatic Hydrocarbons (PAH) | DM 05/05/2013 GU n°128 05/06/2016 |

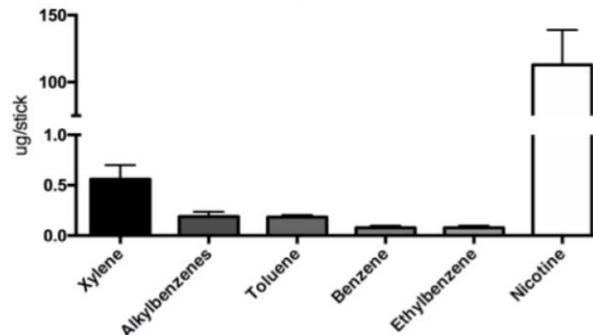
Polycyclic aromatic hydrocarbons (PAHs)



Aldehydes



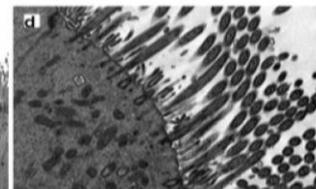
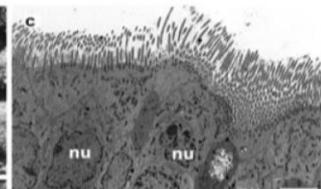
Volatile organic compounds (VOCs) and nicotine



Vivarelli F. et al., 2021 Nicotine & Tobacco Research

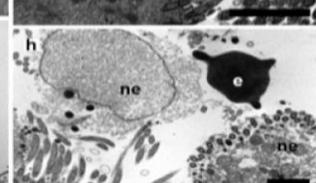
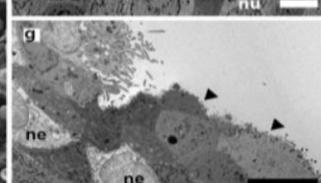
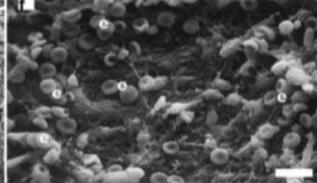
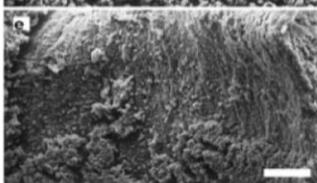
Modificazioni strutturali a livello della trachea e del parenchima polmonare

CTRL



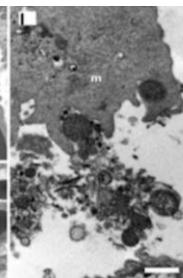
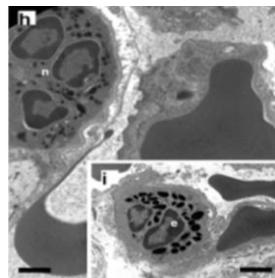
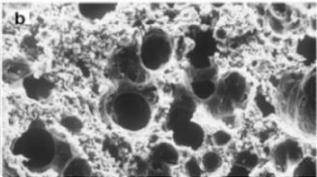
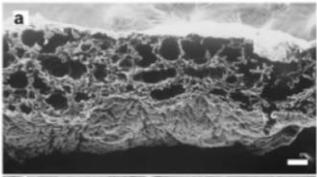
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IQOS

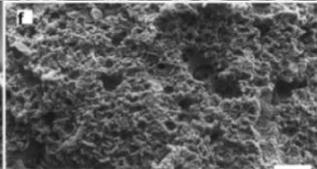
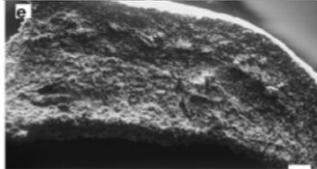


IQOS

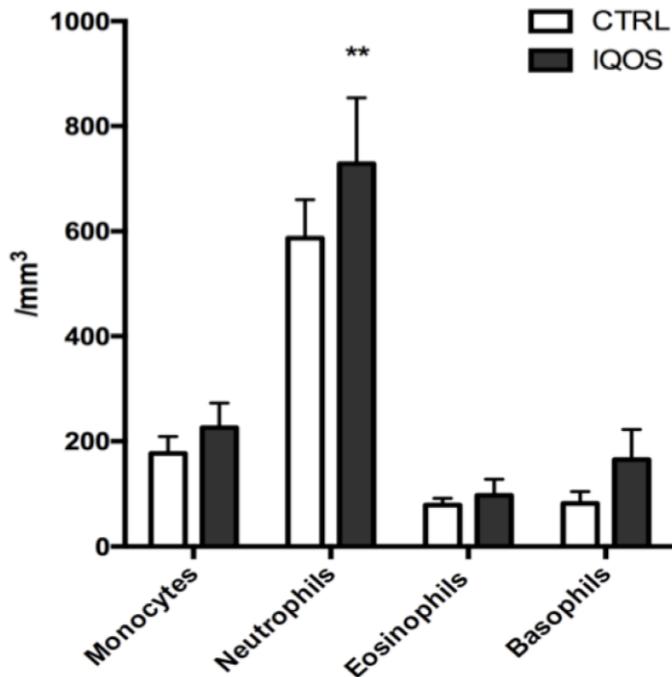
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IQOS



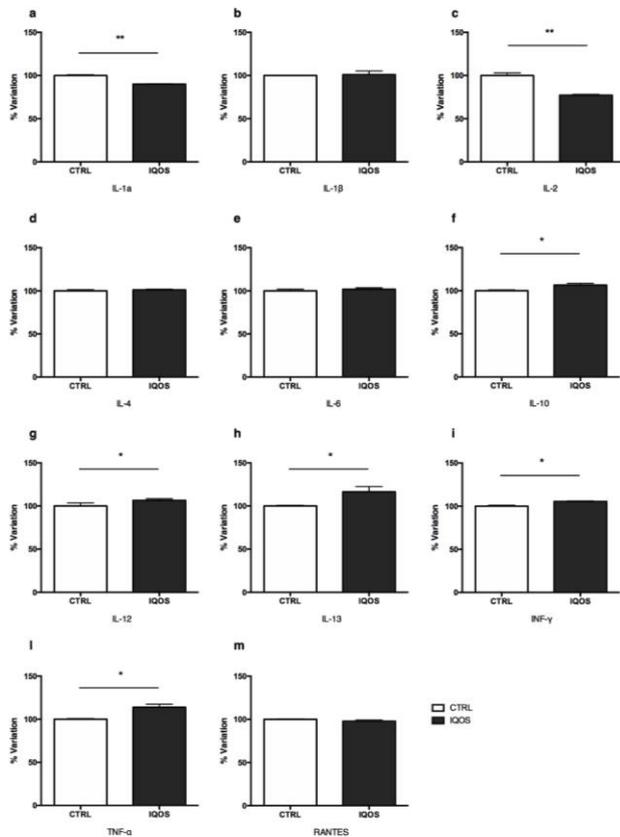
Immagini tratte da
Vivarelli F. et al., 2021
*Nicotine & Tobacco
Research*



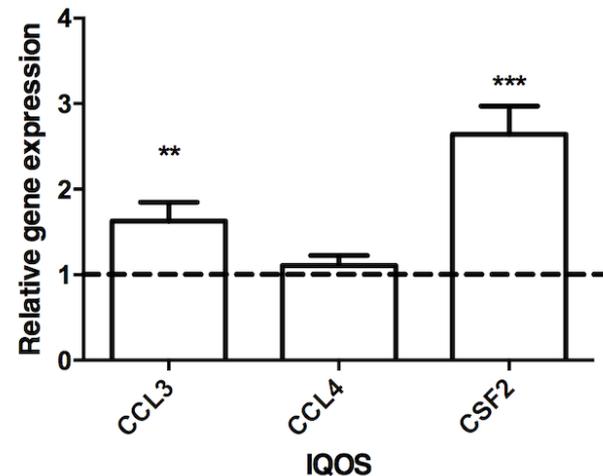
Alterazione del profilo leucocitario

Immagini tratte da
Vivarelli F. et al., 2021 *Nicotine & Tobacco Research*

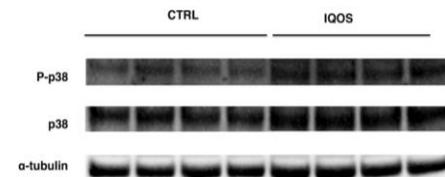
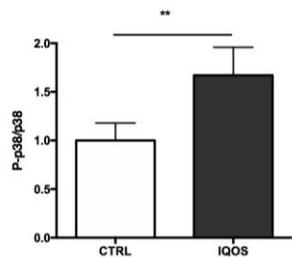
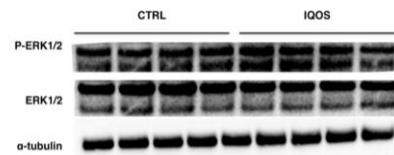
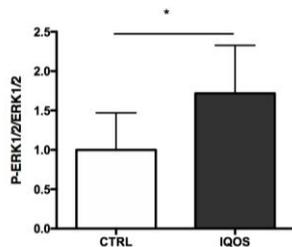
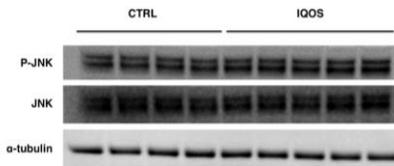
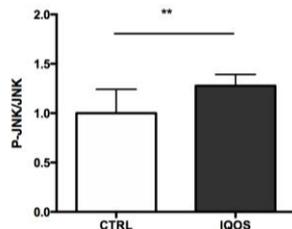
** $P < 0.01$; t-test a due code per dati non appaiati



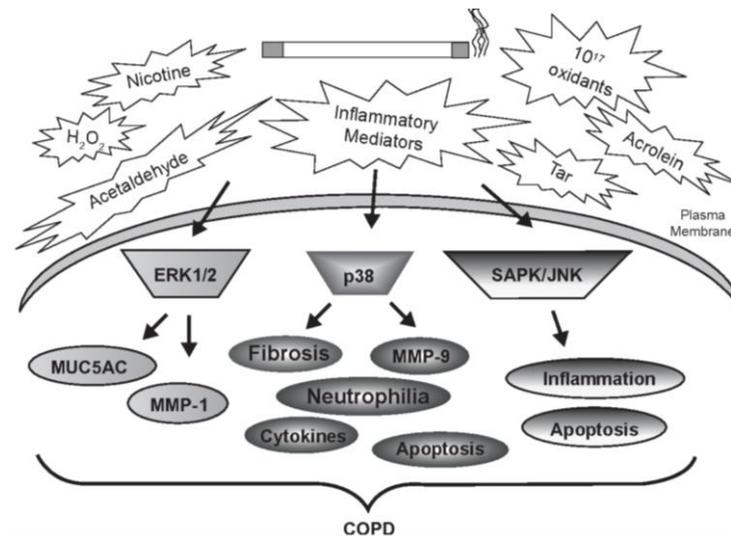
Mediatori dell'inflammatione



Immagini tratte da
Vivarelli F. et al., 2021 *Nicotine & Tobacco Research*
* $P < 0.05$; ** $P < 0.01$; ANOVA – Dunn post – hoc test

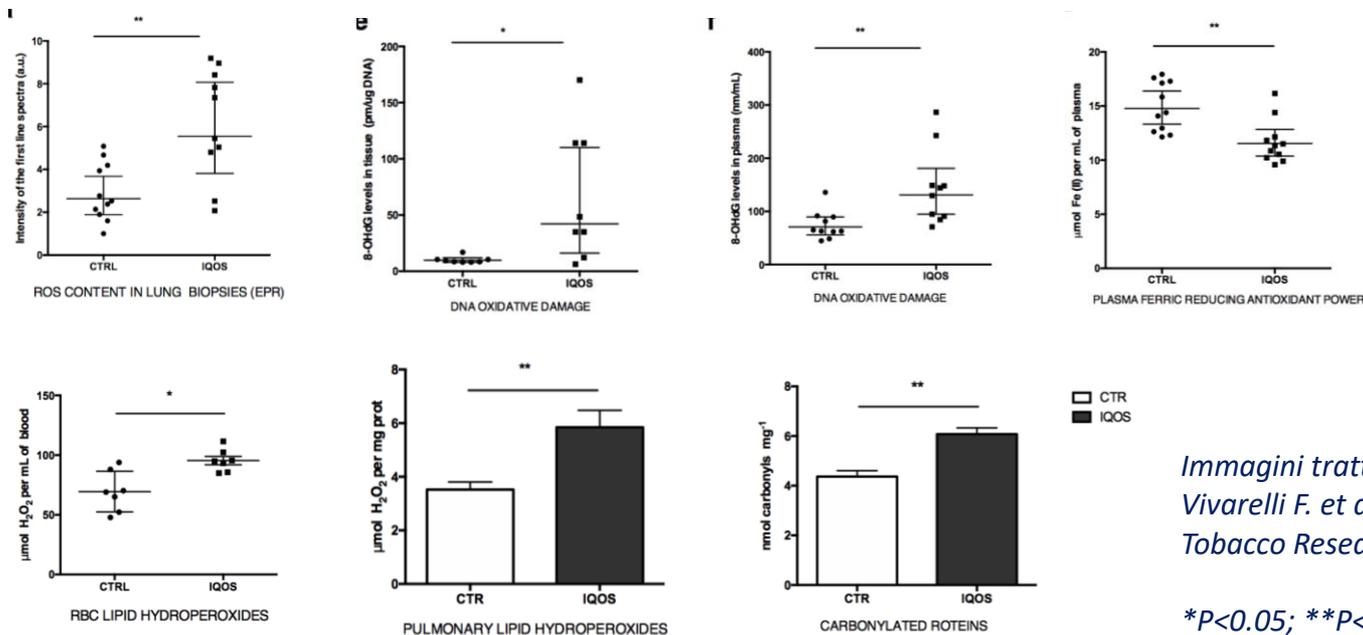


MAP chinasi



Immagini tratte da
Vivarelli F. et al., 2021 *Nicotine & Tobacco Research*
* $P < 0.05$; ** $P < 0.01$; ANOVA – Dunn post – hoc test

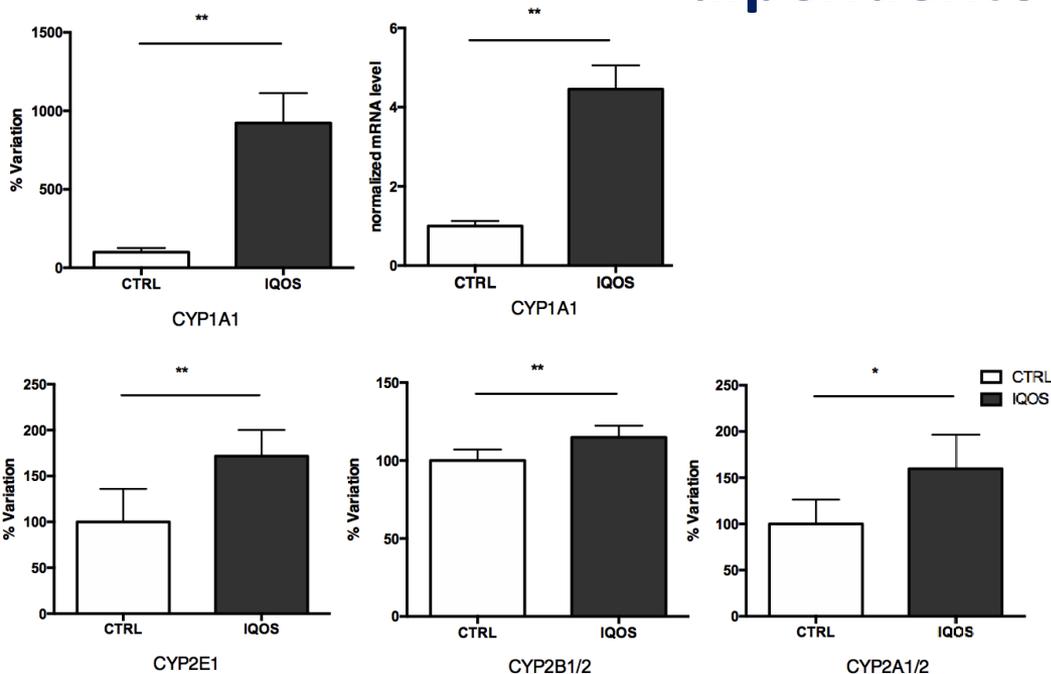
Radicali liberi e danno ossidativo



Immagini tratte da
Vivarelli F. et al., 2021 *Nicotine & Tobacco Research*

* $P < 0.05$; ** $P < 0.01$; t-test a due code per dati non appaiati

Modulazione dell'attività monoossigenasica CYP-450 dipendente

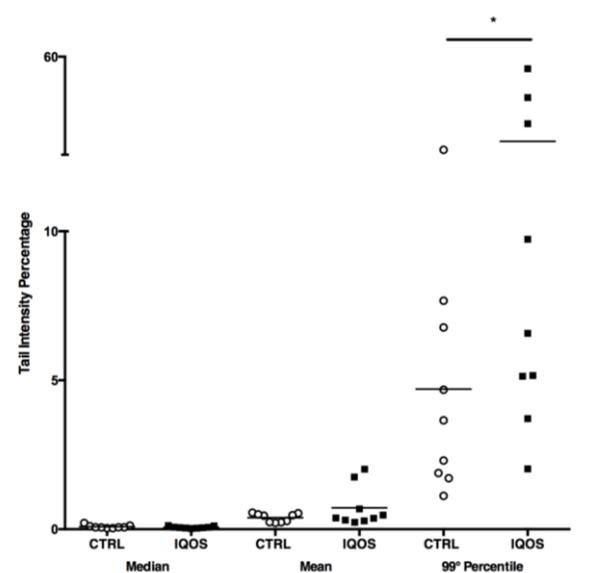
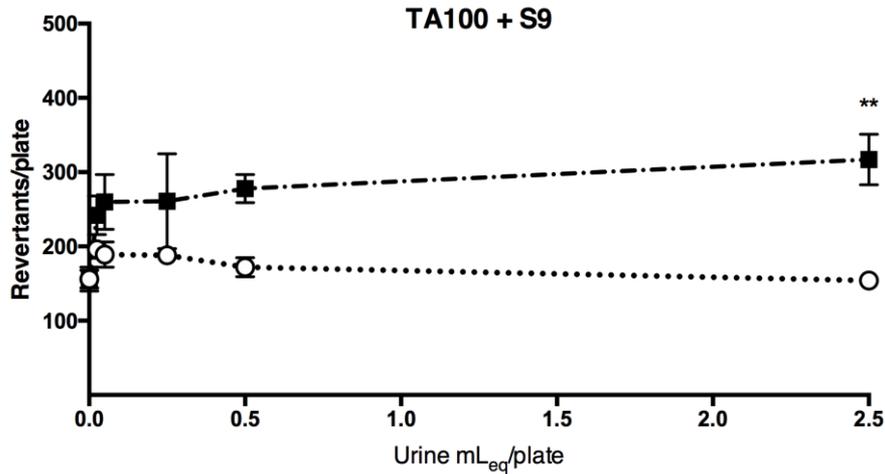


Immagini tratte da
Vivarelli F. et al., 2021 Nicotine & Tobacco
Research

* $P < 0.05$; ** $P < 0.01$; t-test a due code per dati non
appaiati



Mutagenesi



Immagini tratte da

Vivarelli F. et al., 2021 *Nicotine & Tobacco Research* *P<0.05; **P<0.01; ANOVA – Bonferroni post hoc test

Take-Home Message

Il sistema Heat-not-Burn IQOS rilascia livelli concentrazioni significativamente inferiori di alcune sostanze tossiche rispetto alle comuni sigarette

Il presente studio mostra tuttavia come l'esposizione ad IQOS porti ad alterazioni tissutali a livello polmonare e modificazioni genetiche ed epigenetiche tipicamente osservate nei modelli sperimentali di esposizione al fumo

Sono necessari studi a lungo termine per comprendere a fondo il rischio associato a tali dispositivi

Importanza della corretta comunicazione ai consumatori

Grazie per l'attenzione



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