

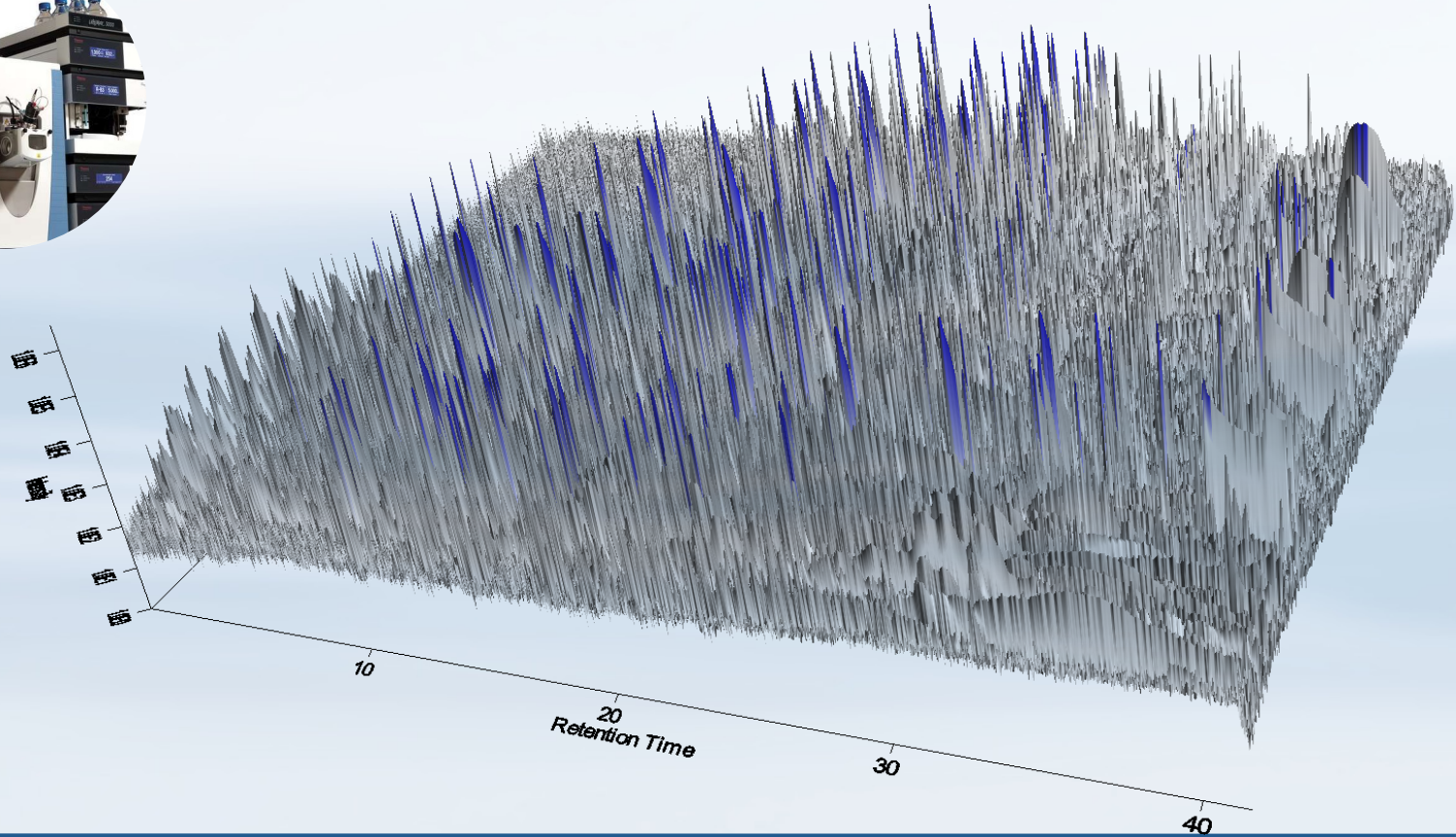
Do chemicals in plastic consumer products contribute to obesity?

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Plastic chemicals: a forest of peaks



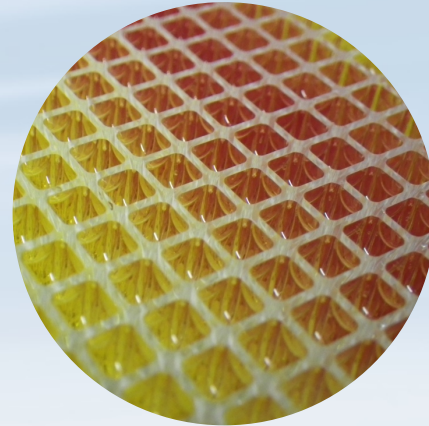
Plastic chemicals: More than additives

Intentionally added substances (IAS)

- starting substances
- catalysts
- additives

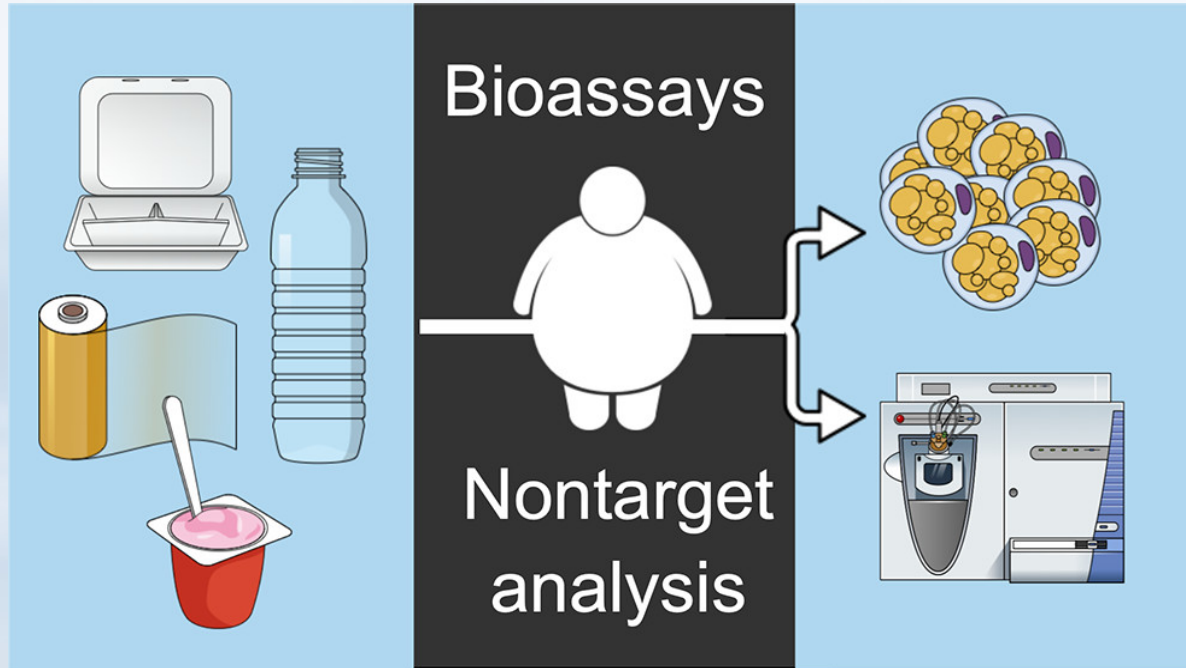
Non-intentionally added substances (NIAS)

- impurities
- reaction by-products
- degradation products



Metabolism-disrupting chemicals in plastic?

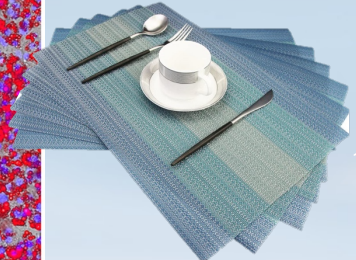
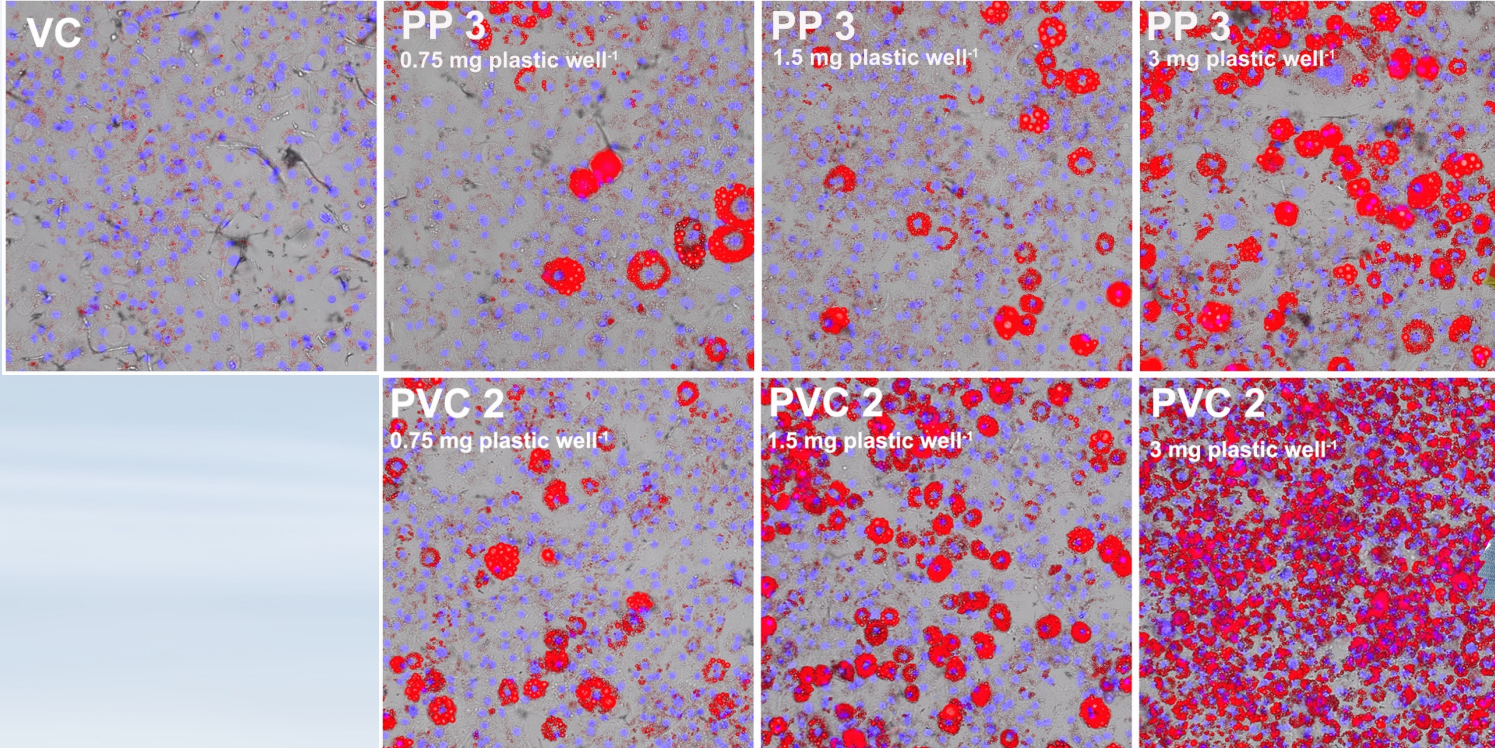
34 everyday
plastic
products



3T3-L1 pre-
adipocytes,
high-content
imaging

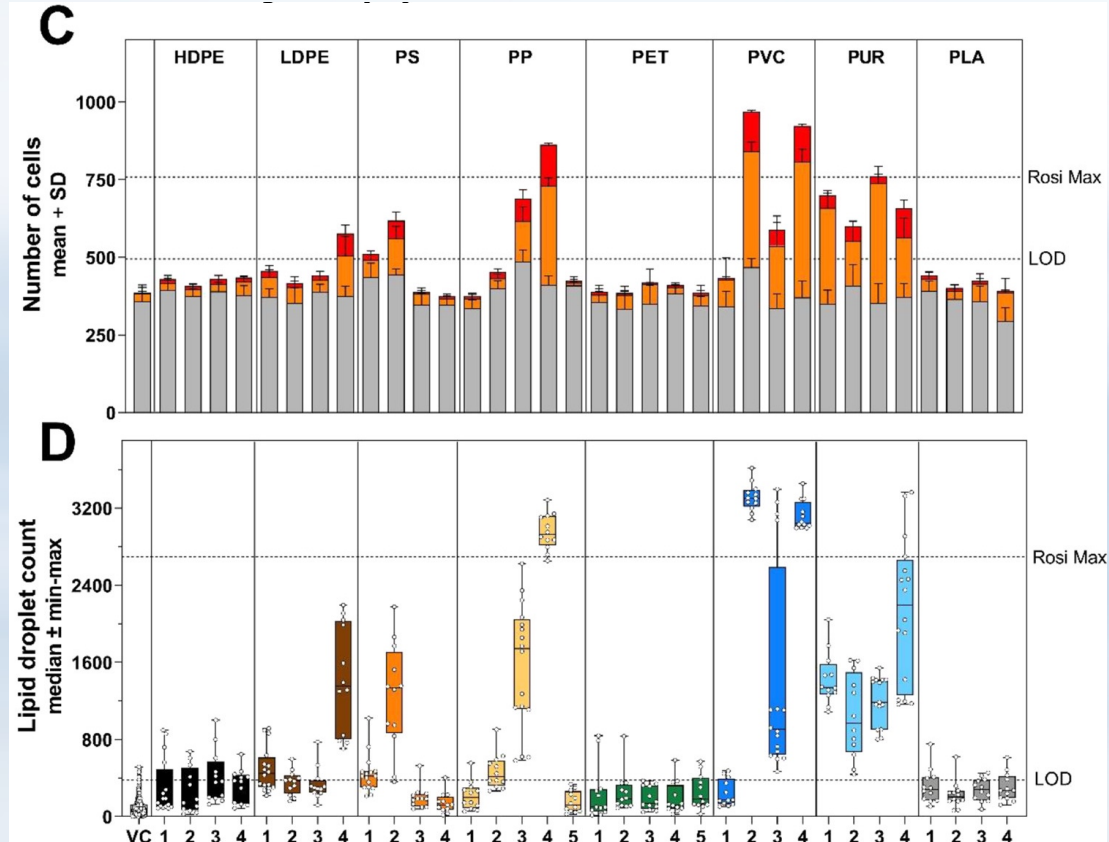
nontarget
LC-QTOF-
MS/MS

Adipogenic activity of plastic extracts

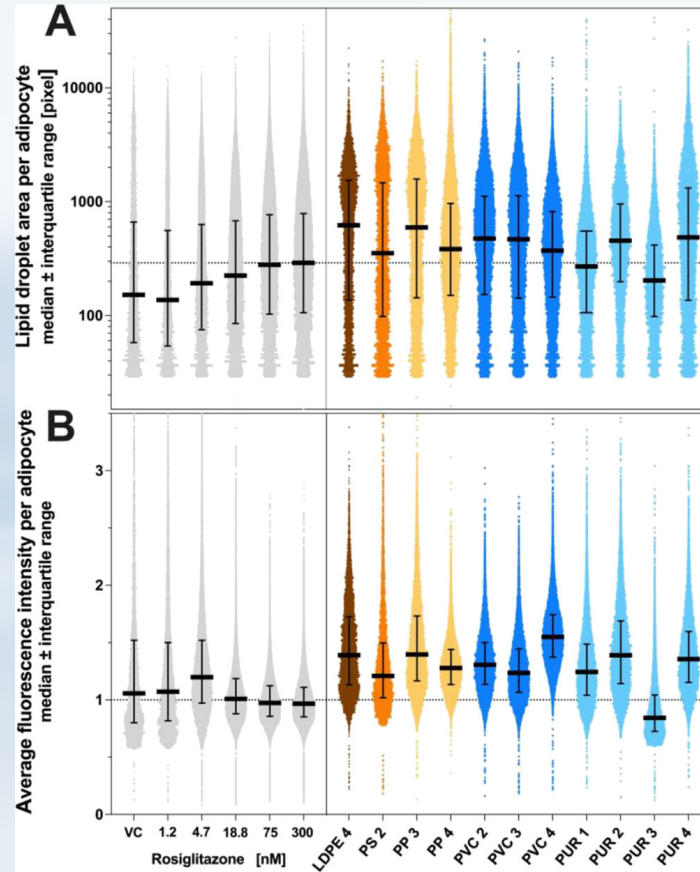


(wikimedia, amazon.com)

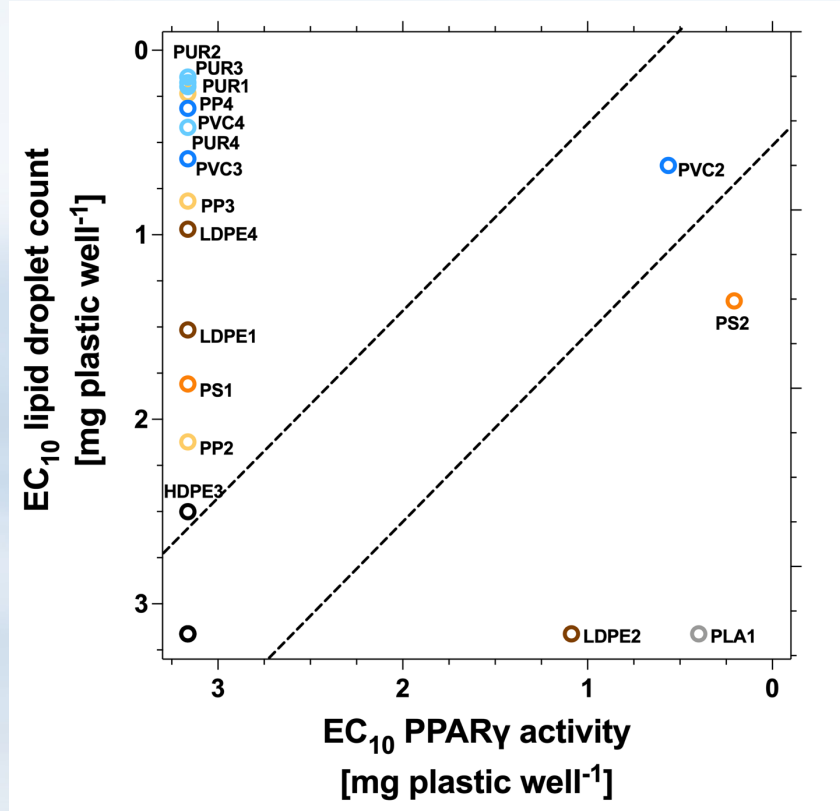
One-third of products induce adipogenesis



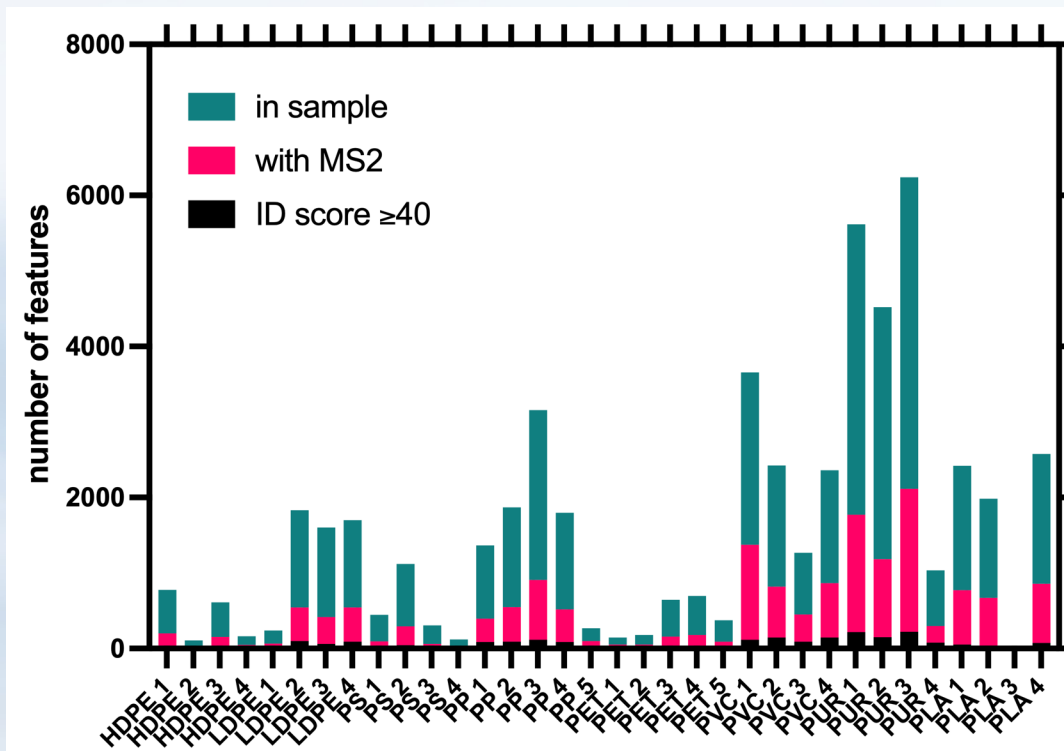
Unhealthy adipocytes?



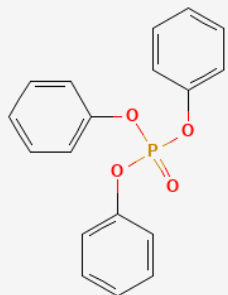
Adipogenic activity is PPAR γ -independent



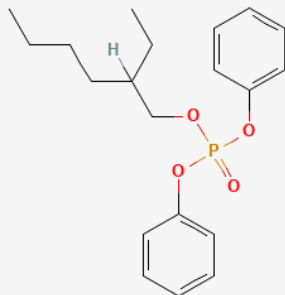
Number of chemical features



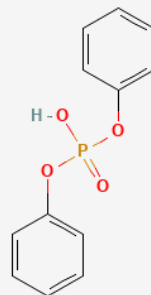
Metabolism-disrupting chemicals in plastic



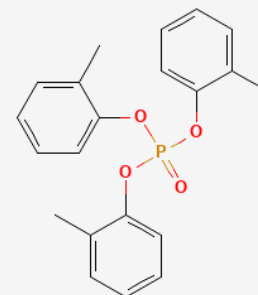
17 samples



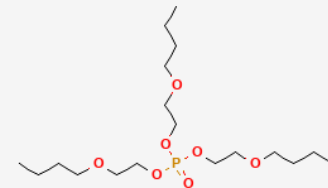
6 samples



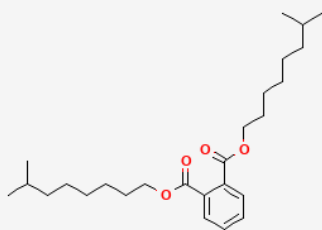
3 samples



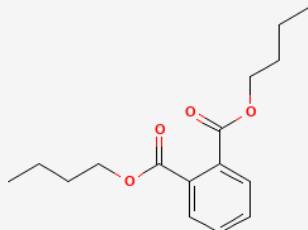
1 sample



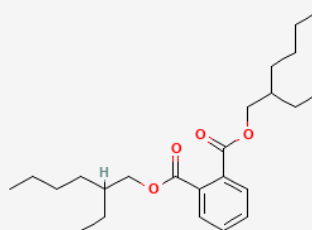
1 sample



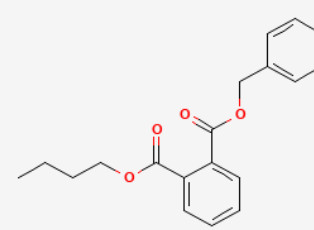
2 samples



1 sample



1 sample



1 sample

In a nutshell

- chemicals in 1/3 of products induce adipogenesis
 - key process towards overweight and obesity
 - plastics may be underestimated environmental factor contributing to obesity
- not mediated via PPAR γ
 - other mechanisms underlying
- products contain >55 000 chemical features
 - vast universe of plastic chemicals
- 11 metabolism-disrupting compounds
 - probably not solely causing the observed effects
 - other, unidentified MDCs in plastic



(Columbia Pictures, 1984)

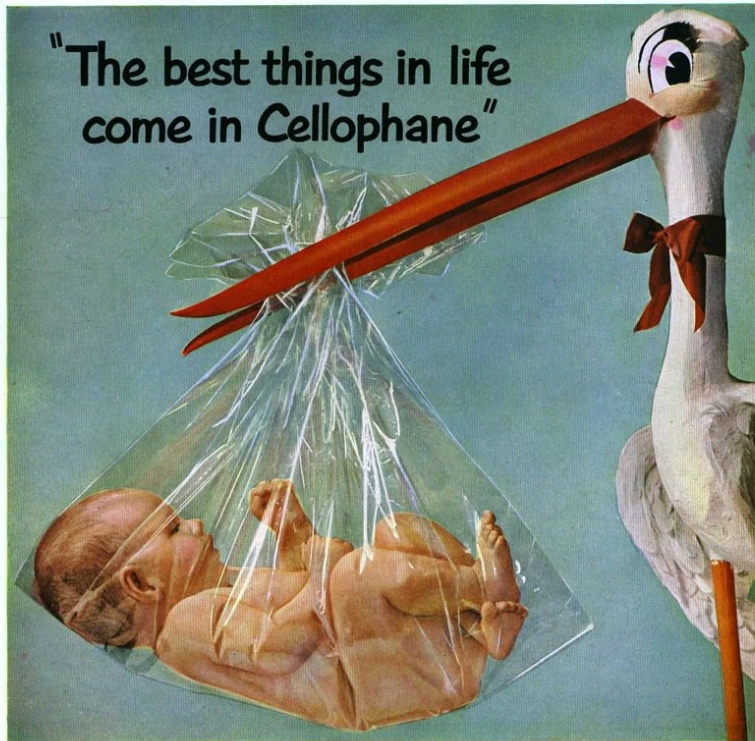
Ways forward

- acknowledge that plastics and other materials cannot be considered safe
- enforce transparency about chemical composition
- evaluate safety of all chemicals in a product not individual chemicals
- encourage safe-by-design and true green chemistry
- enable chemical simplicity as guiding principle



(Columbia Pictures, 1984)

"The best things in life
come in Cellophane"



"You SEE
what you
buy-no
guesswork."

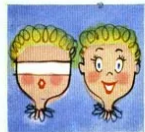


"Foods come
fresh-stay
fresh longer-
less waste."



"...and things
in Cellophane
are clean and
sanitary."

DU PONT
Cellophane



BETTER THINGS FOR BETTER LIVING... THROUGH CHEMISTRY
Look at "Cavalcade of America" on Television