PAHs in the Indoor Environment: A Review

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Beneath is all the fiends’; 
There’s hell, there’s darkness, there’s the sulphurous pit, 
Burning, scalding, stench, consumption; fie, fie, fie! pah, pah!—Give me an ounce of civet; good apothecary, sweeten my imagination; there’s money for thee.

Glou. Oh, let me kiss that hand!
Lear. Let me wipe it first; it smells of mortality.
Glou. O’ ruin’d piece of nature! This great world Shall so wear out to nought.—Dost thou know me?
Lear. I remember thine eyes—well enough. Dost thou
Possible human exposure pathways in ambient indoor environment

- Diet
- Inhalation
- Dermal contact
- Ingestion of settled indoor dust (HEXACOMM)

**PAH sources:**

- Outdoor Ingress
- Smoking
- Cooking
- Heating
- Biomass burning etc.
PAH levels in indoor AIR \((N=32)\)

Legend:
- North America
- Asia
- Other areas

Concepts:
I. Total PAH\(_{\text{adj}}\)
II. BaP\(_{\text{eq}}\)

\[ R^2 = 0.423, \ p < 0.01 \]
\[ t_{1/2} = 7.4 \pm 2.3 \text{ yr} \]

\[ R^2 = 0.495, \ p < 0.01 \]
\[ t_{1/2} = 4.9 \pm 1.3 \text{ yr} \]
PAH I/O ratios in indoor AIR

\[ R^2 = 0.226, p < 0.05 \]
\[ t_{1/2} = 1.2 \pm 0.5 \text{ yr} \]

\[ R^2 = 0.510, p < 0.01 \]
\[ t_{1/2} = 8.5 \pm 2.5 \text{ yr} \]
PAH levels in indoor DUST (N=35)

\[ R^2 = 0.196, \ p < 0.05 \]
\[ t_{1/2} = 5.0 \pm 2.3 \text{ yr} \]

\[ R^2 = 0.208, \ p < 0.05 \]
\[ t_{1/2} = 4.3 \pm 1.9 \text{ yr} \]
PAH levels in DIET (N=12)

Total dietary intakes of PAHs (ng/day)

- US 1970s
- UK 1983
- UK 2000
- UK 2008
- Netherlands 1985
- Italy 1995
- Italy 2008
- Spain 2000
- Spain 2008
- Spain 2006
- France 2006
- France 2008
- China 2010
Daily ΣPAH intakes from major exposure pathways

- Indoor air
- Indoor dust
- Total diet

### Adults
- Asia
- North America
- Other areas

### Toddlers
- Asia
- North America
- Other areas
Research recommendations

• **New sources** (e.g. ingress of outdoor sources such as use of coal-tar) of PAH indoor contamination in addition to smoking, cooking, etc?

• Indoor PAH **emission rates**?

• Does dust from the floor or from **elevated surfaces** best reflect exposure via dust ingestion?

• Future exposure assessments based on samples collected in a spatially and temporally **consistent fashion** (e.g. indoor air, dust, food, etc. at same location at same period of time)
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