An evidence review on the potential acute and chronic risks of e-cigarette use

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Study Context

Public Health England:

Our new review enforces the finding that vaping is a fraction of the risk of smoking,

at least 95% less harmful

and of negligible risk to bystanders. Yet over half of smokers either falsely believe that vaping is as harmful as smoking or just don't know...

Data taken from MCNEILL, A., BROSE, L. S., CALDER, R., HITCHMAN, S.C.. 2015. E-cigarettes: an Evidence update; : a report commissioned by Public Health England. London.

E-cigarette context

e-cigarette testing is essential but avoiding data misinterpretation is fundamental

Mechanistic Approaches

In vitro mechanistic studies are easy to conduct with few guidelines or standards leaving read across between studies almost impossible

Cigarette Context

Many studies lack the required cigarette smoke data to contextualise e-cigarette responses

Human Context

E-liquid studies lack relevance and don't account for artefactual and physiological changes as a result of exposure

Device Detail

Information on device detail and flavour inclusions are often limited. When elevated concentrations of ingredients are used, they are not contextualised against commercial formulations

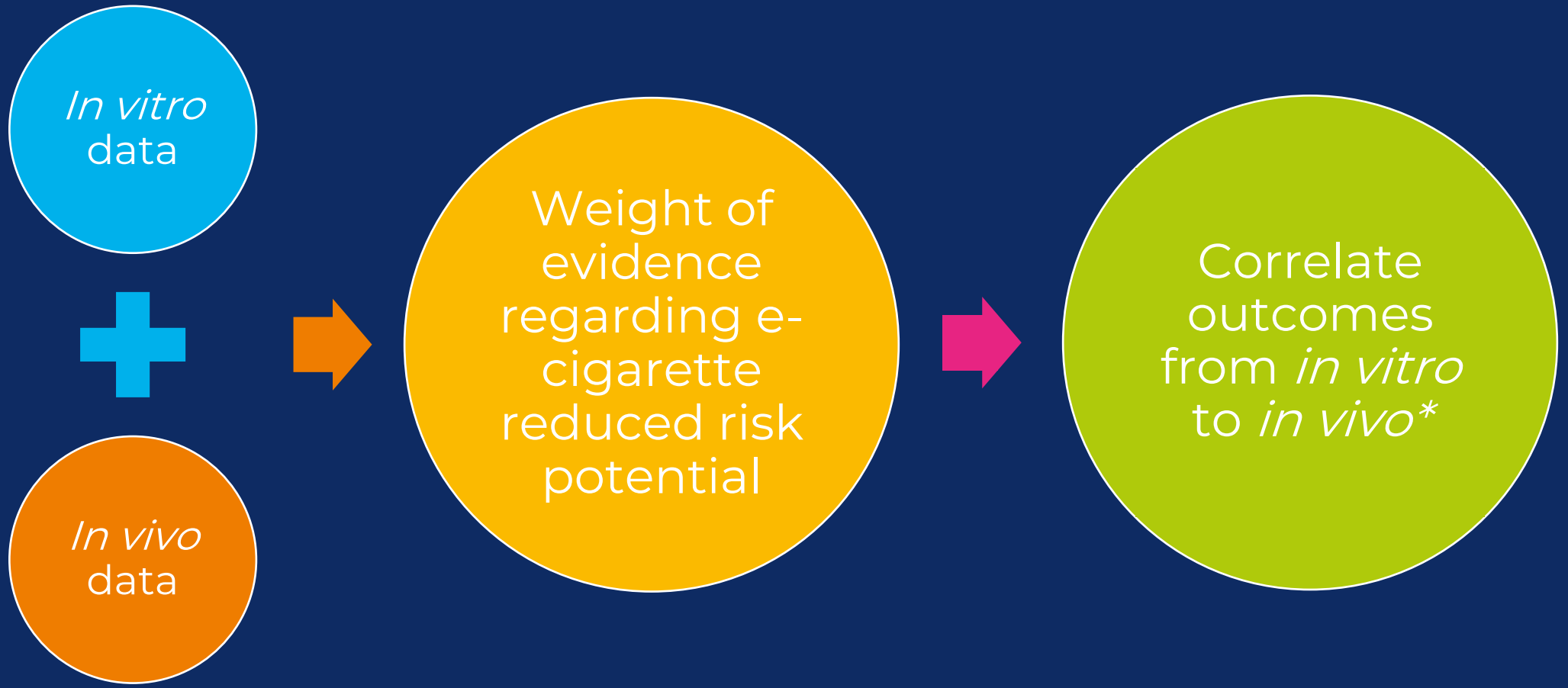
Dose Monitoring

Lack of dose measures restrict data extrapolation and human context

Duty of Care

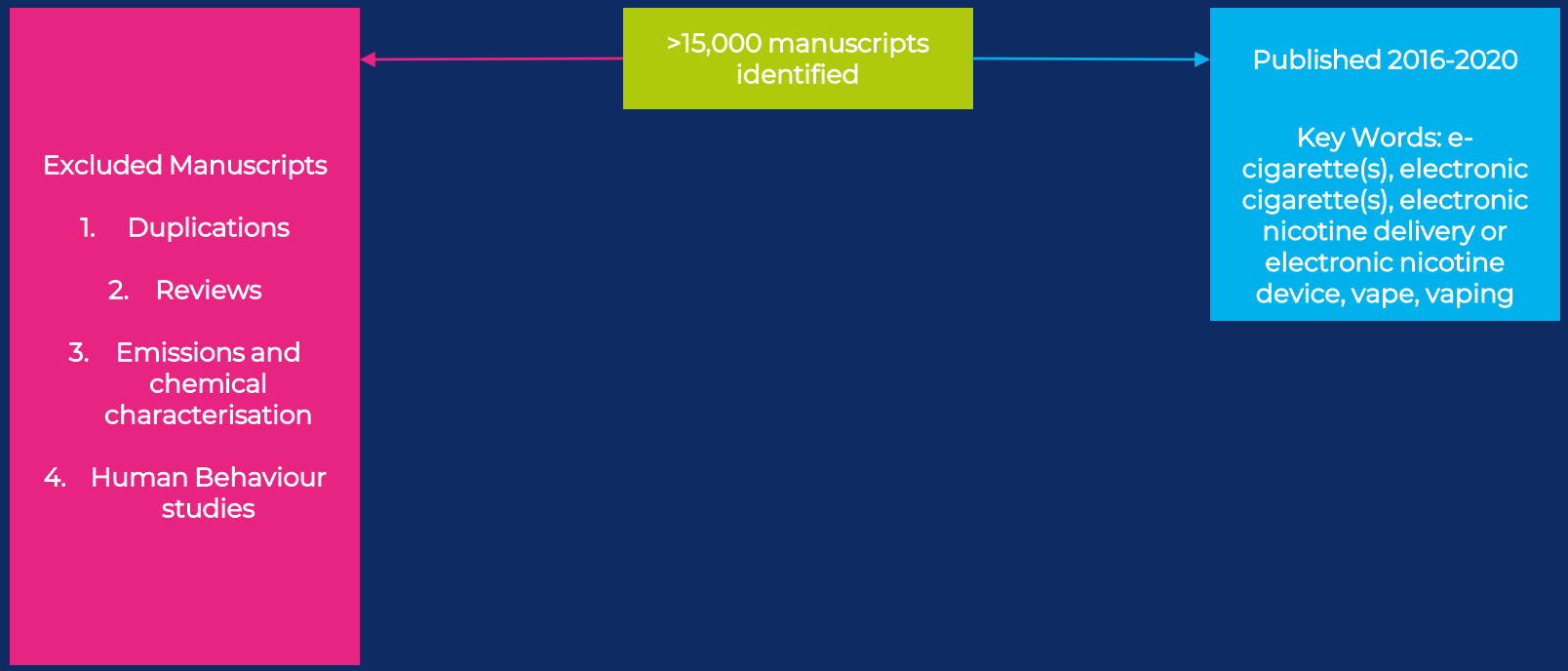
Recognised duty of care approaches, when designing studies are not widely considered when detailing adverse outcomes

Strategy



* = not being discussed in this presentation

Approach



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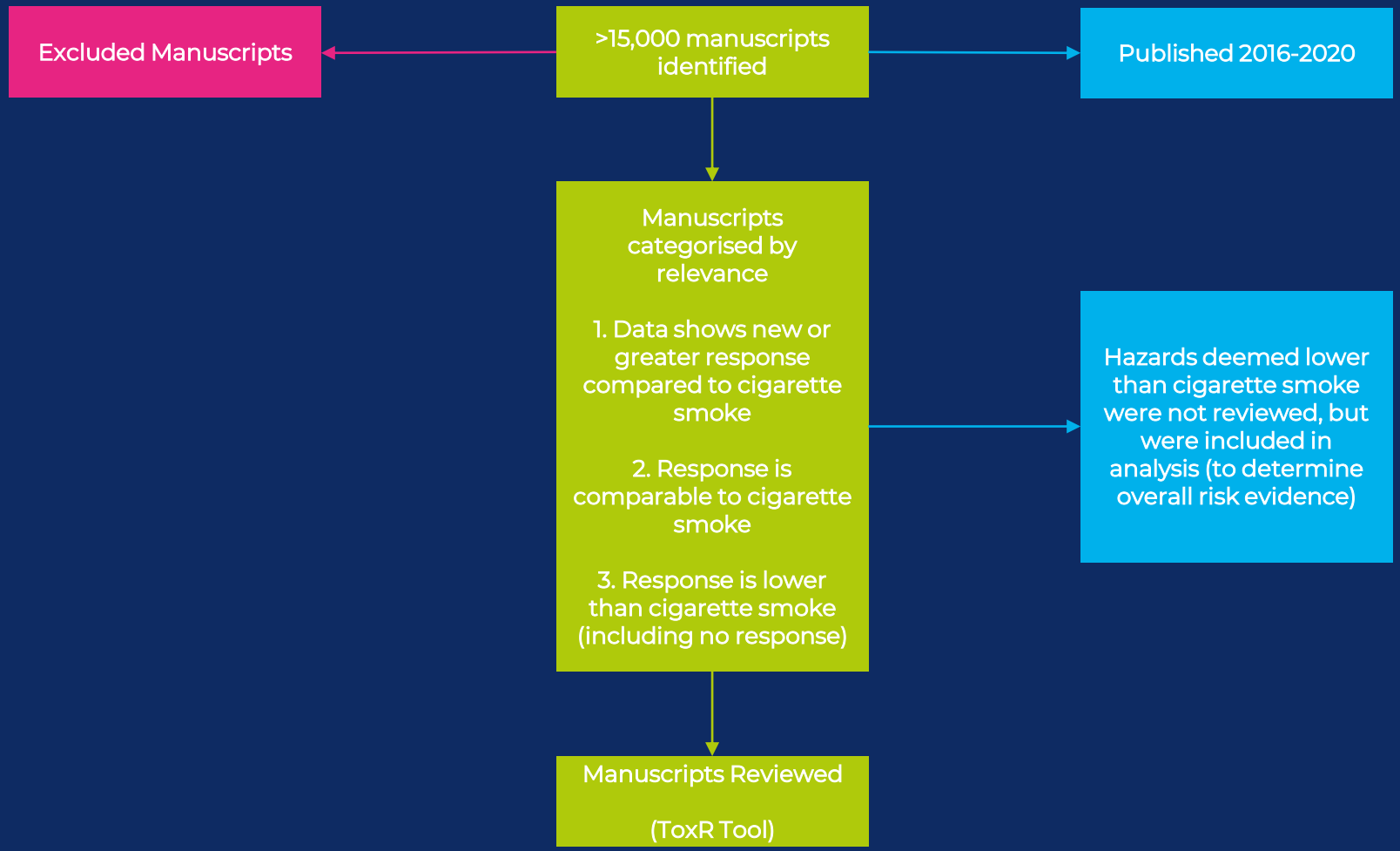
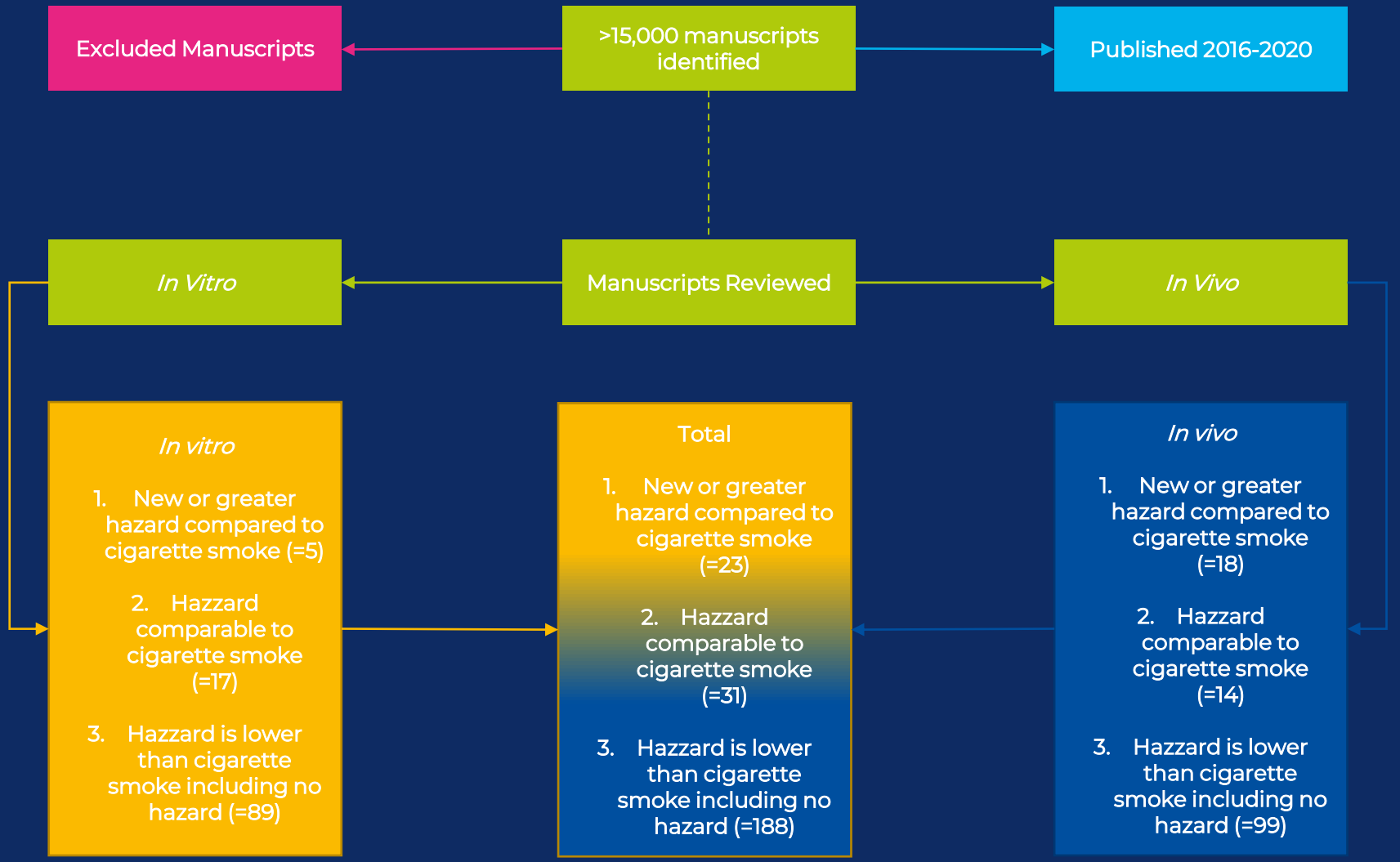
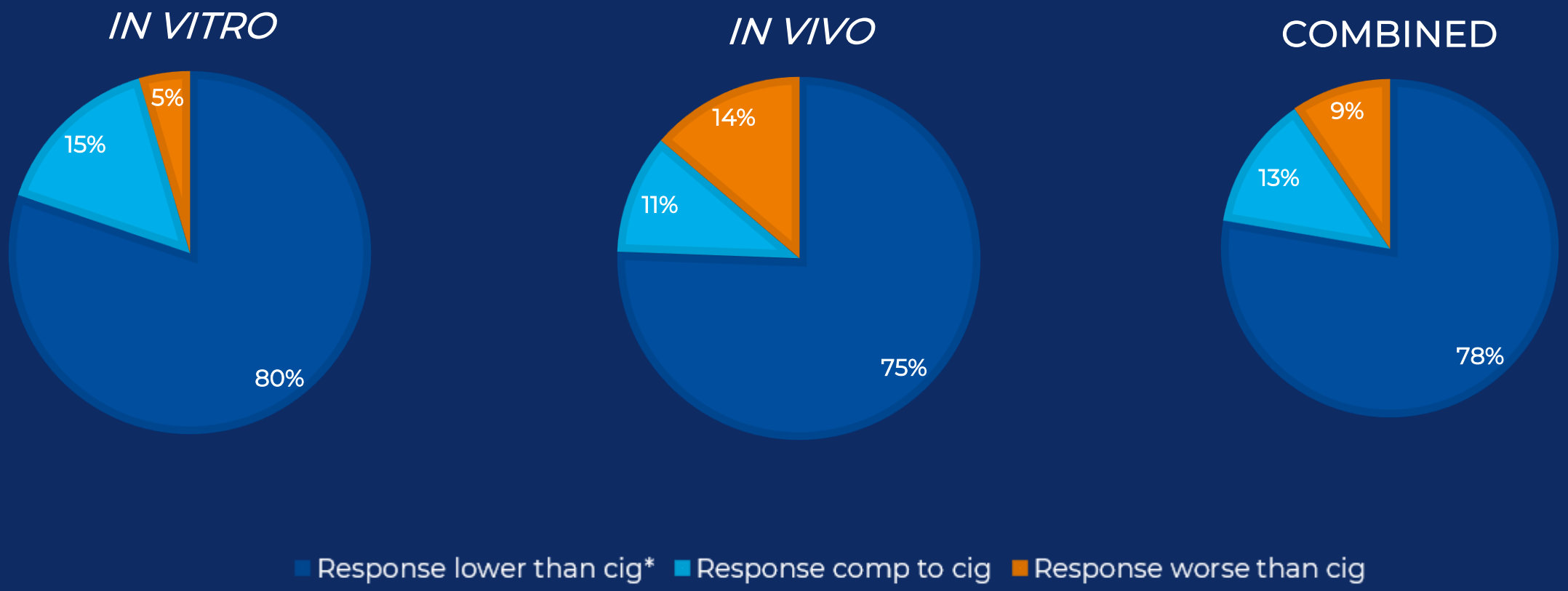


Approach



Results



"These products may contain nicotine, an addictive substance and are not risk free"

* = data inclusive of response both lower than cig and no observed response

Future Considerations

Of the papers reviewed, many studies (both *in vitro* and *in vivo*) were hampered by incomplete or inadequate reporting of key experimental parameters…

1. The inclusion of cigarette smoke (reference cigarettes) and appropriate controls will give valuable context and information on discriminating power, thus clarifying the scale of risk

2. The development of a reference range of ECs would allow standardisation. The application of standardised puffing parameters (many studies used bespoke regimens and human puffing behaviours) would strengthen data and *in vitro* to *in vivo* read across

3. "Dry-wicking" and other unintended laboratory missuses were often not documented. Vaping angle, number of puffs per cartomiser and battery duration were generally not discussed

4. Often, significant biological outcomes (*in vitro*) were detailed on e-liquid exposures only, without appropriate caveats on dose and limitations of such approaches

5. All ECs were treated equal. Very few studies if any detailed within category comparisons

Conclusions

"These products contain nicotine, an addictive substance and are not risk free"

1. Of more than 15,000 studies initially identified, only a small percentage showed adverse responses to EC aerosol that were comparable, greater than cigarette smoke or revealed new potential hazards

2. This review has demonstrated that the wider literature substantiates the reduced risk potential of EC use (*in vitro + in vivo*)

3. Reasuringly consistent observations were made between *in vitro* and *in vivo* datasets in terms of numbers of studies substantiating the reduced risk potential of EC use – ToxR provided a powerful tool to assess reliability of studies for risk asssessment purposes

4. Overall, we found that the *in vitro* effects of increased harm with ECs either did not translate into similar *in vivo* responses or had not been assessed in a consistent manner to allow comparisons

5. Clearer reporting on device specifics, formulations, settings and the use of standardised approaches where possible will strengthen future data

Thank You & Questions?

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