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# The Draize Eye Irritancy Test<sup>1</sup>

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## Summary

This paper discusses the harmful and fatal use of non-human animals, particularly rabbits, in the Draize eye irritancy test. It argues and demonstrates that such use is not scientifically valid if the results are applied to humans. Moreover, not only can this test result in extreme suffering (and death at the end) for non-human beings, dependence on this has the potential for harm to humans. Alternatives to such use are discussed in the context of being more defensible ethically and scientifically.

Keywords: alternative, animal welfare, compassion, Draize eye irritancy test, Draize skin irritancy test, ethics, kindness, morality, non-human animal, ocular irritancy test, rabbit, scientific method, species differences, toxicity testing

In the Draize eye irritancy test, *any* compound which might intentionally or accidentally gain access to the eye is tested by being placed onto the eyes of conscious, restrained rabbits. The animals are observed over a period of several days to see if there is an adverse reaction to the substance. There may be no reaction or there may be irritation ranging from minor to severe. In the worst situation, the cornea may ulcerate and perforate. Because the cornea is one of the most sensitive tissues in the body, rich in nerve endings, irritation or ulceration produces considerable pain. The rabbits usually are restrained in stocks which hold the animals by the neck and prevent them from rubbing their eyes. They cannot, therefore, in any way mitigate the discomfort or pain produced by the material placed in their eyes.

As an ophthalmologist and scientist, it is my professional opinion that the Draize test<sup>3</sup> has little, if any, relevance to human safety. It is fraught with technical and biological problems which make extrapolation of results to the human situation not only tenuous, but also dangerous.

The rabbit is the primary animal used in the Draize eye test<sup>4</sup>. The rabbit's eye and reaction to topical irritants often is considerably different from that of a human's<sup>5</sup>. A compound found to be safe in the rabbit may cause great harm to a human. On the other hand, a compound found to be toxic to the rabbit may cause no problems for a human while providing great benefits.

From a practical standpoint, therefore, the tremendous suffering that some of the animals go through in these tests is absolutely unnecessary. Their misery in no way guarantees the safety of humans. Similar criticism can be made against the Draize skin test<sup>6</sup>.

There are numerous alternative methods to obtain data to predict whether a particular material will be safe for human use. These include those for ocular irritancy<sup>7</sup> and for the Draize skin test<sup>8</sup>.

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1 The intent of this brief review is to demonstrate that reliance on rabbits or other animals is unnecessary, as well as immoral, to ensure a product is safe for human use. Although some of the references may be considered 'dated', they are still valid in developing and supporting the arguments made. The reader can search the world literature for developments in alternatives that are contemporary. Additional strong moral arguments against subjecting non-consenting beings to harm and death is the subject of another manuscript ([Buyukmihci 2022-12-01](#)).

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3 [Draize et al 1944](#)

4 [Bosshard 1985](#)

5 [Bosshard 1985](#); [Buehler 1974](#); [Griffith 1987](#); [Kraushar 1989](#); [Lieto et al 2022](#); [Swanston 1985](#); [Van Abbé 1973](#)

6 [Bosshard 1985](#); [Gfeller et al 1985](#); [Van Abbé 1973](#); [Weil & Scala 1971](#)

7 [Alépée et al 2023](#); [Bonneau et al 2022](#); [Borenfreund & Borrero 1984](#); [Boue-Grabot et al 1992-04-01, 1992-07-01](#); [Chacón et al 2022](#); [Douglas 1982](#); [Fujii et al 2021](#); [Griffith 1987](#); [Klopman et al 1993](#); [Kojima et al 2019](#); [Kruszewski et al 1992](#); [Lebrun et al 2023](#); [Lieto et al 2022](#); [Moe et al 2021](#); [Pirovano et al 1993](#); [Régner et al 1994](#); [Renzi et al 1993](#); [Roguet 1992](#); [Swanston 1985](#); [Wallin et al 1987](#)

8 Anon [1989-01-01](#), [2007-01-01](#), [2016-10-27a](#), [2016-10-27b](#); [Babich & Borenfreund 1989](#); [Cook et al](#) ...2

These methods are more reliable and more humane than the Draize test. In some cases the methods only represent a refinement in the test or a reduction in the numbers of animals used, and are not morally acceptable. In other cases, however, there is evidence that a total replacement, using a number of *in vitro* tests, is possible.

It often is stated that a proposed alternative to the Draize test must first be 'validated'. This means that the proposed alternative must be reasonably close in predicting what would be the result using the standard Draize test. There are at least two systematic errors with this approach. One, as mentioned, is that the data indicate the Draize test is not a reliable indicator of human reactivity. Another is that, to my knowledge, there has been no validation of the Draize test itself. It has been accepted as the standard with no rigorous attempt at verifying its reliability. Therefore, although it is true that new methods of determining irritancy should be 'validated', the standard should be against known reactions to various categories of substances by the *human eye*.

Tradition alone appears to be the major momentum behind the continued reliance on such an archaic, unreliable and abjectly inhumane method as the Draize test. There are *no* regulations which require the use of this test for determining the safety of material which may be used by humans<sup>9</sup>. The data derived from testing on other animals may not even be admissible in court when a person brings action against a company due to injury from a particular product<sup>10</sup>.

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*"The purpose of this study was to develop a defined approach (DA) for eye hazard identification according to the three UN GHS categories for surfactants (DASF). ... The DASF has shown to be successful for eye hazard identification of surfactants."*
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*The Consumer Product Safety Commission wrote a letter outlining the acceptable use of several alternatives to biological testing which included human experience with hazardous substances, previous test data as reported in the literature and testing for skin irritation. "If the test shows the substance to be a skin irritant, a prudent manufacturer might also...presume the substance to be an eye irritant..." The letter was published in the 11 February 1982 Congressional Record, vol. 128.*
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4. Anonymous 2007-01-01 "Corrositex" *InVitro International*  
<http://invitrointl.com/products/corrositex.php> Accessed 2019-09-02
5. Anonymous 2016-10-27a "EpiDerm™" MatTek Corporation  
<https://www.mattek.com/products/epiderm/> Accessed 2019-07-27
6. Anonymous 2016-10-27b "EpiSkin" *SkinEthic* <http://www.episkin.com/EPISKIN.asp>  
Accessed 2019-09-02

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[...1 1992](#); [Hareyan 2008](#); [Isseroff 1989](#); [Neves et al 2013](#); [Pitman 2014](#)

<sup>9</sup> [Anon 1982-04-01](#)

<sup>10</sup> [Gleeson 1987-10-01](#)

<sup>11</sup> In this paper, I have cited only a few references to document various points because the literature on this subject is substantial.

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*"This review provides a broad overview of the validated methods for analyzing ocular irritation and those still used by some industries, as well as promising models that need to be optimized according to the [Organisation for Economic Co-operation and Development]. Finally, we give an overview of recently developed innovative models, which could become new tools in the evaluation of ocular surface toxicity within the scope of [integrated approaches to testing and assessments]."*
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*"Moreover discrepancies in the response of the rabbit and human eye impede the extrapolation from animal data to man."*  
  
*"Anatomical, physiological and biochemical differences between animals and humans prevent direct prediction of the expected irritancy in man from data on experimental animals."*  
  
*"...the information that is necessary to prevent a possible hazard to man is the identification of an irritant or a corrosive substance. If this straightforward goal is kept in mind, in vitro techniques will soon provide reliable data for the estimation of the irritancy potential in man."*
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*Some differences between rabbit and human are: maximum volume of fluid in conjunctival cul-de-sac is about 0.08 ml in rabbit, 0.01 ml in human; blink rate in the rabbit is a few per hour, about 12 times a minute in the human; although immediate reaction to irritant is serous (watery) tears in rabbit, soon becomes viscous and milky due to Harderian gland secretion (no Harderian gland in human); corneal surface area relative to that of whole globe is 25% in rabbit, 7% in human. The article reviews the Draize test and the scientific shortcomings with suggestions for refinement.*
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*They found considerable variation in results for the same materials between labs as well as within labs and made several conclusions, although no mention of alternatives or animal welfare considerations; "...the tests which have been used for over 20 years to decide the degree of eye or skin irritation produce quite variable results among the various laboratories as well as within certain laboratories. To use these tests...to obtain consistency in classifying a material as an eye or skin irritant or nonirritant, therefore, is not deemed practical...it is suggested that the rabbit eye and skin procedures currently recommended by the Federal agencies for use in delineation of irritancy of materials should not be recommended as standard procedures in any new regulations."*