



Lunch Sessions

SL1: Databases: progress report

The AnimALT-ZEBET Database: A Unique Resource for Comprehensive and Value-Added Information on 3R Alternatives

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Summary

Evaluation of value-added databases represents the most reasonable starting point for any structured search for information on suitable alternative methods. This source provides clear, comprehensive and reliable reviews on the most advanced procedures with relevance to the 3R concept.

At the forefront of these essential resources is the AnimAlt-ZEBET database offered by the German Federal Institute for Risk Assessment (BfR) and accessible online free of charge. The documents of this database compiled by scientific experts provide selected and condensed high-quality information in compliance with specific requirements of scientists, competent authorities and others who are obliged to consider the applicability of specific alternative methods. Thus, the focus of AnimAlt-ZEBET is on (1) essential technical key points, (2) application domains, (3) advances/limitations of the most elaborate protocols, (4) prediction models, (5) opinion(s) of expert panels (e.g. ESAC; ICCVAM), (6) status of validation and acceptance and, most notably, (7) contribution of the respective methods to 3R.

Because the documents of the database are written in a structured manner, they can be used as the feed-stock for any up-to-date text mining application, like “semantic landscape”-producing tools. The database currently holds some 140 documents focusing on safety testing of chemicals and drugs, but soon will be expanded to basic sciences as well.

Keywords: text mining, information retrieval, structured search, value-added database, ZEBET

1 Introduction

The amount of accessible information grows rapidly in a largely uncontrolled manner. Buried within this ever-growing “thicket” are innovative ideas and seminal research that may become obscured over time. Scientific meta-databases like *PubMed* provide the possibility to search almost 20 million documents simultaneously via simple and usually general keywords. After retrieving the hit list, great efforts are thus necessary to sort out irrelevant literature, to elaborate an effective combination of search terms (search strategy) for subsequent queries and, at the same time take care of not losing track. As a result, the approach of targeted searching for information is becoming commonly unpopular among scientists. Most never attended a special course on retrieval techniques during their education

and are unfamiliar with straightforward concepts (and computer aided tools) for deducing powerful keywords.

Regardless of the issues mentioned, scientists in Germany are obliged to undertake a valid indispensability search prior to applying for authorisation of an animal experiment. The aim of an indispensability search is to exclude all possibility of the presence of (i) a suitable alternative method that can be applied instead of the animal experiment, (ii) usable results from comparable previous animal experiments, and (iii) results from other research suited to anticipate the outcome of the planned experiment. This obligatory search has to consider the current state of scientific knowledge exhaustively. Only when the availability of suitable alternatives or usable scientific results has been excluded in a valid search procedure based upon the current state of knowledge, an animal experi-



ment may be approved as indispensable to reach a vindictory scientific objective.

To assist scientists and authorising bodies, *ZEBET* at *BfR* – i.e. the German Centre for Documentation and Evaluation of Alternatives to Animal Experiments – provides free online access to its value-added database *AnimAlt-ZEBET*. This source currently contains some 140 method summaries that are written in a structured and standardised manner and concentrate on the most essential facts of the portrayed alternative methods. The added value of these documents is constituted through expert selection of incorporated literature committed to most substantial and reliable information only. Furthermore, the summaries aim to enable users to consider the suitability of the method at hand for their own purposes without needing to collect additional information. Therefore, *AnimAlt-ZEBET* serves as a convenient starting point, especially for scientists and authorising bodies, to perform a structured search for information on suitable alternatives to a particular animal experiment.

2 Effective searching with a structured approach

The basic consideration of a structured search approach is an *a priori* identification of those resources or resource-subsections that most likely contain the required information. Speaking metaphorically: When you return after a sunny day to your car and realise that you have lost the keys, then, of course, before returning to the beach and starting to dig, you may first try to consider those sites most promising. Only a person with too much time and a high frustration threshold would search the whole beach, grain for grain. But exactly this is what scientists attempt when they explore accessible meta-databases by means of simple keyword searches. Elaborating a search strategy (combination of search terms) is es-

entially the same as adjusting the mesh size of a sieve: If it is set too small you will retrieve the keys but also coins, shells, bottle caps, etc. If it is set too large you will select the bigger flotsam but might miss your keys. Even with a highly adjusted sieve, however, searching the entire beach will prove tedious. (It is a perfect way to find all lost car keys present at that site, though.)

With regard to the employment of search terms, the above certainly seems true for a structured search as well. Due to the restricted amount of information, however, the list of relevant documents retrieved is essentially less voluminous, more reliable and may be evaluated much faster. Thus the fine adjustment of the “mesh size” (search strategy) is easily achievable and, in a topic-restricted environment, a much easier search strategy can be composed due to the redundancy of certain keywords (i.e. topic-defining terms like “3R”).

The structured search for scientific literature on a certain candidate alternative method should be initiated from sources that are likely to deliver the most relevant results while requiring the lowest efforts, that is value-added databases such as *Anim-Alt-ZEBET* and *ECVAM DB-ALM*. If no relevant literature can be detected here, the search may then proceed in adequate topic-restrictable databases like *PubMed* or *AGRICOLA*, where the pool of explorable literature can be preselected via subject headings like “animal use alternatives” (currently roughly 2000 documents in *PubMed* and 1100 in *AGRICOLA*, respectively). The searcher can find further assistance at the convenient *ALTBIB-Portal to PubMed*.

3 AnimAlt-ZEBET at a glance

The fundamental concept behind the documents in the database is to provide selected high-quality information in compliance

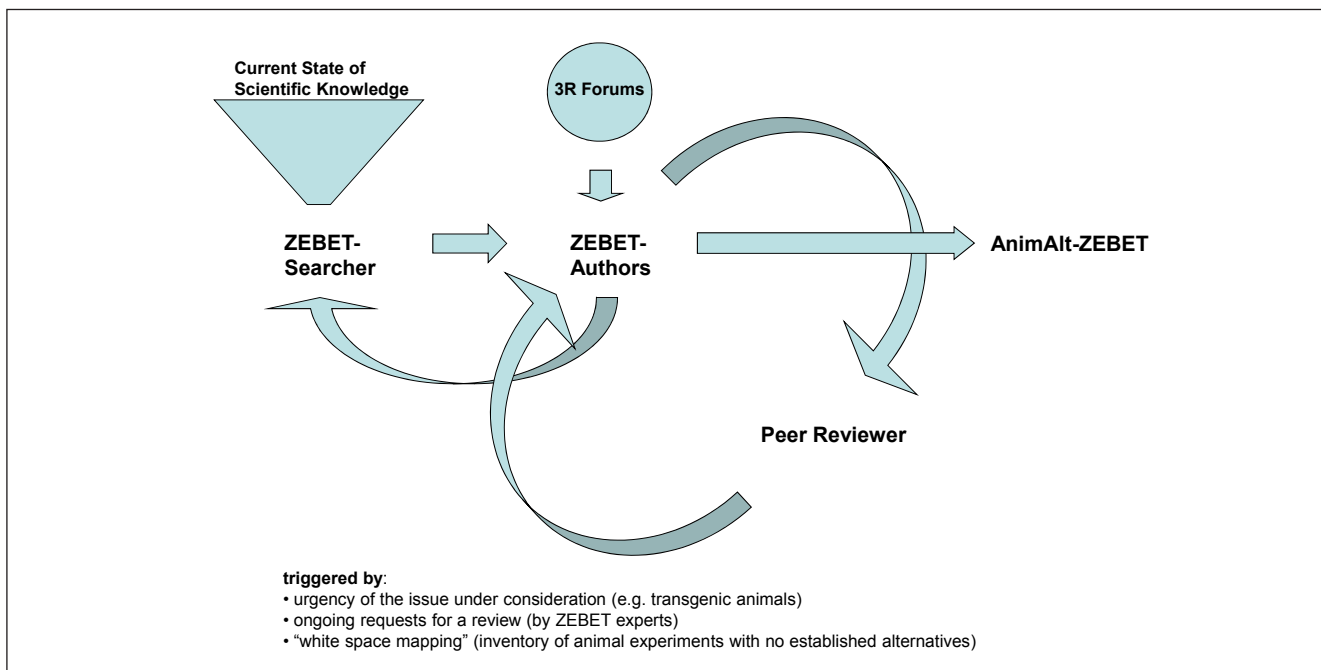


Fig. 1: The workflow of method-summary production for *AnimAlt-ZEBET*. The process is triggered by the indicated stimuli.

with specific requirements of scientists, competent authorities (authorising bodies) and others who are obliged to consider the applicability/suitability of a certain candidate alternative method. The information provided is therefore focused on, (1) the essential technical key points and required equipment, (2) the application domain, (3) advances/limitations of the most elaborate protocol and its variations, (4) the prediction model, (5) the opinion(s) of expert panels (e.g. *ESAC*; *ICCVAM*), (6) the status of validation and acceptance and, most notably, (7) the contribution of the respective method to the *3R* concept.

The workflow of method-summary production integrates several quality ensuring feedback loops (Fig. 1). Firstly, from the pool of potentially relevant documents collected at *ZEBET*, only the most adequate literature is selected for integration based upon defined criteria. Secondly, the draft summaries are subjected to a stringent internal review process performed by highly recognised experts in the field.

The decision on which method-summaries should be provided next is triggered by (i) the urgency of the addressed issue (e.g. dramatic increase in the number of transgenic animals), (ii) whether there are ongoing requests for a review on animal use applications by national authorising bodies, and (iii) the general desire for “white space mapping” within an inventory of required animal experiments that visualises areas of as yet absent established alternatives. To keep up-to-date with the latest activities and developments in the field of *3R*, the authors also consider relevant forums like *AltTox.org* and *3R* specific portals like *AltWeb*. Nevertheless, care is taken to extract only information relevant for the particular audience.

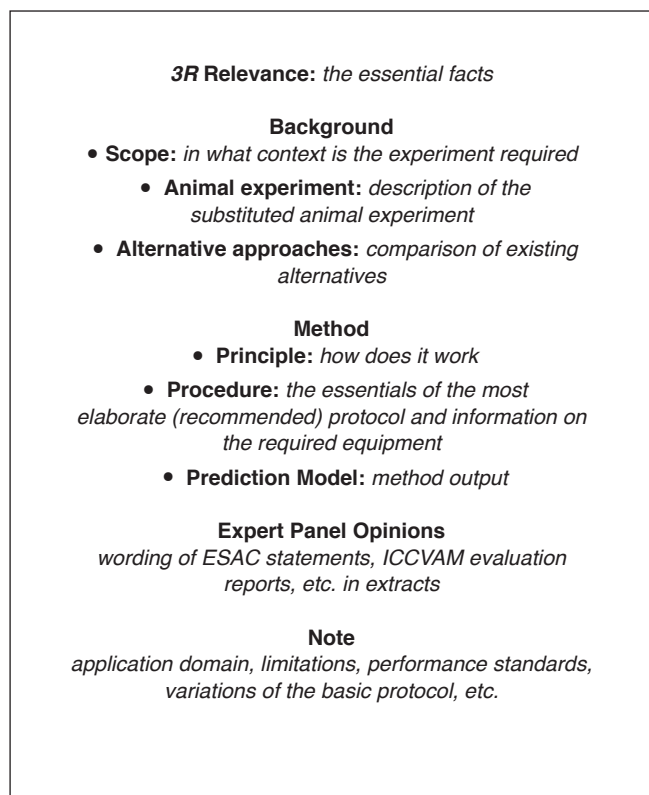


Fig. 2: The conceptual frame of the method-abstract.

Structure and phrasing of the method-summaries are standardised to enable immediate orientation and easy comprehension and to provide the possible feedstock for up-to-date text mining applications. To get a general idea of the method at hand, the reader may simply consult the meta-data fields “Title”, “Evaluation”, “Status” and “Regulation”, in combination with the abstract section “*3R* relevance”. Here, users will find highlighted facts to consider the specific objective, the state of development, the acceptance in the scientific/regulatory community, the application domain, and the contribution to the *3R* concept.

Starting with method-summaries that were generated in 2009, there will be a revised structure of the main text (Fig. 2). As explained above, this main text aims to cover all aspects that are necessary to consider the suitability/applicability of a particular method in a given context. Thus, there is a focus on practical considerations, e.g. endpoints, operating schedule, required equipment, limitations, etc. The section “Expert Panel Opinions” provides a detailed picture of the acceptance status of the particular approach and possible objections that might have been raised by official bodies.

Currently, the *AnimAlt-ZEBET* database holds documents that focus on safety testing of chemicals and drugs, but soon it will be expanded to also cover all relevant areas in basic sciences.

4 New online presence in october 2009

AnimAlt-ZEBET is hosted by *DIMDI*, the *German Institute of Medical Documentation and Information*. At this resource one can search the database exclusively or – in a “superbase mode” – blended with other databases like *PubMed*. It is planned to run a stand-alone online presence of *AnimAlt-ZEBET* that will be launched at the *BfR* website in the future.

References

(Resources as available on 21.08.2009)
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