

RB/LP/46D

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PROJECT QATAR

Quality of tar in relation to product development

The 'quality' of different cigarette smoke condensates refers to relative or specific biological activity per unit weight of tar. Quality of tar should not be confused with smoke quality, which will be a composite of the biological activity of smoke tar, its inhalability, degree of retention, rate of clearance from the lungs, etc.

The concept of testing the quality of tar has been the cornerstone of a large amount of biological work done since the mid-60's by BAT and certainly all other U.K. tobacco companies, either independently or as part of the TRC programme.

From the start, great reliance was placed on testing long-term comparative carcinogenic activity of tar, using the skin painting technique. Comparisons have been made between different cigarette types and various materials. The influence of smoking parameters on quality of tar has been looked at briefly.

Although details are not given, in some instances the relative biological activity of different tars has been calculated and is available as a tumorigenic index. Clearly, when assessing the potential effect of changes in tar quality, consideration must be given to the specific activity and the total delivery of condensate (TPM dose) from the cigarette.

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An outline of some of the information which has been gathered on tar quality (specific activity) is given below:

- 1 Puff volume reduced; specific activity increases. †
- 2 Reduced circumference of cigarette; specific activity decreases.
- 3 Dark tobacco, including cigar tobacco made into cigarettes; more tumorigenic than flue-cured.
- 4 Cuts per inch; no effect.
- 5 Acetate, PEG and charcoal filters; probably increased activity. (Suggests 'quality' idea of Hunter and Russell could be false. Filters produce a dose-related change, rather than improvement in specific activity of tar).
- 6 Stem less active than stem/lamina mixture.
- 7 PCL < 50% F.C. stem = U.S. blend < F.C. lamina.
- 8 Schweitzer (SRT) < PCL < F.C. blend.
- 9 100% x-PCL-5 < 60% x-PCL-5 < F.C. blend
(X-PCL-5 gives reduced activity as proportion in cigarette is increased).
- 10 Gerlach from < Gerlach < PCL < EXT* < Control
EXT* with Gerlach blend
additives

* EXT = ethanol extracted tobacco.

† At same time total delivery is down, so overall "nicot" is less

To date, information has been collected by an empirical approach to the monitoring of tar quality. This will remain a most useful method of investigating quality in relation to advances in process and product technology.

Attempts to pin-point and isolate particularly active components of smoke have been made in large-scale studies. The

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practical problems of selectively removing from tobacco or smoke specific chemical groups (let alone individual 'bad' chemical species) within the limits of cigarette design and production processes, caused the first attempt at this type of approach to be abandoned. A realistic objective is to maintain empirical testing as a check on process/product innovation and to run alongside this other research studies on the question of tar quality.

Increased awareness of the concept of tar quality underlines the need for validation and continued use of dose measurement for proper interpretation of inhalation studies, both in animals and in humans. The concept of specific activity measurement has already been applied extensively in other biological studies.

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