THE SCIENCE OF DOSAGE FORM DESIGN

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First published 1988
Second Edition 2002

Standard edition ISBN 0 443 05517 3

International Student Edition ISBN 0 443 05550 5

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

Library of Congress Cataloging in Publication Data
A catalog record for this book is available from the Library of Congress

Note
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Printed in Spain

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compression is not new. In 1843 the first patent for a hand-operated device used to form a tablet was granted. The use of tablets as dosage form became of interest to the growing pharmaceutical industry, but within pharmacies the pill (a dosage form for oral administration formed by hand into spherical particles about 4–6 mm in diameter) remained the most popular solid dosage form for a long time.

A tablet consists of one or more drugs (active ingredients) as well as a series of other substances used in the formulation of a complete preparation. In the European Pharmacopoeia (3rd edition, 1997) tablets are defined as 'solid preparations each containing a single dose of one or more active ingredients and obtained by compressing uniform volumes of particles. They are intended for oral administration. Some are swallowed whole, some after being chewed, some are dissolved or dispersed in water before being administered and some are retained in the mouth, where the active ingredient is 'liberated'. Thus, a variety of tablets exists and the type of excipients and also the way in which they are incorporated in the tablet vary between the different types. There are also other dosage forms that can be prepared in a similar way, such as suppositories, but which are administered by other routes.

Tablets are used mainly for systemic drug delivery but also for local drug action. For systemic use the drug must be released from the tablet, i.e. normally dissolved in the fluids of the mouth, stomach or intestine, and thereafter be absorbed into the systemic circulation, by which it reaches its site of action. Alternatively, tablets can be formulated for local delivery of drugs in the mouth or gastrointestinal tract, or can be used to increase temporarily the pH of the stomach.

Tablets are popular for several reasons:

- The oral route represents a convenient and safe way of drug administration.
- Compared to liquid dosage forms tablets have general advantages in terms of the chemical and physical stability of the dosage form.
- The preparation procedure enables accurate dosing of the drug.

may cause local irritant effects or otherwise caus harm to the gastrointestinal mucosa.

QUALITY ATTRIBUTES OF TABLETS

Like all other dosage forms, tablets should ful a number of specifications regarding their chemica physical and biological properties. Quality issues rela ing to the final product are worth considering early the development process (and thus early in th chapter) as they give an indication of the goal to achieved during the development and manufacture tablets.

Tests and specifications for some of these prope ties are given in pharmacopoeias. The most impo tant of these are dose content and dose uniformi the release of the drug in terms of tablet disinteg tion and drug dissolution, and the microbial qual of the preparation. In addition, the authorities a manufacturers define a set of other specificatio One such important property is the resistance of t tablet towards attrition and fracture.

The quality attributes a tablet must fulfil can summarized as follows:

1. The tablet should include the correct dose of t drug.
2. The appearance of the tablet should be elegan and its weight, size and appearance should be consistent.
3. The drug should be released from the tablet i controlled and reproducible way.
4. The tablet should be biocompatible, i.e. not include excipients, contaminants and microorganisms that could cause harm to patients.
5. The tablet should be of sufficient mechanical strength to withstand fracture and erosion during handling.
6. The tablet should be chemically, physically an microbiologically stable during the lifetime of the product.

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