

The “4 Ds” (Drug, Device, Diagnosis, Data management) - Example Treatment of Diabetes

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In the past decades the treatment of a disease developed towards a combination of 3 pillars: (1) **diagnosis** of the particular disease and diagnosis of treatment success, (2) Identification of a potent **drug** for a reasonable delivery route including a good drug formulation, and (3) appropriate means to administer the drug product (**device**).

The pharmaceutical development was mainly triggered by new targets and new chemical/biological entities. In diabetes -besides the classical oral treatment- the s.c.-administration route became increasingly prominent starting with classical insulins up to new antidiabetic peptide classes like GLP1-agonists or nowadays e.g. GLP1/GCG agonists. This development came along with slow release principles (weekly dosing) and lead to special devices (from multi-dose pens to auto-injectors). The latter is/was already a tribute to the patient`s needs: ease of handling and an improved compliance and safety.

Although substantial efforts were made in blood glucose management, a successful therapy is still strongly contingent upon the patient`s behavior (nutrition/diet vs dose regimen).

For further improving quality of life and convenience, an optimization of diabetes-therapy by automatic drug dosing adjusted according to data from continuous individual diagnosis would be highly desirable.

This can be finally achieved by a strong interplay of (1) suitable drugs (stability) administered in (2) suitable devices, (3) online diagnostic systems and (4) **data management** loops, resulting finally in “artificial pancreas” like treatment options, that would be the holy grail in blood glucose management.

The poster gives an overview upon the history of the 4 Ds in diabetes treatment.