Preparation and documentation with CYPRO

CYPRO is a mass-oriented program for the preparation of cytostatic drugs. Maximum quality and security are guaranteed by complete documentation of all therapy-relevant data.

CYPRO’s focus is on highest security standard by weighing every step during the preparation process. The program leads exactly through this process and surveys the correct handling. The „4-eye-principle“ (that means one person is needed for preparation and one for controlling, as you need it for the volumetric preparation way) isn’t longer necessary, so the second person can do other work in the same time.

All stabilities of every preparation and every rest will be considered. Opened vials can be used for preparation until the end of the expiry date. So an efficient utilization of all vials is given.

Labels will be printed automatically at the end of every preparation process including all important information as there are: patient, doctor, ward, active substance, trade name, amount, stability, storage, etc.
Although CYPRO prefers the mass-orientated preparation, it is also possible to prepare by “volumetric” way. But you have to consider that a volumetric preparation never is such safe and newer gives you that kind of control over the preparation process as the mass-orientated does. As a CYPRO-specific preparation-kind, you can also prepare in “partly volumetric” way. Here you will use the scale only for weighing the original and the rest vials, given you total control for your rest amounts. In purely volumetric preparation there is no control of the substance amount in the rest vials and no control of the quality for the prepared drug.

One of CYPRO’s strong points is a wide ranged documentation including a freely configurable statistic.

With the help of the CYPRO statistic tool all reports based on the preparation process (e.g. „used batch-list“) can be listed. Saving the report as an excel-file is also possible.
All patients are accompanied during their entire stay by CYPRO. To enter new patients or change data of existing patients, the **Patient Manager** is used (Menu „Patient“ - „Patient-management“, shortkey F2, Menu „Patient“ - „Change data“ for existing patients).

The **Patient Manager** registers patient data, such as:

- Name
- First name
- Address
- Age
- Sex
- Weight
- Height
- Body surface area
The values for **weight** and **height** are needed to automatically calculate the **body surface area**. Patients can either be allocated to a ward or to a specific doctor during ambulatory treatment.

Further information, such as:
- Cumulated dose
- Glomerular filtration rate
- Admission data
- Doctor’s letter
is also recorded.

The **GFR** for example, needed to calculate the **AUC** (Area under the curve), can be entered directly or can be calculated via the 24h urine method or using the Cockroft Gault or Jeliffe formula.

CYPRO monitors and documents the complete therapy during the patients stay in hospital. Each change of the patient data will be registered and stored in a **patient history**.

Through the **networking** and **multi-user-ability** it is possible to enter the data in the pharmacy or directly at the the wards by nurses, pharmacists or doctors. So a parallel working with many users at the same time is possible.
Schedule Manager (F5)

The schedule manager (Menu „Basic data“ - „Schedule“, shortkey F5) enables the pharmacist to enter the cytostatic drug as well as the supportive medication of the schedule. It is possible to document the indication, side-effects, contra-indications and any other information of the schedule, as for example the number of cycles. To enter a new schedule press the „New schedule“ button and name the new schedule. To enter a single substance press „Add drug“, to edit an existing substance, select the row in the drug-list at the bottom and press „Edit drug“. The fields, which are marked by a blue point, must be filled out.

It is possible to print a cytostatic order form either filled with the information of the chosen schedule or an empty order form where the values can be filled in by hand.
Schedule Manager (F5)
Prescription Manager (F6)

With CYPRO you can document and validate all cytostatic preparations as well as the complete supportive medication. Prescriptions can be entered with the date and time of administration, enabling a chronological print of all administered preparations and an overview of the entire therapy of the patient. The therapy progress gives an overview of all cytostatic drugs administered during the hospital stay of the patient. It is possible to enter an individual prescription or to choose from a standard schedule yet defined in the schedule manager.

To do this choose menu „Patient“ - „Prescription“, press the button „New therapy“ and fill in the shown fields. With the button „Add drug“ you enter the values of the substance either in the individual prescription or (if a standard schedule was chosen) add a new substance to a defined schedule. To edit an existing substance, select the row in the drug-list at the bottom and press „Edit drug“.

Dose calculations for the different cytostatic drugs are based on body surface area, body weight or alternatively the AUC. If any of the important values like weight, height, body surface area, regular dose or calculation base changes, the prescription (as far as it isn’t prepared yet) will be recalculated. It is possible to enter a second substance for mixed infusions.

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<thead>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20.10.2005 08:00</td>
<td>1</td>
<td>Fluorouracil</td>
<td>850 in</td>
<td>Isoton. NaCl 9,0 %</td>
<td>500 l</td>
<td>l.v. Inf.</td>
</tr>
<tr>
<td>1</td>
<td>10.10.2005 08:00</td>
<td>1</td>
<td>Calciumfolinate</td>
<td>40 in</td>
<td>Isoton. NaCl 9,0 %</td>
<td>250 l</td>
<td>l.v. Inf.</td>
</tr>
<tr>
<td>1</td>
<td>11.10.2005 08:00</td>
<td>2</td>
<td>Fluorouracil</td>
<td>850 in</td>
<td>Isoton. NaCl 9,0 %</td>
<td>500 l</td>
<td>l.v. Inf.</td>
</tr>
<tr>
<td>1</td>
<td>11.10.2005 08:00</td>
<td>2</td>
<td>Calciumfolinate</td>
<td>40 in</td>
<td>Isoton. NaCl 9,0 %</td>
<td>250 l</td>
<td>l.v. Inf.</td>
</tr>
<tr>
<td>2</td>
<td>12.10.2005 08:00</td>
<td>3</td>
<td>Fluorouracil</td>
<td>850 in</td>
<td>Isoton. NaCl 9,0 %</td>
<td>500 l</td>
<td>l.v. Inf.</td>
</tr>
<tr>
<td>1</td>
<td>12.10.2005 08:00</td>
<td>3</td>
<td>Calciumfolinate</td>
<td>40 in</td>
<td>Isoton. NaCl 9,0 %</td>
<td>250 l</td>
<td>l.v. Inf.</td>
</tr>
</tbody>
</table>

Created on: 30.10.2005  Modified: 10.10.2005
For preparing, each prescription has to be validated either directly in the prescription manager after filling in the values or by choosing the „Validation manager“, where all other not yet validated prescriptions are shown. Here you have the possibility to validate more than one prescription.

The validation of prescriptions activates the particular prescription for preparing. CYPRO differentiates between **doctor’s validation** and **pharmacists validation**. First the physician validates the prescriptions as he entered them, after that the pharmacist validates them too (pharmacist’s validation). To make this possible, individual user-permissions are assigned to each CYPRO-user.

To validate prescriptions in the prescription-dialogue, edit the drug and press the button „Validation“. With the first click the doctor’s validation is done, with the second click the pharmacist’s validation is done, but therefore a previous doctor’s validation is needed. If you change any value of the prescription (except of ward and doctor) the validation will be removed.

Non-validated prescriptions are not shown in the prescription list of the preparation dialogue.
Validation (F7)

Each prescription must be validated, either directly during the prescription input or by using the validation-dialogue. In the validation-dialogue all not yet validated prescriptions are shown. So you can either validate here single prescriptions, validate selected prescriptions (using the CTRL-button) or validate all shown prescriptions. To show the validation-dialogue choose menu „Patient“ - „Validation“ (shortkey F7).

If you want to validate only a single prescription, select the prescription in the list at the bottom and then click on button „Validation“ in the area „Doctor's validation“ at the top or on button „Validation“ in the area „Pharmacist's validation“ below the doctor's area. You can also edit single prescriptions by double clicking on the selected prescription row.

To select more than one prescription, press the CTRL-button and then select the prescriptions by clicking with the left mouse button on the relevant rows of the list. For validating this selection click the validation-buttons as described above.

To validate all shown prescriptions click on the „Arrow“-button to the right of the „Validation“-buttons and then select „Total validation“.
Drug Manager (F9)

The drug manager (Menu „Basic data“ - „Drug manager“, shortkey F9) surveys the entire cytostatic stock of the pharmacy. Here all informations beginning with the substance up to the batch number with expiry date can be found. This data contains the main information for the preparation part.

To enable the preparation, you have to enter the batch number (batch description), the stock amount and the expiry date of the batches for particular substance.
To do so, activate the drug manager by clicking shortkey F9, select the primary indication (e.g. „Zytostatika und Metastasenhemmer“ - in English this is „Cytostatic drugs and metastasis inhibitors“) and then click on button „Second. Indication“ on the top right to show the secondary indications. Select here for example „Chemisch definierte Zytostatika“ (in English this is „Chemically defined cytostatic drugs“). Then click on button „Active substance“ on the top right to show the assigned active substances. Select the wished active substance (e.g. „Fluorouracil“). Go to page „Medicine form“ by clicking the button with the same name on the top right. Select the wished medicine form (e.g. „Lösung (Herstellung)“ - in English this is „Solution (Preparation)“). Click on button „Starch“ on the top right and select the wished starch. After that, click on button „Trade name“ in order to change to the next page. Select the wished trade name in the list at the left side and than click on „Batch“ on the top right. Here you can insert or edit batch informations. To add a batch click on the „+“-button at the bottom, to store the entered data, click on the green „checkmark“-button at the bottom. You only have to fill in the data which is marked with a blue „point“-symbol.
Preparation (F8)

After a prescription is validated, it is activated for preparation. In the **preparation-dialogue** (Menu „Preparation“ - „Preparation“, shortkey F8) all prescriptions for today's preparation are shown. It is possible to show the preparations for the following days as well. During the preparation the program is controlled only by the scale. The scale displays the same commands that appears on the screen. So in the cabinet there’s no keyboard needed.

The preparing process starts by choosing a prescription. Each working step is shown on the screen, ensuring an easy and fast working.

After selecting the prescription, all original vials, registered by CYPRO's drug manager, as well as previously generated rest vials for this active substance are listed. After chosen the vial, CYPRO indicates each step for preparation. In order to ensure a safe preparation, each of these steps is supervised by CYPRO.

All measured values have to be in defined tolerances. An error notice appears immediately on screen if a wrong vial is chosen, an incorrect amount taken or another mistake is made. You can repeat the last step and correct the mistake or you can ignore the warning and continue the preparation. But you should note, that ignoring with deviating weight can lead to an abort of the preparation!

After each successful preparation a label is printed automatically. This label contains all important patient data, the substance name and its amount (actual amount and target amount), as well as storage informations and expiry date.

To see how the preparation works and to get some exercise there’s the possibility to start an „emulation mode“ for the mass-orientated preparation where the scale is graphically shown. So you can prepare cytostatic drugs by mass-orientated way without using a real scale. You'll find it in menu „File“ - „Options“ - „Preparation“ - „Scale“. Choose „Emulation“ in the list at the bottom or check „Scale + emulation“ with selecting „Mettler Toledo PR-scale (MT-SICS)“. Don’t forget to click on button „Save“ to store your changes!
Mass-orientated and volumetric preparation

Although CYPRO prefers the mass-orientated preparation, it is also possible to prepare by volumetric way. But you have to consider that a volumetric preparation never is such safe and newer gives you that kind of control over the preparation process as the mass-orientated does. As a CYPRO-specific preparation-kind, you can also prepare in partly volumetric way. Here you will use the scale only for weighing the original and the rest vials, given you total control for your rest amounts. In purely volumetric preparation there is no control of the substance amount in the rest vials and no control of the quality for the prepared drug.

You can either prepare only by one preparation type (only mass-orientated, only volumetric, partly volumetric) or choose for different substances different types of preparation.

The type of preparation is specified in the prescription dialogue (Edit drug). If the option Read the type of preparation from the prescription (Menu „File“ - „Options“ - Rubric „Preparation“ - „Type of preparation“) is not used and instead Always use this preparation type is checked, the type of preparation, that is stored in the prescription dialogue is not used however, only the value from the CYPRO-options is read out.

In order to assign from the beginning a certain type of preparation to certain substances, the type of preparation can be defined also in the drug manager (page „Active substance“) and in the schedule manager („Edit drug“). It will be used if you insert new prescriptions. Please consider that therefore the option For new prescriptions or schedule-entries read the type of preparation from the drug manager (Menu „File“ - „Options“ - Rubric „Preparation“ - „Type of preparation“) is needed.

In the following the individual steps of the menu-led mass-orientated preparation are clarified by screenshots of the CYPRO-program.
Mass-orientated preparing of a drug for infusion

Step 1: Selecting a prescription

Click the „Enter“-button of the scale Preparation (F8) in emulation mode) to start the preparation process.
Step 2: Selecting a vial

Choose a vial by using the touchpad of the scale. Pay attention to the correct batch number.

Put the vial on the scale and click the „Enter“-button of the scale (or click on „Next“ in emulation mode) to weigh it.

If you use a spike to take out solution from the vial, attached it now into the vial and weigh it together with the vial (don’t detach it from the vial, if you weigh the rest vial – see step 5).

Attention: In emulation-mode you have to enter the weight manually in the shown scale-dialogue (e.g. 200 g).
Step 3: Add empty syringe

Put a syringe additionally on the scale (so on the balance plate there is now the vial together with the empty syringe). CYPRO calculates the size of the needed syringe volume and shows it on the screen. But of course you can also use multiple syringes with lesser single volume.

Click the „Enter“-button of the scale (or click on „Next“ in emulation mode) to weigh out.

Attention: In emulation-mode you have to enter the weight manually in the shown scale-dialogue (e.g. 210 g).
Step 4: Wind up the substance in the syringe

Wind up the shown volume in the syringe and put only the filled syringe on the scale. On the top of the dialogue you see the expected weight with minimum and maximum value in the range for the allowed tolerance.

Click the „Enter“-button of the scale (or click on „Next“ in emulation mode) to weigh out.

Attention: In emulation-mode you have to enter the weight manually in the shown scale-dialogue (e.g. 27,61 g).
Step 5: Weigh the commenced vial

If the substance amount of the chosen vial was greater than the needed amount for the preparation, a rest vial will be generated. You can use this vial for further preparations as long as it isn't expired. CYPRO will weigh the commenced vial and recalculates the substance amount. For recognition a vial number is given (you will see it on the next screenshot). Please note it on the vial. A rest label is not printed automatically, because it could be possible that you will use it completely in the next preparations. You can print a rest label manually by using the rest-management (button „Rest-management“ in preparation-dialogue or menu „Preparation“ - „Rest-management“).

So put only the commenced vial on the scale and click the „Enter“-button of the scale (or click on „Next“ in emulation mode) to weigh it.

**Attention:** In emulation-mode you have to enter the weight manually in the shown scale-dialogue (e.g. 182,40 g).
Step 6: Choose the infusion bag

Choose an infusion bag by using the touchpad of the scale. Pay attention to the correct batch number.

Put the infusion bag on the scale and click the „Enter“-button of the scale (or click on „Next“ in emulation mode) to weigh it.

Attention: In emulation-mode you have to enter the weight manually in the shown scale-dialogue (e.g. 550 g).
Step 7: Put the syringe content into the infusion bag

Put the syringe content into the infusion bag and place the filled bag onto the scale.

Click the „Enter“-button of the scale (or click on „Next“ in emulation mode) to weigh it.

**Attention:** In emulation-mode you have to enter the weight manually in the shown scale-dialogue (e.g. 567.60 g).
Step 8: Substance amount is correct

If the substance amount is correct, the preparation process will be finished with a preparation label, otherwise, if you need perhaps more on substance amount, CYPRO will calculate the needed amount and the vial list is shown again (see step 2).

Click the „Enter“-button of the scale (or click on „Final“ in emulation mode) to finish the preparation process and to start the label printing.
Step 9: Print label and finish preparation

If the preparation process has succeeded, it will be finished with a preparation label. CYPRO also automatically documents all used amounts of substances and all used batch information and stores it to the CYPRO-database, so that it’s possible to print-out the documentation at any time and for any time you want.

Therefore a unique preparation-number is generated. With this preparation-number all preparations can easily be retraced.

Click the „Enter“-button of the scale (or click on „Exit“ in emulation mode) to finish the preparation process and to start the next one.
<table>
<thead>
<tr>
<th>C</th>
<th>Y</th>
<th>T</th>
<th>O</th>
<th>S</th>
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<th>A</th>
<th>T</th>
<th>I</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mustermann, Udo</strong></td>
<td>Birthday : 01.01.1950</td>
<td>Ward : New Ward</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 FU-Hexal 850 mg (Fluorouracil)</td>
<td>i.v. Inf. in 500 ml isoton. NaCl 0,9 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application : <strong>Mo 10.10.2005</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Actual : 849,42 mg (Is-Diff.: -0,07 %)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2005-10-00001 - 10.10.2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage :</td>
<td>Durable till : <strong>Do 13.10.2005 - 19:40 O’Clock</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Test-Pharmacy</td>
<td></td>
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</table>
Documentation and statistic

One of CYPRO's strong points is a wide ranged documentation including a freely configurable statistic.

With the help of the CYPRO statistic tool all reports based on the preparation process (e.g. „used batch-list“) can be listed. Saving the report as an excel-file is also possible.

The documentation of the preparation shows e.g. all used batches and amounts. The documentation of the losses is used for the listing of possible exposition of cytostatic drugs. This helps to build up further medical analyses.

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**CYPRO - Preparation report**

<table>
<thead>
<tr>
<th>Preparation No.</th>
<th>Prescriber</th>
<th>Description</th>
<th>Cost center</th>
<th>Application</th>
<th>Is (mg)</th>
<th>Target</th>
<th>Diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-10-00001</td>
<td>Mustermann, Udo</td>
<td>5 FU-Hexal iv, inf in 500 ml, solution.</td>
<td></td>
<td></td>
<td>0.45</td>
<td>0.45</td>
<td>0.07</td>
</tr>
<tr>
<td>Producer:</td>
<td>syv</td>
<td>10.10.2005</td>
<td>New World</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade name:</td>
<td>5 FU-Hexal</td>
<td>H780</td>
<td>450 mg</td>
<td>Fluorouracil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carrier:</td>
<td>500 ml glass bottle, Baxter</td>
<td></td>
<td>500 ml</td>
<td>Carrier solution</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**CYPRO - Preparation report**

<table>
<thead>
<tr>
<th>Preparation No.</th>
<th>Prescriber</th>
<th>Description</th>
<th>Cost center</th>
<th>Application</th>
<th>Is (mg)</th>
<th>Target</th>
<th>Diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-10-00002</td>
<td>Mustermann, Udo</td>
<td>5 FU-Hexal iv, inf in 500 ml, solution.</td>
<td></td>
<td></td>
<td>0.45</td>
<td>0.45</td>
<td>0.07</td>
</tr>
<tr>
<td>Producer:</td>
<td>syv</td>
<td>10.10.2005</td>
<td>New World</td>
<td></td>
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<td>500 ml</td>
<td>Carrier solution</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
With CYPRO, you can print out the following documentations:

- **Chemo-Plan**: The „Chemo-Plan“ prints the date, when the drugs will be applied to the patients. It is especially used from the nurses at the wards. So they know when the patients will arrive at ward.

- **Preparation requirement**: The „Preparation requirement“ is used to calculate the needed amount of active substances and carrier solution for preparation.

- **Preparation-Documentation**: With the „Preparation-Documentation“ you can print out all active substances, carrier solutions, amounts and batch data, which are used in preparations. The print-out is normally ordered by preparation-number, but it can also be ordered by ward or patient.

- **Loss-Documentation**: The documentation of the losses is used for the listing of possible exposition of cytostatic drugs. This helps to build up further medical analyses. CYPRO can calculate the losses by using the difference between amount filled in the syringe and amount filled in the infusion bag. This is only possible with the mass-oriented preparation used by CYPRO.

- **Booking-List**: The „Booking-List“ shows all amounts of substances and carrier solution as it is needed for booking with your materials management system. All amounts of over- and under-filling of the vials, that will be considered from CYPRO for the preparation, are ignored here. That means, only the starch that is indicated by the manufacturer is used to calculate the booking amounts.

You find the CYPRO-documentation at the print-out-menu (e.g. menu „Print-out“ - „Preparation-documentation“).
Generating a query for the statistic-tool

With the freely configurable CYPRO-statistic-tool (Menu „Print-out“ - „Statistic“ or shortcut F10) all reports based on the preparation process (e.g. „used batch-list“) can be listed. Saving the report as an excel-file is also possible.

To generate a query with the statistic-tool, first you have to choose, if you want to indicate a preparation-statistic, a statistic for non-preparable drugs and omissions (e.g. supportive medications) or a schedule-statistic. The schedule statistic only shows the count of schedules or cycles of schedules, that have been applied to patients.

After that click on „New statistics“ and than select the information-fields you want to show in your query. At the bottom you can select from 1-3 detail-information fields (e.g. count or amount).
After clicking on „Next“, you can choose selection criteria. Selection criteria is used, if you want to limit the result of the query to specific data, e.g. if you only want to create a query for patient „Mustermann“ and not want to show the results for other patients, than you have to do the following:

Click in field „Field“ and than on the „Arrow“-button at the right. Select „Patient-name“ of the shown list. Enter „Mustermann“ in field „Value“. To store the criteria click on the green „check-mark“-button at the top of the criteria -list.

To add more criteria, click on the „+“-button. This will insert a new row, which you can edit as described below. Normally the condition „equal“ is used for the value, but you can choose from several other conditions by clicking in the field „Conditions“ (e.g. „unequal“, „like“, „starting with“).

If you use more than one criteria, you should specify the link between the criteria-entries. To do so, click in the field „Link“ and select the logical link-value form the show list. Normally or if the link-value is empty „and“ is used.

Click on „Next“ to show the „sort order“. Normally you don’t have to modify the shown values.

Click on „Next“ to enter the time period, for which you want to generate the query. You can enter the period manually or you can use the buttons at the bottom of the dialogue.

After clicking on „Next“ again, you will see a summary of your settings. Here you can save your query definition (button „Save the statistic“), create new statistic or excel-exports, create an excel-export on base of the available statistic and of course print the specified query (button „Create statistic“).
With the CYPRO-Options (Menu „File“ - „Options“) you can easily adapt CYPRO to your own needs. For example you can select the language, in that CYPRO appears (Rubric „Global“ - „Language“), set prescription- and schedule-options (Rubric „General“ - „Presc. /Schedule“), enable the behaviour of validation-messages, that appears after a doctor's validation is done (Rubric „General“ - „Validation“), select printer or adapt print-outs and sorting-order of reports (Rubric „Print“) or set preparation and scale-options (Rubric „Preparation“).

In order to ensure fast access to the options, an „Option“-button is shown in nearly all CYPRO-dialogues. With this button you get direct access to the options needed for this dialogue. The „Option“-button in the print-out-dialogue, shows e.g. only the printer-selection and the options for printing-reports.

Running CYPRO in a terminal server environment

CYPRO can not only run locally on the computer, but also in a terminal server environment, so you have only one software installation on the server.

In a terminal server environment using Citrix Metaframe, CYPRO maps every local access to interfaces (scale, printer) to the terminal server. Local printers and scales are wired to the CYPRO workstation, but were accessed from the terminal server. The interface-mapping (COMx of local computer is mapped to COMx of terminal server, LPTx of local computer is mapped to LPTx of terminal server) can be done by CYPRO using the „Net Use“ command. Some interface mappings were done in standard way by Citrix (e.g. COM1 of local computer is mapped to COM1 of terminal server), in that case no interface mapping from CYPRO is necessary. The used serial interfaces must be defined additionally on every client workstation (Citrix program neighbourhood- menu „Extras“ - „Serial devices“). The printer drivers needs to be installed in the Citrix server software (Citrix management console), the drivers can also be shared on each client, but in that case they can be used (and are visible) in the whole network. The scales don't need a driver installation.

CYPRO runs in a terminal server environment (Windows terminal server, Citrix) with installation on a dedicated server computer. In a terminal server environment all user options for CYPRO are stored in a special configuration file in the folder „Config“ in the CYPRO-installation-folder. The options are defined for each workstation and not for each CYPRO user. Every Citrix-client has own options. These were stored centrally on the terminal server. The options for every single client are assigned with the saved computer name of the client. In an application pool there must be a central data storage for the options, which will never change, too, if not all option files for all CYPRO computers of the application pool had to be synchronized constantly. If you run CYPRO with the command-option „-cf“, you can specify the central data storage for the option file. But you can also use the program „Global Options / Citrix configuration“ from the Windows-Startup-menu (group „CYPRO“) to define global options.
CYPRO runs on all named operating systems and terminal server variants, but on Microsoft terminal servers without add-ons only limited (this does not apply to Citrix). Windows NT 4 terminal server supports only 256 colours, but CYPRO needs a 16 bit colour mode. There will be shown some „faulty“ colours, so the dialogues appearers with reduced colours.

Since the RDP protocol of Microsoft, which is used for the terminal services, does not support mapping of COM-ports, the using of a scale is not available, if you use Microsoft terminal server. This is only available with a third-party add-on from NCD ClientServices (ThinPath Plus, www.ncd.com).

If you use Citrix Metaframe there will be no limitations in the functionality of CYPRO. The using of local printers is more simple (in Microsoft terminal server, all local printers need a driver-installation in the terminal server computer), COM-port mapping is supported (you can use serial devices, such as scales) and there is no colour mode limitation, so the CYPRO-dialogues looks as in a local running version.

CYPRO uses the installed printer drivers (local printers, shared printers or network printers). There is no direct printing to the printer interface without using the printer drivers.

The CYPRO-HL7-Interface

The CYPRO-HL7-Interface runs as Windows-Service only in Windows NT 4.0, Windows 2000 and Windows XP. It works global for the CYPRO-network and therefore must be run only once (that means only on one specified computer), so you have to choose a dedicated computer. The HL7-interface receives HL7-messages by a socket-connection and stores the build-in data in the CYPRO-HL7-database. Existing CYPRO-patients where updated automatically, the data for Non-CYPRO-patients stays stored in the HL7-database, you can insert these „HL7-patients“ as „CYPRO-patients“ from the CYPRO-HL7-database to the CYPRO-database. So you should choose a stable computer environment for the HL7-interface, running the whole time, or you will not get all HL7-messages.

The CYPRO-HL7-interface works with SAP- and NON-SAP-hospital-systems. These systems in general don't use the SAP-moving-numbers, so CYPRO will create own moving numbers. But if you want, you can also use the HL7-interfaces with NON-SAP-systems, that use own moving numbers.
CYPRO supports the HL7-version 2.2 with the following commands:

A01: Admit Patient
A02: Transfer Patient
A03: Discharge Patient
A04: Register Patient
A06: Transfer outpatient to inpatient
A07: Transfer inpatient to outpatient
A08: Update Patient
A11: Cancel Admit Patient
A12: Cancel Transfer Patient
A13: Cancel Discharge Patient
A31: Update Patient (like A08)

CYPRO uses the following informations from the HL7-messages:
Patient-ID, patient names, patient birthday, patient gender, patient address, hospital, section, ward, attending doctor, visit number, admit date/time, discharge date/time, patient transfer time, insurance data (company ID, company name, policy number...), moving number.

Since there are some differences in HL7 standard and especially changes in particular between different hospitals, CYPRO not only supports the standard HL7-version, but also modifications from standard HL7-language that only applies to specific hospitals, like special segments for doctors in the Netherlands (STF), special segments for moving numbers and patient transfer in Germany (ZIB, ZBE), special formatting of names differ from the standard way (with or without MIDDLE OR INITIAL NAME, MIDDLE OR INITIAL NAME is prefix of the title or part of the first name, ...) or special formatting of wards differ from the standard way (with or without hospitals and sections, sending hospital in MSH.SENDING FACILITY, ...).
The Modularity of CYPRO

The CYPRO-database runs on Windows and Linux servers (you can use workstations too, but for a hospital environment this is not practicably).

As advantage for a hospital environment, there should be the modularity of CYPRO. You can install and run all components of CYPRO on one computer, but also every single server-, service- or program-module on an external computer.

It is also possible to run CYPRO in combined „Citrix-“ and Non-Citrix-mode, that means dependently of the bandwidth of your network, some CYPRO-workstations can be run using a terminal server and some can be run on the local computer, if the bandwidth is sufficient.

The CYPRO components are:

- **CYPRO-program** (only for Windows)
- **HL7-interface** (only for Windows as Windows-service)
- **Automatically tasks** (e.g. „Automatically backup”, as Windows-service or as cronjob for Linux)
- **CYPRO-Server** (as Windows-service or as daemon for Linux, it must be run on the same computer as the SQL-Server for the CYPRO-database)
- **Firebird-SQL-Server** with CYPRO-database (for Windows or for Linux)

The database server must be run on the same computer as the CYPRO-database and the CYPRO-HL7-database. You can use a combined database with CYPRO- and HL7-data in the same database, but we prefer two external databases. The two databases can be installed on the same computer, but also on two different ones. In that case you will use two Firebird-SQL-Servers, one for each database.
Needed components to work with CYPRO

To work with CYPRO you have to use the following components:

- The CYPRO Software Base-Version for the preparation workstation and for the documentation workstation. Both software parts are connected via network.
- Scale „Mettler-Toledo PR 5002“ with user defined menu, that means there is no additional keyboard necessary. You can order the scale by ars pharmaceutica GmbH for a reduced price.
- Flat screen TFT 15" bis 19" for the window section in the cabin, or to positioning separate to the cabin.
- 2 PC's, one for each cabin (we suggest the fanless cleanroom-PC) and one for each documentation and prescription-input in the documentation-room.
- A label-printer (thermo-direct or thermo-transfer) for each cabin, separated to the cabin. The labels will be printed automatically after the preparation of cytostatic drugs.
- A list-printer in the preparations-room or in the office. This printer is used for the preparation plan, for the documentation and to print the statistics.