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Rowny Systems offers free technical support and advice for Antigen Plus for one year from the date of purchase, Monday-Friday between 9 am and 5 pm U.S. Eastern Time at (301) 761-3106. International callers please call 001 301 761-3106. Rowny Systems also offers technical support via Email at help@antigenplus.com. All support is continued with renewal of the annual license.

Data Entry Support

Rowny Systems offers automated red cell panels for Antigen Plus. The panels provided are electronically verified to match with the specification sheets provided by the supplier. Antigen Plus assumes no responsibility for errors by the suppliers, but will correct any such errors as soon as possible when they are discovered.

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Introduction

Antigen Plus is a red blood cell inventory and antigen search program that allows the user to enter test results that are automatically evaluated to assist with the interpretation of those results. It is designed to permit fast and easy data entry of test panels, and then search the data for any combination of antigens you choose. It is intended to quickly select donor cells with particular phenotypes for antibody identification studies and to speed up the interpretation process for the blood bank technologist.

The data stored for each donor are:

- Donor ID
- Optional Note
- Lot Number
- Vial Number
- Expiration Date
- Optional Retesting Information on expired cells
- Supplier Name
- Location (optional)
- Phenotype Designation
- Sex
- Blood Group
- 28 Principal Antigens Phenotype
- Additional Antigens - user-defined special typings
- Frozen flag
- Out-of-Stock flag

Data that can be stored for a patient are:

- ID number *, *encrypted*
- Name (First*, Middle*, Last*) *encrypted*
- Date of birth* *encrypted*
- Short note to appear on the screen or on saved panels *encrypted*
- Description on a saved panel *encrypted*

*required fields

Data that can be stored on a saved panel are:

- All the data described above (*encrypted where indicated above*)
- Test results (negative or positive reactions to donor cells and check cells (optional for self-defined columns) recorded on a Results Worksheet
- Test results evaluations
- Initials of technologist and dates of test for each Results column
- Name of up to two panel reviewers

The user may specify any combination of antigens to search for, search the data and select any cells desired, enter test results, and print a selected panel or results panel worksheet, and save a panel if a patient is selected. The user may store and retrieve the selected panels with any test results as desired. Antigen Plus Version 7.5 must be run from inside Microsoft Windows Vista or later. It requires a printer that can print in Landscape format (11 x 8½).

Validation

Antigen Plus provides a template for validation of the software based on the NCAALS format on its website www.antigenplus.com. It is intended to be modified to meet the protocols and standards of the individual institution, but may be reliably used as is to validate the software. Antigen Plus provides technical support for this process.

The panels provided are electronically verified to match with the specification sheets provided by the supplier. The phenotypic information printed on a selected or results panel can be validated by assuring that its data exactly match the data from the suppliers. Part of a laboratory's validation procedure should be to print several lot panels and have the responsible technologist compare them with the supplier's data sheets.

Antigen Plus makes no decision or final recommendation on the meaning of test results or on patient care - this is the user's responsibility. Antigen Plus uses the logic recommended by the American Association of Blood Banks to evaluate initial test results in the same way a technologist would do.

Installation

If you are Upgrading from a Version Earlier than AP7.5

Please email your current database (AP6.mdb or AP7.mdb) to customerservice@antigenplus.com. We will convert those data to the new version and return the new database for you to incorporate when you install the program.

Install .NET Framework 4.5

.NET Framework 4.5 is required. The latest version is actually 4.5.1, and this is the version we recommend. The general download page is:

[http://msdn.microsoft.com/en-us/library/5a4x27ek\(v=vs.110\).aspx](http://msdn.microsoft.com/en-us/library/5a4x27ek(v=vs.110).aspx)

This page links to an offline installer which can be placed on CD or USB key and installed without an internet connection.

To install Antigen Plus on your desktop, you must download the program from <http://clickonce.antigenplus.com/clickonce/AntigenPlus.application>. Register, and then wait for us to create a database and notify you that the program is ready to go. The first person to use Antigen Plus once you are set up will have administrator privileges and should accomplish a few tasks before other users are given their log-ins and passwords.

Encryption of Patient Data

Encrypted data cannot be read by us on our server where your database is stored. The patient information key that the program creates on your end ensures that the data will be readable to anyone who logs in with the appropriate user name and password. Saving that key to a secure location ensures that your data will be recoverable in its unencrypted form in the event of a computer failure on your end. It is therefore **VERY IMPORTANT** that the first user open the File menu and click on the Save patient information key tab to save the key to a secure location. You should be aware that anyone with administrator privileges will be able to save that key again at any time in the future.

To Run the Program

Double click the Antigen Plus Cloud icon to start the program. When the program loads, select the Options menu at the top of the screen. Type in the name and address of your facility as you want it to appear on all the printouts generated by the program.

As the first person to use the program, you will be logged in with your current Windows login and have administrator rights. If others share your log in, you should assign yourself a username and password, and, in any case, give yourself initials for use in the program. To do this, open the Users menu and open Account Settings and enter name, password, and initials (if you are the only one who uses this Windows login, a password is not necessary as long as you keep Login automatically from Windows account checked).

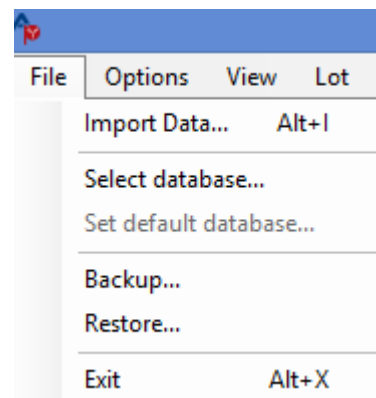
Logging Others In

In a network environment, you may automate the log in to Antigen Plus to match the Windows log in of each user. This will maintain a record of each individual user as long as everyone has a separate log in to Windows. If users are sharing a log in, individual user accounts should be set up. Open the Users Menu/Maintain Accounts and enter information for each user. Users can change their passwords after logging in.

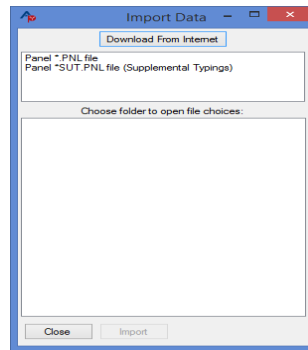
Menus

File Menu

The File menu accesses five functions, **Import Data**, **Select Database**, **Backup**, **Restore**, and **Exit**.



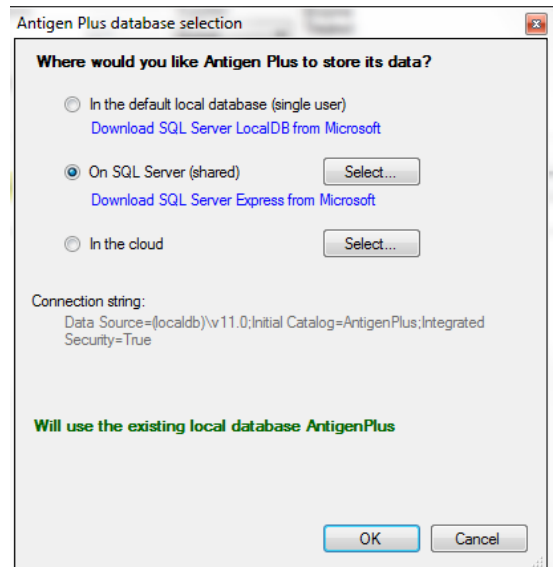
Import Data allows the importation of commercial lots from the internet, the importation of panels in Antigen Plus format from other sources.



Select Database allows you to select or create a database to store your data:

A database will have been created when the program is first installed and this will usually suffice, but these features are available in the event that you desire more than one database or wish to change the type of installation that you have e.g, go from a single user to a network or switch to the Cloud version. Single user and Server versions require SQL databases and the links to download them are provided in case they are not already installed on your system.

A single user (the same pc is being used for all Antigen Plus work or pcs are being used completely independently in the same facility)



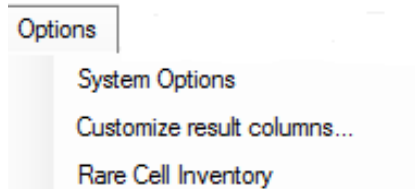
On SQL server (shared) --the program is installed on a server or shared drive and users are logging in from individual workstations to use data held in common.

In the Cloud—you will be prompted for a log-in and password to use Antigen Plus stored for you on our server when you are using the on-line version of the software.

Backup prompts you to select a location to back up all of your Antigen Plus data if you are running on a local database (only one computer is accessing Antigen Plus). To avoid losing your data in the event of a pc or system failure, we recommend that you store this data on a drive or storage device that is separate from your system. The data may be easily retrieved by Antigen Plus using the Restore feature that prompts you to select a location from which to retrieve all of your Antigen Plus data. Back-ups and restoration for shared SQL Server databases are best managed using SQL Server Management Studio.

Options Menu

System Options



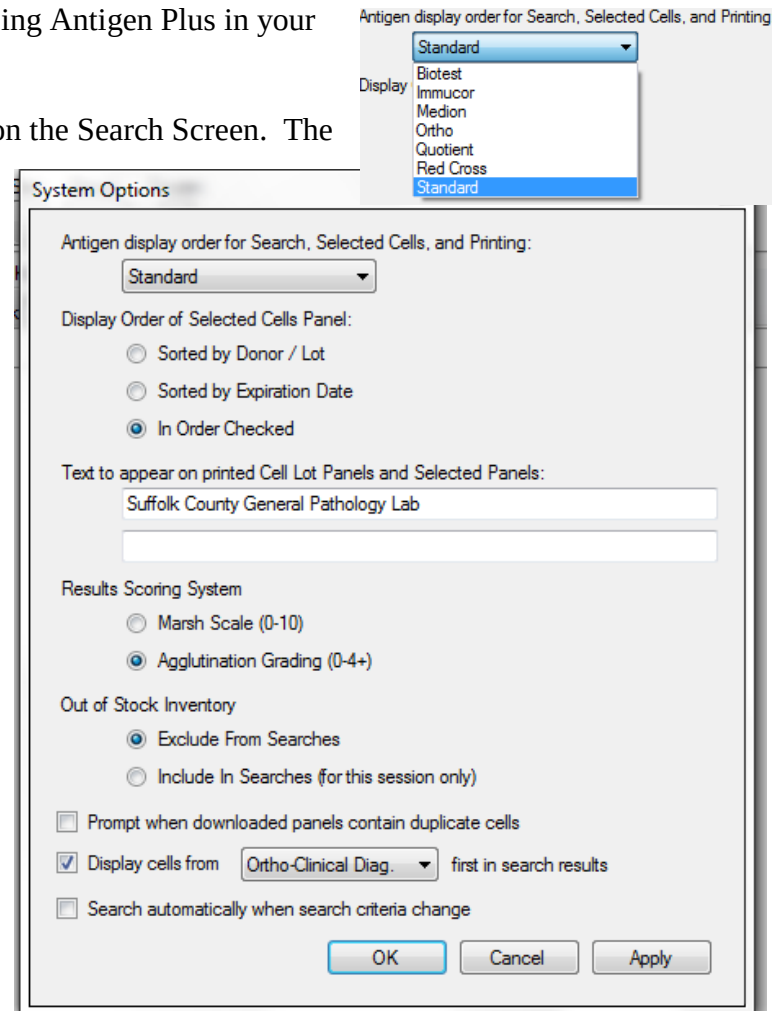
The System Options menu allows you to set and/or change general default parameters for using Antigen Plus in your lab.

The first option sets the display order for cells on the Search Screen. The antigen array of whichever manufacturer (or alternative) will be the one you use for searching, selecting, and entering your test results.

The second option allows you to view your selected cells in one of three sorted orders.

The third option allows you to enter text that will be printed on any printed output to identify your facility.

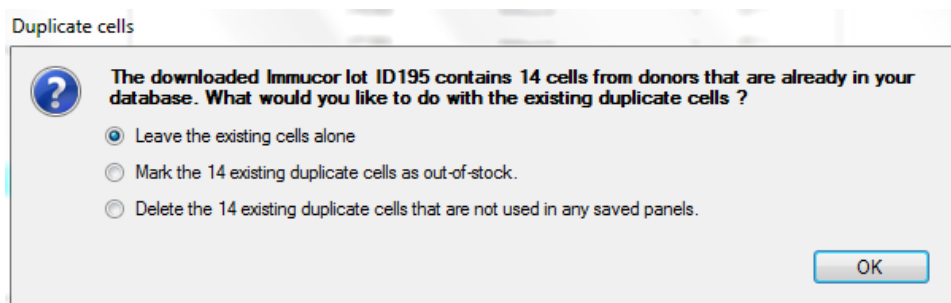
The fourth option allows you to select one of two scoring systems for entering your test results.



The fifth option allows you to include out-of-stock cells in your searches.

The sixth option activates an automatic check for duplicate cells when you are downloading commercial red cell panels. If you chose this option, when you download a panel, you will be alerted to the existence of duplicate donor cells in your database and be given the option to ignore them, mark them out-of-stock, or delete them (as long as they are not in any worksheet that you have saved).

Please note: If you are importing two identical panels (e.g. Quotient panels that are the same except that one is enzyme treated), both panels will be marked out-of-stock if you have this feature turned on and choose the out-of-stock option.



The seventh option allows you to prioritize your search by a single supplier. Normally, when cells are searched, the search order is freshest to oldest to frozen. This option allows you to find all the cells from one supplier in that order before other cells are found. This feature is designed to make cell selection easier for those labs that rely most heavily on a single supplier or test system and would prefer to test those cells unless none are available with the required characteristics.

The final system option—Search automatically when search criteria change--removes the Search button from the Search Pattern screen. When this is done, cells matching each criterion entered are found and displayed. As more criteria are added, the cells change to match the cumulative pattern. Hospitals and blood banks with an inventory of fewer than 200 cells may find it more convenient to search in this manner as it eliminates the necessity of hitting the search button to initiate a search.

Customize Results Columns

The Results columns default to IAT, ENZ, DTT, and A, B, C, and D respectively. A,B,C, and D columns exclude by the same rules as IAT, and those columns may be renamed and all the columns may be repositioned from the Options Menu as default settings. Names are suggested for the columns but you may type any text in the column header box that you choose. Check cell status may be selected for the optional columns and the check cell threshold for all columns may be set.

	A	ENZ	IAT	DTT	B	C	D
► Abbreviation	Gel ▼	Enz	IAT	DTT	▼	C ▼	D ▼
Check cell	☐	☒	☒	☒	☐	☐	☐

• Drag column headers to reorder columns
 • Edit the abbreviations for columns A-D to customize column names
 • Check the box in columns A-D if check cells are required to confirm negative results

Check cell threshold: 1+ ▼

Save Restore Defaults Cancel

Rare Cell Inventory

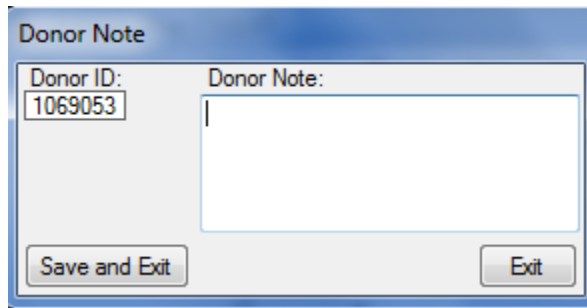
This option calls up a list of all the special typings (additional antigens) in your database. You may search for all or some of them and print out a report.

RARE CELL INVENTORY					Page 1
Antigen Plus Testing Lab					10/20/2013 8:40 PM
304 Dogwood Drive, Gaithersburg MD 20877					
Antigen	Donor	Lot	Vial	Location	
Dantu+	N1860	20367	TC	W3-P1	
Dantu+	N1860	30890	TC		
Do(a-)	B4582	DP068	5		

View Menu

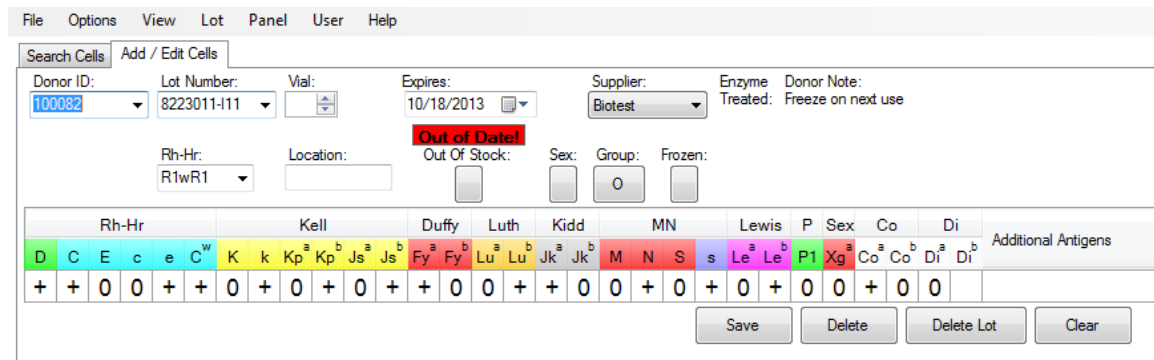
Donor Note

When a donor is selected on the Add/Edit screen, the donor note option allows a note to be inserted that will stay with that donor number (regardless of lot number) until it is removed.



The Donor Note dialog box has a title bar 'Donor Note'. It contains two input fields: 'Donor ID:' with the value '1069053' and 'Donor Note:' with a large empty text area. At the bottom are two buttons: 'Save and Exit' and 'Exit'.

The donor note will be displayed with the cell on the Add/Edit or Search screens.



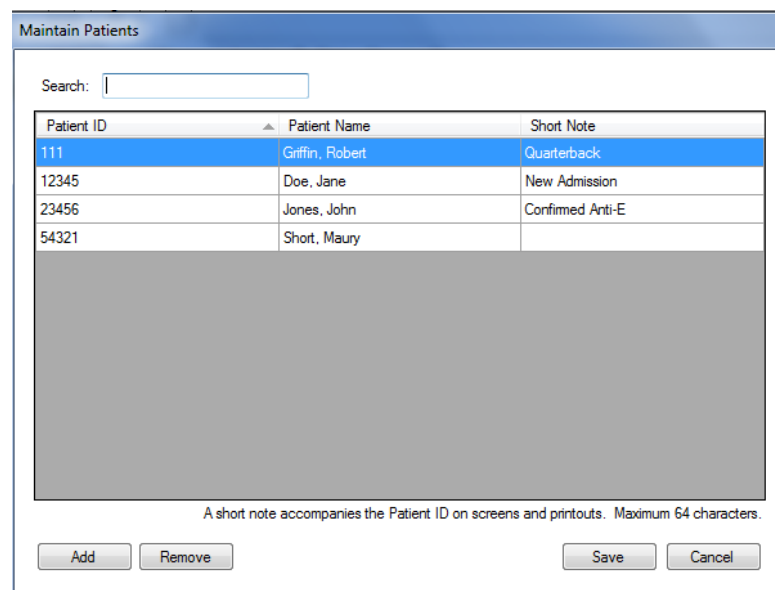
The Add/Edit Cells screen shows various input fields for donor information. The Donor ID is 100082, Lot Number is 8223011-111, and Expires is 10/18/2013. A red 'Out of Date!' warning is displayed. The screen also includes a table of antigens and their status.

Rh-Hr		Kell				Duffy		Luth		Kidd		MN		Lewis		P	Sex	Co	Di	Additional Antigens									
D	C	E	c	e	C ^w	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Lu ^a	Lu ^b	Jk ^a	Jk ^b	M	N	S	s	Le ^a	Le ^b	P1	Xg ^a	Co ^a	Co ^b	Di ^a	Di ^b
+	+	0	0	+	+	0	+	0	+	0	+	+	0	0	+	+	0	0	+	0	+	0	+	0	0	+	0	0	

Patients

The patients menu opens the Maintain Patients screen where patient information may be entered or edited.

The search feature on this screen enables a search by any of the criteria in any of the columns. Clicking in any cell opens it for editing.



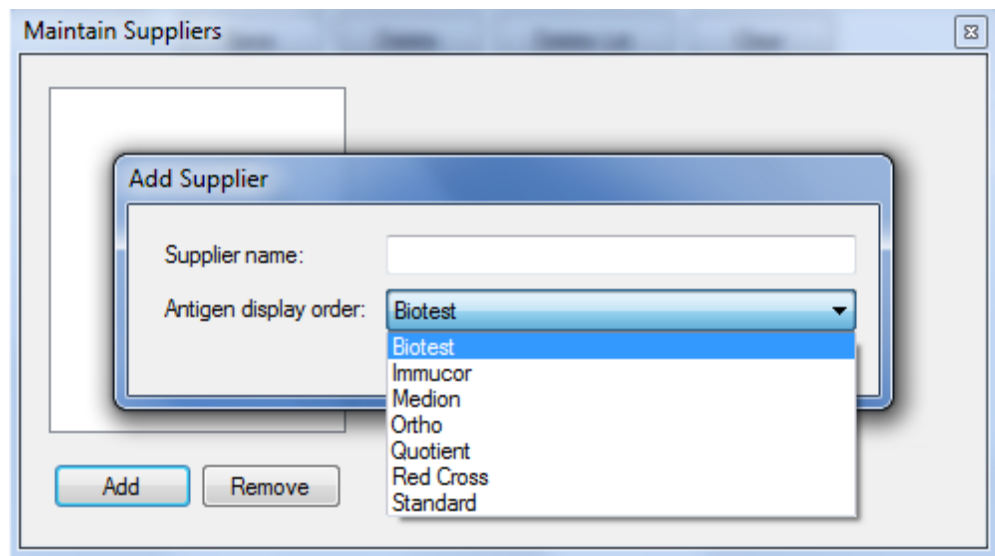
The Maintain Patients screen features a search bar and a table of patient records. The table has columns for Patient ID, Patient Name, and Short Note. Below the table is a large text area for a short note, with a maximum character limit of 64.

Patient ID	Patient Name	Short Note
111	Griffin, Robert	Quarterback
12345	Doe, Jane	New Admission
23456	Jones, John	Confirmed Anti-E
54321	Short, Maury	

A short note accompanies the Patient ID on screens and printouts. Maximum 64 characters.

Suppliers

This option allows entry of a supplier other than the currently licensed commercial red cell manufacturers. This is primarily for reference laboratories who are typing their own cells or receiving cells from other sources. Any of the available antigen arrays may be associated with the new supplier.



Lot Menu

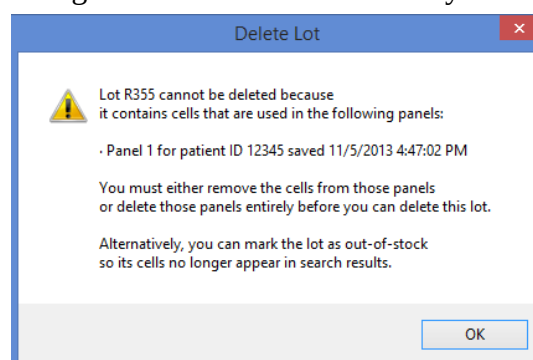
Lot	Panel	User	Help
	Download Lots from Internet		Alt+D
	Preview Print Lot Profile		Alt+V
	Print Lot Profile		Alt+P
	Maintain Lots		Alt+M

The Lot menu connects you with the Antigen Plus server for download of commercial red cell panels (see Downloading Lots on p. 28), and allows for preview or printing of any lot that is selected on the Add/Edit screen.

Selecting Maintain Lots opens the Maintain Lots table. On this table you can delete one or more lots (as long as they have not been used in any saved work in the last ten years) by highlighting a row (or highlighting several rows by holding down the CTRL key) and clicking on Delete Selected Lots. You may also mark any lot as out-of-stock or enzyme treated. A lot that is in-stock but has one or more cells that are out-of-stock will be marked with a square rather than a check mark in the box. Lots can be sorted in forwards or backwards Lot Number or Expiration Date order by clicking at the top of the column.

Maintain Lots				
Lot Number	Supplier	Expiration Date	Out of Stock	Enzyme Treated
3SS769	Ortho-Clinical Diag.	12/10/2013	☐	☐
3SS798	Ortho-Clinical Diag.	2/11/2014	☐	☐
3SS799	Ortho-Clinical Diag.	2/11/2014	☐	☐
3SS801	Ortho-Clinical Diag.	2/18/2014	☐	☐
3SS802	Ortho-Clinical Diag.	2/18/2014	☐	☐
40004	Immucor	12/13/2013	☒	☐
40005	Immucor	12/13/2013	☐	☒
40006	Immucor	12/13/2013	☐	☐
40007	Immucor	12/13/2013	☐	☐
40008	Immucor	12/13/2013	☐	☐

If you attempt to delete a lot that has been used in a saved workup, you will be notified that the saved work must be deleted before the lot can be deleted. Deletion of saved work-ups may only be done after ten years have passed since the panel was saved. If it is too early or you do not wish to delete the work and the lot, you may mark the lot as out-of-stock thus removing it from searchable inventory while saving any work that has been done with it.



Panel Menu

Panel	User	Help
Load Saved Panel...		Alt+L
Save the Selected Cells Panel...		Alt+S
Clear Selected Cells Panel		Alt+C
Selected Cells Worksheet		
Results Worksheet		Alt+R

The Panel Menu brings up a variety of options that are the most frequently used in Antigen Plus. If those options are unavailable (i.e. there are no cells selected), they will be greyed out on the screen.

Load Saved Panel

Panel	User	Help
Load Saved Panel...		Alt+L
Save the Selected Cells Panel...		Alt+S
Clear Selected Cells Panel		Alt+C
Selected Cells Worksheet		
Results Worksheet		Alt+R

This option opens up a table of all saved work-ups (any selected panel that has been saved with or without test results)

A saved panel may be retrieved for further work or review by selecting its row and pressing Load or by double-clicking on the row. Once the saved panel is retrieved, all of the information it was saved with will populate the appropriate screens (Search, Selected Cells Worksheet, and Results Worksheet).

A saved panel may also be deleted from this table if it is ten years old—a confirmatory warning will appear after Delete is selected.

You may save a Selected Panel (with any results included) from this screen. As this can be done more directly from the Selected Cells Worksheet or Results Worksheet, the function is here so that you may remember to save current work when you are loading another panel

Load Selected Panel					
Search:					
Date	Patient ID	Panel number	Patient name	Description	Last Saved
10/17/2013 12:50 PM	12345	5	Doe, Jane		10/17/2013 12:50 PM
10/15/2013 12:37 PM	12345	345	Doe, Jane		10/15/2013 12:37 PM
10/14/2013 1:51 PM	111	TEST 1	Griffin, Robert		10/14/2013 1:51 PM
10/9/2013 9:35 PM	12345	2	Doe, Jane		10/9/2013 9:35 PM
10/9/2013 9:19 PM	12345	1	Doe, Jane		10/9/2013 9:19 PM
10/5/2013 12:40 PM	12345	3	Doe, Jane		10/5/2013 12:40 PM
10/5/2013 12:38 PM	23456	2	Jones, John		10/5/2013 12:39 PM
10/5/2013 12:07 PM	23456	1	Jones, John	Suspect Anti-E	10/5/2013 12:07 PM

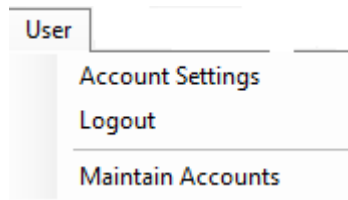
Load Delete Cancel

(there will also be a warning when you are loading a new panel that one is already in use).

Selecting Clear Selected Cells Panel will clear all selected cells from the screens. Current work will not be saved. But if the panel was previously saved it will remain in the database.

Selecting Selected Cells Worksheet or Results Worksheet will call up the current work and open those screens.

User Menu



Account Settings

This window allows a user to change name, initials and password. Administrators can also assign administration rights from this window. A new user may not log in until an administrator has added him or her in the Maintain Accounts table.

A user may change a name, initials, or password only if he or she has his or her current password.

Administrator with Automated Windows Log in Account Settings—see p. 18

Administrator Account Settings

A screenshot of the "Account Settings" window for an administrator. The window has a title bar that says "Account Settings". Inside, there are fields for "Name:" (containing "Linda"), "Initials:" (containing "LCR"), "New password:", and "New password (again):". Below these fields are two checkboxes: "Enabled" and "Administrator", both of which are checked. At the bottom of the window are three buttons: "Remove Password", "Save", and "Cancel".

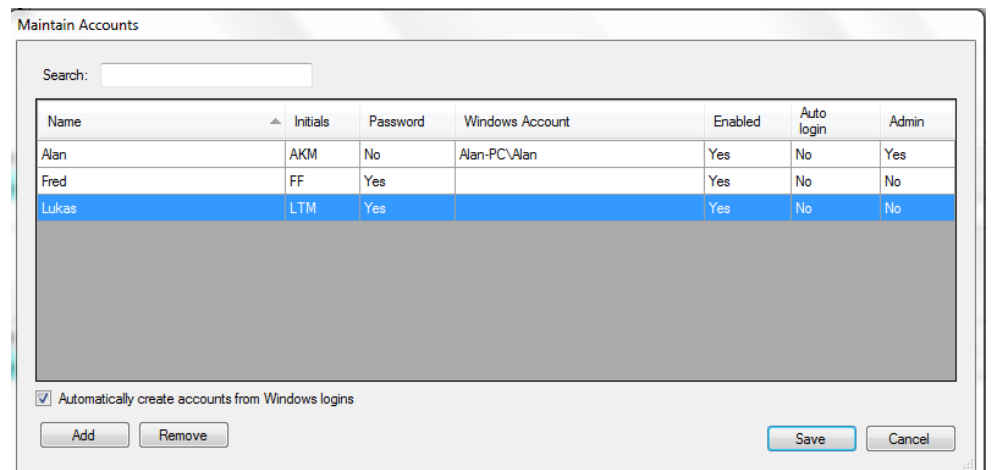
User Account Settings

A screenshot of the "Account Settings" window for a user. The window has a title bar that says "Account Settings". Inside, there are fields for "Name:" (containing "Ellis Osgood"), "Initials:" (containing "EO"), "Old password:", "New password:", and "New password (again):". At the bottom of the window are three buttons: "Remove Password", "Save", and "Cancel".

[Logout](#) Logs the current user out and asks for a username and password to continue.

Maintain Accounts

This menu is available only to administrators and is used for managing user access to Antigen Plus. If Automatically create accounts from Windows is checked, Antigen Plus will recognize the user from that user's log in to Windows and require a password if the Windows login also requires it.



The 'Maintain Accounts' dialog box features a search field at the top. Below it is a table with the following columns: Name, Initials, Password, Windows Account, Enabled, Auto login, and Admin. The table contains three entries: Alan (AKM, No, Alan-PC\Alan, Yes, No, Yes), Fred (FF, Yes, , Yes, No, No), and Lukas (LTM, Yes, , Yes, No, No). The 'Lukas' row is highlighted in blue. At the bottom, there is a checked checkbox for 'Automatically create accounts from Windows logins', and buttons for 'Add', 'Remove', 'Save', and 'Cancel'.

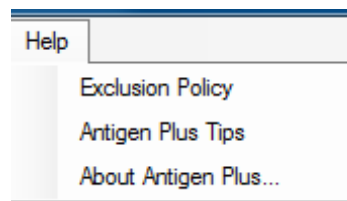
Name	Initials	Password	Windows Account	Enabled	Auto login	Admin
Alan	AKM	No	Alan-PC\Alan	Yes	No	Yes
Fred	FF	Yes		Yes	No	No
Lukas	LTM	Yes		Yes	No	No

☒ Automatically create accounts from Windows logins

Add Remove Save Cancel

Help

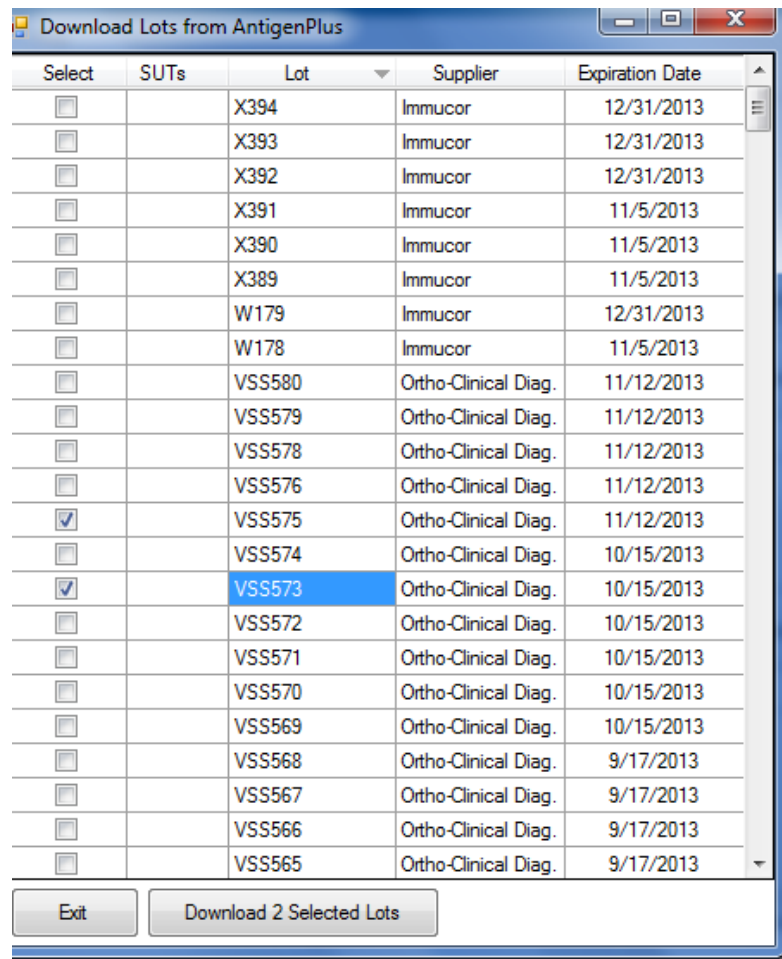
The Help Menu makes text regarding the use of Antigen Plus available to the user. That text is reproduced in this manual in the appropriately named sections.



Operation

Downloading Lots from the Internet

Initially, you must have entered some text identifying your laboratory in menu Options|Text to appear on printed Cell Lot panels and Selected Panels. You should insure that your workstation has a working connection to the internet. The first time you press Lot/Download Lots from Internet , Antigen Plus will automatically be notified, and will contact you when the subscription is activated. Once the subscription is established, you will see the following screen:



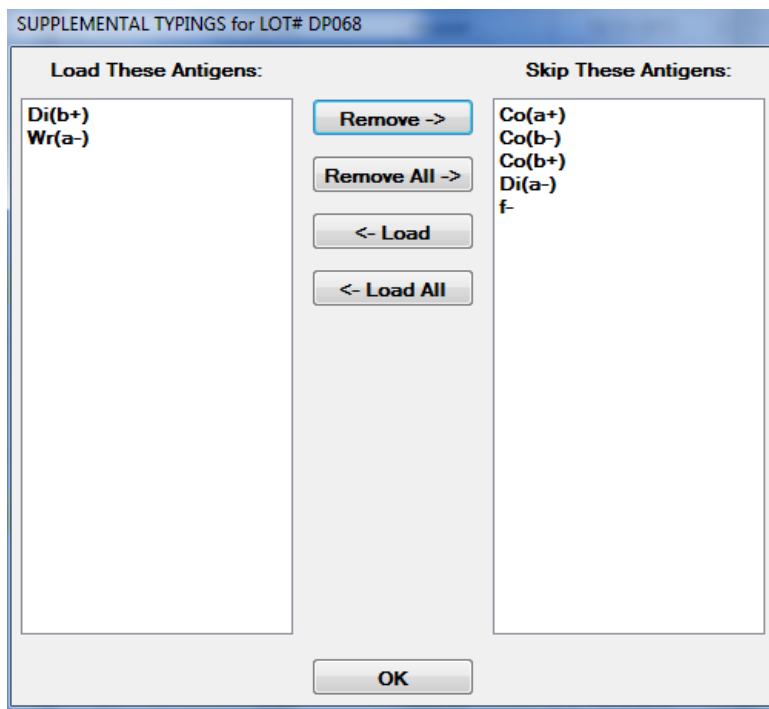
Select	SUTs	Lot	Supplier	Expiration Date
☐		X394	Immucor	12/31/2013
☐		X393	Immucor	12/31/2013
☐		X392	Immucor	12/31/2013
☐		X391	Immucor	11/5/2013
☐		X390	Immucor	11/5/2013
☐		X389	Immucor	11/5/2013
☐		W179	Immucor	12/31/2013
☐		W178	Immucor	11/5/2013
☐		VSS580	Ortho-Clinical Diag.	11/12/2013
☐		VSS579	Ortho-Clinical Diag.	11/12/2013
☐		VSS578	Ortho-Clinical Diag.	11/12/2013
☐		VSS576	Ortho-Clinical Diag.	11/12/2013
☒		VSS575	Ortho-Clinical Diag.	11/12/2013
☐		VSS574	Ortho-Clinical Diag.	10/15/2013
☒		VSS573	Ortho-Clinical Diag.	10/15/2013
☐		VSS572	Ortho-Clinical Diag.	10/15/2013
☐		VSS571	Ortho-Clinical Diag.	10/15/2013
☐		VSS570	Ortho-Clinical Diag.	10/15/2013
☐		VSS569	Ortho-Clinical Diag.	10/15/2013
☐		VSS568	Ortho-Clinical Diag.	9/17/2013
☐		VSS567	Ortho-Clinical Diag.	9/17/2013
☐		VSS566	Ortho-Clinical Diag.	9/17/2013
☐		VSS565	Ortho-Clinical Diag.	9/17/2013

Exit Download 2 Selected Lots

Available panels are listed in descending order of Expiration Date. They may also be sorted in ascending order or by Supplier or Lot Number. You may select as many as you wish, the number selected is displayed at the bottom of the screen as each panel is added to your database when you click Download Selected Lot(s).

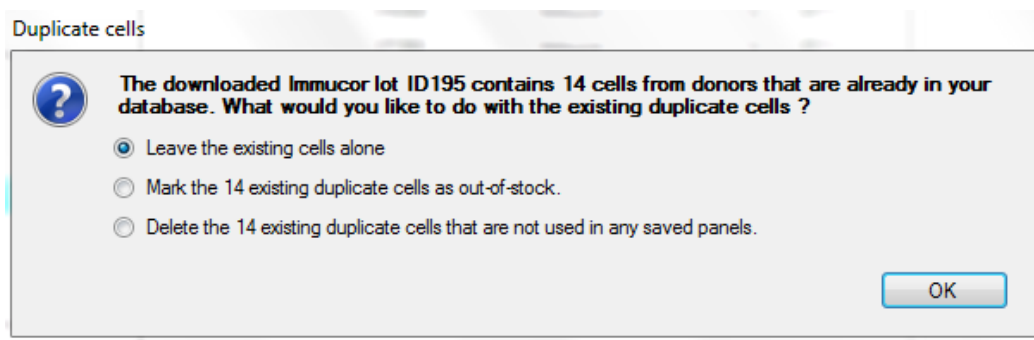
Downloading Lots with Supplemental Typings

Immucor provides supplemental unconfirmed typings with their panels. You may download some or all of these by selecting the SUT box next to the lot number when you are downloading. You will be given a choice of which typings you wish to see on your downloaded cells in a dialog box. Your choices will remain and may be changed or not the next time you download.



Download Prompt Option

If you have selected Prompt when downloading duplicate cells in the System options menu, you will be notified whenever donors on the downloading panel exist in your database. You can ignore the notification, mark the duplicate cells as out of stock, or delete them. If you attempt to delete a cell that has been stored as part of a saved panel, you will be advised to mark it out of stock instead.



Please note: If you are importing two identical panels (e.g. Quotient panels that are the same except that one is enzyme treated), both panels will be marked out-of-stock if you have this feature turned on and choose the out-of-stock option.

Principal Modes of Operation

There are two principal modes of operation: **Search** and **Add/Edit Cells**. You can switch between the two modes by clicking the tab in the upper left of the screen. A menu option is selected by highlighting it with the mouse, scrolling to the desired option with the Up and Down Arrow keys and pressing enter, or by pressing a letter key matching an underlined letter in the menu option.

When the program starts, the **Search screen** will automatically be displayed. A search pattern box allows you to enter a search pattern of the 28 principal antigens and/or any additional antigens, search the inventory for matches, and mark cells or lots for inclusion in a selected panel. (Some red cell suppliers include additional antigens on their array and some leave off principal antigens; those arrays are displayed that way in Antigen Plus if that supplier is chosen.)

File Options View Lot Panel User Help

Search Cells Add / Edit Cells

Patient: (none) Current Display Order: Otho Current User: Alan

Search Criteria

Donor ID: Lot Number: Sex: Group: Frozen: Enzyme Treated:

Clear Search Criteria

Rh-Hr				Kell				Duffy		Kidd	Sex	Lewis	MN	P	Luth	Additional Antigens					
D	C	E	c	e	f	C ^w	V	K	k	Kp ^a	Kp ^b	Jk ^a	Jk ^b	S	s	M	N	P1	Lu ^a	Lu ^b	

The search panel will immediately display how many cells are found in your database that are matches for your current search pattern, and continuously displays how many cells have been selected. Note that the search pattern defaults to blood group O cells.

Search Criteria

Donor ID: Lot Number: Vial: Supplier: Expires: Rh-Hr: Location: Group: Sex: Frozen: Enzyme Treated:

Clear Search Criteria

Rh-Hr				Kell				Duffy		Kidd	Sex	Lewis	MN	P	Luth	Additional Antigens					
D	C	E	c	e	f	C ^w	V	K	k	Kp ^a	Kp ^b	Jk ^a	Jk ^b	S	s	M	N	P1	Lu ^a	Lu ^b	
0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Donor ID: Lot Number: Vial: Supplier: Expires: Rh-Hr: Location: Group: Sex: Frozen: Enzyme Treated:

Rh-Hr				Kell				Duffy		Kidd	Sex	Lewis	MN	P	Luth	Additional Antigens	Donor	Lot #	Select					
D	C	E	c	e	f	C ^w	V	K	k	Kp ^a	Kp ^b	Jk ^a	Jk ^b	S	s	M	N	P1	Lu ^a	Lu ^b				
0	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+	+	+	+	+	+	Do(b-)	E458	DN059	☐
0	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+	+	+	+	+	+	Bg(a-)	E170	48136	☐
0	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+	+	+	+	+	+	+	E677	41014	☐

3 Matches Found

0 Cells Selected Preview Selected Cells Clear All Selected Cells Select ALL Matches

The **Results Worksheet** screen can only be activated when at least one cell or lot has been selected. All selected cells will be displayed in the Results Worksheet screen grid. Next to each cell phenotype, seven results columns are provided.

Selected Panel Test Results

FileViewHelp

Unsaved panel

Review 1

Review 2

Current User: Alan

Click in Results Box to indicate test outcome.

Supplier/ Lot #	Donor/ RHI-Val	Rh-Hr																Kell																Duffy				Kidd		Sex	Lewis				MN				P				Luth				Additional Antigens								Gel	Enz	IAT	DTT	C	D																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
		D	G	C	E	c	e	f	C ^w	Y	K	k	Kp ^a	Kp ^b	Kp ³	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Xg ^a	Le ^a	Le ^b	S	s	M	N	P1	P1 ^u	Lu ^a	Lu ^b																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

The default columns are IAT (indirect anti-globulin test), Enz for Enzyme treated cells, and DTT for DTT/AET treated cells. These columns have obligatory check cell results. The remaining columns labeled A through D follow the same exclusion rules as IAT, may be renamed to match the particular tests you use, and may be given check cell status if desired.

You may use the headings suggested or enter your own and display the columns in any order you wish (see the example on the Results Worksheet above) by dragging them across the screen.

Adjustment of results columns is done in **Options/Customize Results Columns...** see page 21
 The cells displayed on the Results Panel Worksheet will be those currently selected either in the Search mode or by using the Add Lot to Selected Cells function on the Utilities menu.
 An autocell row will always display at the end of each Results Panel.

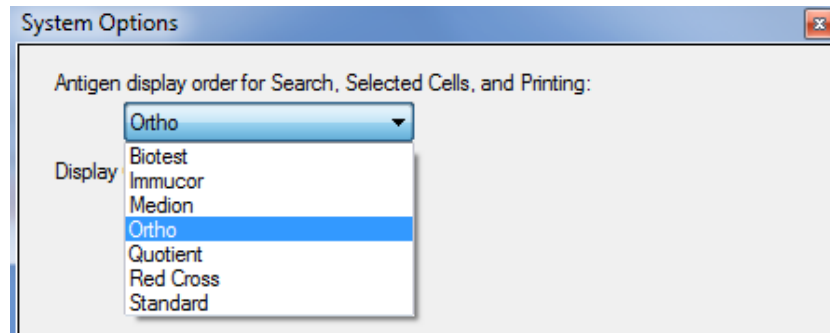
The Results Panel screen cannot be minimized, but clicking on the Exit button at the top of the screen will not erase the current results. All results will be maintained until the Clear Selected Cells button on the Search screen or Panel Menu is selected, and its results, with comments, can be saved for future reference by going to Panel Menu | Save Selected Panel or the File Menu on the Results Panel Worksheet. Individual cells (and their associated results) can be removed by exiting the Results Panel screen and unchecking the cell from the Selected Cells Panel screen. Instructions for entering test results and an explanation of their interpretation may be found in this manual in the section on Evaluating Test Results. Whenever a reaction is entered into a results box (the columns under IAT, Enz, DTT and A-D), those antigens that are ruled out by a negative reaction will be shaded, and the number of times an antigen has been ruled out is displayed on the bottom line. The rule-out counts for P1 and Xga are given an asterisk, with an explanation in the Evaluation box below. Positive P1 and Xga antigens require three negative reactions to verify their exclusion.

Instructions for entering test results and an explanation of their interpretation may be found in this manual in the section on Evaluating Test Results. Whenever a reaction is entered into a results box (the columns under IAT, Enz, DTT and A-D), those antigens that are ruled out by a negative reaction will be shaded, and the number of times an antigen has been ruled out is displayed on the bottom line. The rule-out counts for P1 and Xga are given an asterisk, with an explanation in the Evaluation box below. Positive P1 and Xga antigens require three negative reactions to verify their exclusion.

Antigen Order for Selected Cells

The antigen buttons are displayed in a common default order of blood groups: Rh-Hr, Kell, Duffy, Kidd, Lewis, P, MN, Lutheran, and Sex-Linked. Some suppliers' data sheets list them in a different order, so in order to simplify searching, selecting, and entering data there are 7 display options selectable with the 7 option buttons in the Options/ System Options menu. These choices stay with any donor displayed in the Search mode (if more than one supplier is

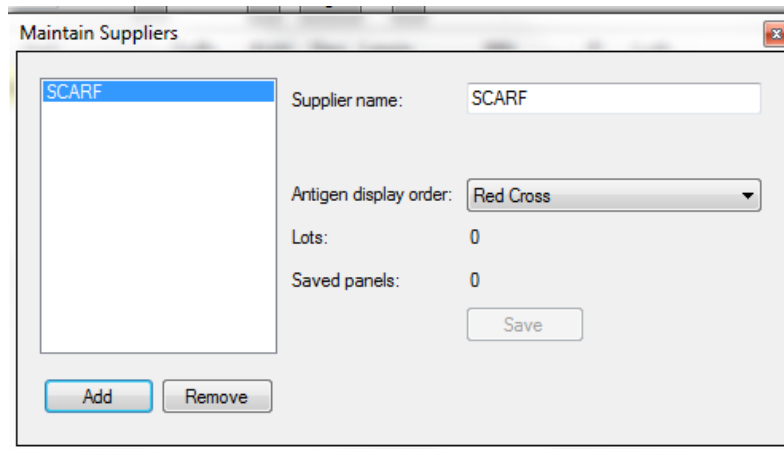
represented, the Additional Antigens box will accommodate any typings missing from an array; e.g. if you are using the Immucor order that omits the "f" typing and select an additional cell that has this typing, the "f-" or "f+" will appear in the Additional Antigens box (exclusion rules will consider the 28 common typings regardless of where they appear on the screen).



Automated Antigen Order on the Add/Edit Screen

On the Add/Edit screen, the array will match the supplier currently selected and appearing in the Supplier Box and will change automatically as the supplier is changed.

You may add a supplier with any one of these arrays from the **View** Menu.



Available Arrays

Option 1: Biotest

Rh-Hr						Kell						Duffy	Luth	Kidd	MN				Lewis	P	Sex	Co	Di						
D	C	E	c	e	C ^w	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Lu ^a	Lu ^b	Jk ^a	Jk ^b	M	N	S	s	Le ^a	Le ^b	P1	Xg ^a	Co ^a	Co ^b	Di ^a	Di ^b

Option 2: Immucor

Rh-Hr						Kell						Duffy		Kidd	Lewis		P	MN				Luth		Sex		
D	C	c	E	e	V	C ^w	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Le ^a	Le ^b	P1	M	N	S	s	Lu ^a	Lu ^b	Xg ^a

Option 3: Medion

Rh-Hr							MN				P	Lewis		Luth		Kell				Duffy		Kidd		Sex		
D	C	E	c	e	f	C ^w	V	M	N	S	s	P1	Le ^a	Le ^b	Lu ^a	Lu ^b	K	k	Kp ^a	Kp ^b	Js ^a	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Xg ^a

Option 4: Ortho

Rh-Hr							Kell						Duffy		Kidd	Sex	Lewis		MN			P	Luth				
D	C	E	c	e	f	C ^w	V	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Xg ^a	Le ^a	Le ^b	S	s	M	N	P1	Lu ^a	Lu ^b

Option 5: Quotient

Rh-Hr							Kell						Duffy	Kidd	Lewis	MN				P	Luth	Sex	Wr					
D	C	E	c	e	f	V	C ^w	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Le ^a	Le ^b	M	N	S	s	P1	Lu ^a	Lu ^b	Xg ^a	Wr ^a

Option 6: Red Cross Preferred

Rh-Hr							MN			Lewis		P	Kell				Duffy	Kidd	Luth	Sex
D	C	E	c	e	f	V C ^w	M	N	S	s	Le ^a Le ^b	P1	K	k	Kp ^a Kp ^b	Js ^a Js ^b	Fy ^a Fy ^b	Jk ^a Jk ^b	Lu ^a Lu ^b	Xg ^a

Option 7: Standard Hopkins Option

Rh-Hr							Kell						Duffy		Kidd	Lewis	P	MN				Luth	Sex				
D	C	E	c	e	C ^w	f	V	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Le ^a	Le ^b	P1	M	N	S	s	Lu ^a	Lu ^b	Xg ^a

Searching and Selecting

Search for Match

On the Search screen, the Search Pattern box allows you to search and select lots or individual cells.

The pattern box contains a Donor ID list box, a Lot Number list box, Sex, Group, Frozen and Enzyme Treated buttons, Search and Clear Search Criteria buttons, a row of 28 to 32 Antigen buttons and an Additional Antigens box:

File Options View Lot Panel User Help

Search Cells [Add / Edit Cells](#)

Patient: Current Display Order: Otho Current User: Alan

Search Criteria

Donor ID: Lot Number: Sex: ☐ Group: ☐ Frozen: ☐ Enzyme Treated: ☐

Rh-Hr	Kell	Duffy	Kidd	Sex	Lewis	MN	P	Luth	Additional Antigens
D ^a C ^a E ^c e f c ^w V	K k Kp ^a Kp ^b Js ^a Js ^b	Fy ^a Fy ^b JK ^a JK ^b	Xg ^a Xg ^b Le ^a Le ^b	S s M N	Pt Lu ^a Lu ^b				

Search Pattern

You may search by any of the criteria appearing on the Search Pattern box. To find a donor, select the donor number (and click the Search button if you are using that feature); to find a lot, select the lot number (and click the Search button if you are using that feature)—the donor phenotype or phenotypes will appear below the Search pattern box and may be selected individually or all at once for inclusion in a Selected Cell and Results Worksheet Panel. To enter a search pattern, click the desired antigen buttons in the search pattern box. You may set the buttons to 0, +, or blank. A 0 or + setting means that a matching cell must have a 0 or + in the same place (s or w designations will be read as + during a search). A blank setting means “don’t care”, and during a search those antigens will be ignored. To search for frozen cells only, click the Frozen button. To search for enzyme treated cells only, click the Enzyme Treated button. To search for a particular blood group, click the Group button until the appropriate group designation appears. To add additional antigens to the search pattern, check those desired in the Additional Antigens box by selecting the arrow on the right of the box to drop down a list of all the additional antigens in your database. You may select as many additional antigens as you like, but only the first 8 to 10 (depending upon their length) will display on the screen and an ellipsis will indicate that more are selected. If you mouse over any of the selected antigens or the ellipsis, a box containing all of your selected antigens and their associated ISBT numbers will appear.

A table of ISBT numbers used in Antigen Plus can be found in the Appendix.

Bga(+)	
Co(a+)	015-001
Cs(a-)	
Dantu+	002-025
Di(a+)	010-001
Di(b-)	010-002
He+	002-006
Hut+	002-019
I-	027-001

To remove Additional Antigens from the search display box, uncheck the item(s) in the Additional Antigens drop down list.

Searching

To perform a search, enter your search criteria (and click the Search button if you have not checked Search automatically when search criteria change in System Options--see p.21). The system will search your inventory for a cell which matches ALL the +, 0, and Additional Antigens in your search pattern; s or w are recognized as positive during a search. When you search, the inventory will be searched starting with the NEWEST cells first, that is, in reverse expiration date order. All frozen cells have no expiration date and will be gathered at the END of the search order unless you have specified a preferred supplier (see System Options) in which case all cells from that supplier will be found first in reverse expiration order and be followed by all other suppliers in reverse expiration order.

A search for an unspecified blood group (blank) will match ANY blood type, specified or unspecified.

A search for Frozen will return any frozen cell with any other criteria you have entered.

A search for Enzyme Treated will return any enzyme treated cell with any other criteria you have entered.

If you have a donor number displayed in those boxes, only that cell will be found. Clicking on any other search criterion will remove that donor number from the box. If you have a lot number displayed cell or cells with that lot number with any other criteria you have entered will be found.

As soon as you enter search criteria (or click on the Search button), all cells matching the criteria you have entered will be displayed beneath the Search Pattern box. The full phenotype of each cell with the donor and lot numbers will be arrayed. Clicking on any of these cells will display the full information for that cell above the array. Out-of-date cells will have the lot number highlighted in red and frozen cells will have the lot number highlighted in blue.

If an antigen pattern or additional antigen shows “0 Matches Found” and you are sure that the pattern or antigen exists, it may be because the cell’s blood group does not match, or the cell is marked Out of Stock and the System Options|Exclude From Searches box is checked.

Each time a match is found, the cell is displayed below. Any change to the search criteria (changing any search antigen button or changing the search additional antigens box) will reset the search procedure, and the data will be searched starting at the beginning

The screenshot shows the 'Antigen Plus 7.5.0.82' application window. At the top is a menu bar with 'File', 'Options', 'View', 'Lot', 'Panel', 'User', and 'Help'. Below the menu is a 'Search Cells' section with a 'Patient' dropdown set to '(none)' and 'Current Display Order' set to 'Ortho'. The 'Search Criteria' section includes fields for 'Donor ID', 'Lot Number', 'Sex', 'Group', 'Frozen', and 'Enzyme Treated', along with a 'Clear Search Criteria' button. Below this is a large table of search results. The table has columns for 'Rh-Hr', 'Kell', 'Duffy', 'Kidd', 'Sex', 'Lewis', 'MN', 'P', 'Luth', and 'Additional Antigens'. Each column contains a series of '+' and '0' symbols representing antigen presence. The table lists 12 matches found. At the bottom, there is a status bar showing '12 Matches Found' and buttons for '0 Cells Selected', 'Preview Selected Cells', 'Clear All Selected Cells', and 'Select ALL Matches'.

Selecting

Whenever you are in the Search mode (the search pattern box is present) and a cell is displayed below, you may click the Select box to tag this cell with a checkmark or to erase an existing checkmark. If you click Select All Matches, all the cells displayed will be selected. Cells with a checkmark are included on Selected Cell and Results Worksheet panels. When duplicate cells are selected, they will be highlighted in yellow so that they may be easily de-selected.. There is no limit to how many cells you may select, however the search preview screen can only display up to 13 cells at a time (6 if the screen is minimized) and a printed selected panel can only print up to 16 cells on a page. The results worksheet screen can only display up to 15 cells at a time. You may scroll to subsequent preview screens and all cells selected will print on consecutive pages. To empty the Selected and Results panels without exiting the program, remove ALL checkmarks by selecting the Clear Selected Cells button.

Selecting Expired Cells

Whenever you select a cell (or cells) with an expiration date that has passed, a dialog box will appear allowing you to select that cell (or cells) to enter the results of testing to ensure that cell is still reactive for the specific antigens in question. You may enter the result for any or all of the positive antigens on that cell and those results will be maintained with the date of the test and the name of the tester. You may opt out of this process by selecting Close and the cell will still be selected.

Review Selected Cells

These selected cells have passed their expiration dates. You may want to review their testing history to ensure the required antigens are still active.

Donor	Lot	Vial	Expiration Date	Last Tested	Antigens Retested	Select
A511	35941	1	11/8/2013	12/23/2013 11:29 AM	D+	☒ Review
B2085	35941	2	11/8/2013	12/23/2013 11:55 AM	Xg(a+)	☒ Review
C5382	35941	3	11/8/2013			☒ Review
D787	35941	4	11/8/2013			☒ Review
E870	35941	5	11/8/2013			☒ Review
F715	35941	6	11/8/2013			☒ Review
G483	35941	7	11/8/2013			☒ Review
H554	35941	8	11/8/2013			☒ Review

Close

Cell Testing History

Donor: C5382, Donor Note: , Lot: 35941, Vial: 3, Location: , Supplier: Immucor, Sex: , Enzyme Treated:

Rh-Hr	Kell	Duffy	Kidd	Lewis	P	MN	Luth	Sex	Additional Antigens
D C c E e V C ^w	K k Kp ^a Kp ^b Js ^a Js ^b	Fy ^a Fy ^b	Jk ^a Jk ^b	Le ^a Le ^b	P1	M N S s	Lu ^a Lu ^b	Xg	
+ 0 + + 0 0	0 + 0 + 0 + 0	0 + 0 + 0 + 0	0 + 0 + 0 + 0	0 + 0 + 0 + 0	0 + 0 + 0 + 0	0 + 0 + 0 + 0	0 + 0 + 0 + 0	0 + 0 + 0 + 0	

Technician: Alan, Testing Date: 2/7/2014, Retested Antigens: Kp(b+)

☐ D+ ☐ Lu(b+)
☐ c+ ☐ Xg(a+)
☐ E+
☐ k+
☒ Kp(b+)
☐ Js(b+)
☐ Jk(a+)
☐ Le(b+)
☐ M+
☐ N+
☐ S+
☐ s+

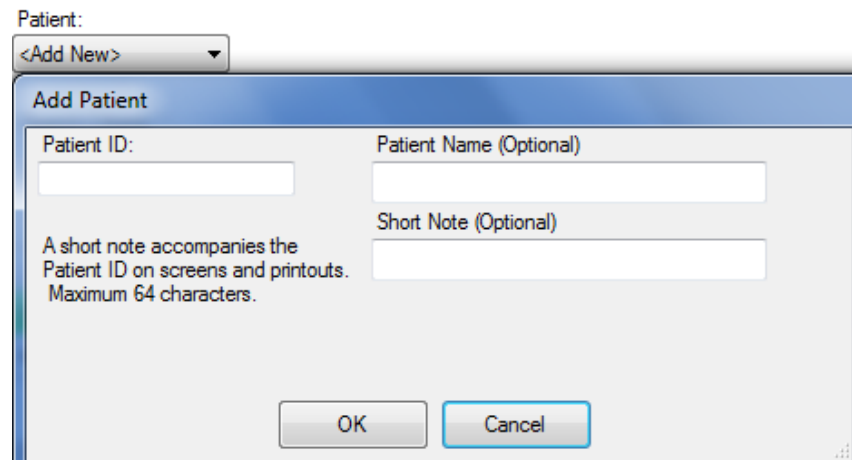
Previewing a Selected Panel

You may preview your selected panel on the screen by selecting the Preview Selected Cells Panel button. Before previewing your panel, however, you should choose the order in which you want them previewed and printed. This is done from the System Options menu. If you choose Sorted by Expiration Date, the cells will start with the most recent and end with the frozen cells selected. The frozen cells themselves will be displayed in Donor ID/Lot number order. If you choose In Order Checked, the cells will appear in the order in which you selected them during the search. If you choose Sorted by Donor/Lot, the cells will be displayed by Donor ID/Lot number order. The same order choice will govern your printed worksheet and will remain in effect until you change it from the Options menu. The selected cells will be displayed 15 at a time. The 28 principal antigens are displayed in the Display Option order you have selected on the search/entry screen.

Patient Information

Information about patients that will display on the Search screen and remain with saved work-ups is entered either on the Search Screen or in the View menu. On the Search screen, open the Patient drop down menu and select Add New.

You must enter an ID for the patient that will uniquely identify that patient. The nomenclature or protocol is up to you. The patient ID will display on the screen whenever you call that patient up from the Search screen. If you enter a patient name and information in the Short Note, that will also appear on the screen. Saving any work-up with a particular patient on the Search screen will attach that information to the printed worksheet as well as the saved lot table. Patient information can be also entered or edited in the Maintain Patients table that is found in the View menu.



Clear All Selected Cells

This button option on the Search screen will clear all the cells currently selected and there will be zero cells selected. Unless the Selected Cells or Results Worksheet has been saved, no results will be retained. A warning will appear confirming the intention to discard the current work

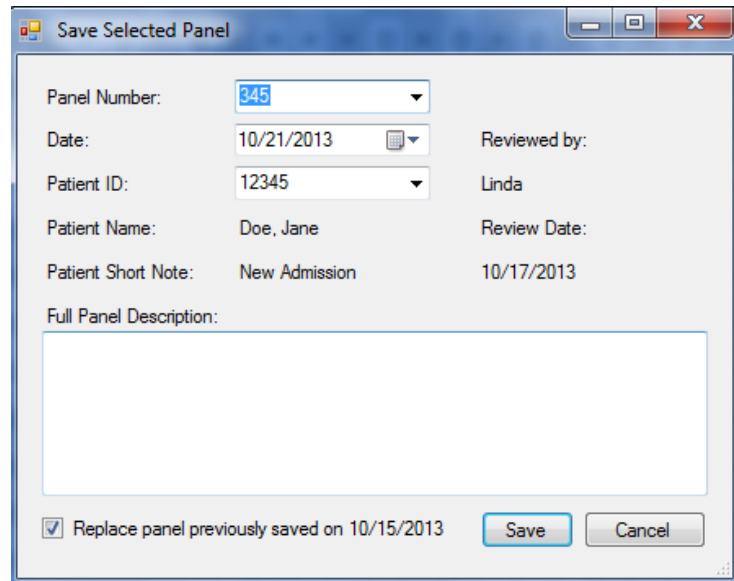
Save Selected Panel

As soon as any test result is entered, the Save Selected Panel option is disabled unless a patient has been selected, or the user has loaded a saved panel.

To save the currently selected panel:

Open the Panel menu and select the Save the Selected Cells Panel option or from the File menu on Selected Cells or Results Worksheet select Save Panel . A new screen will appear showing current data to be saved with the worksheet:

You may add a description of unlimited length to the saved panel in the Full Panel Description text box. When you are ready to save the panel with or without an extended description, press Save.

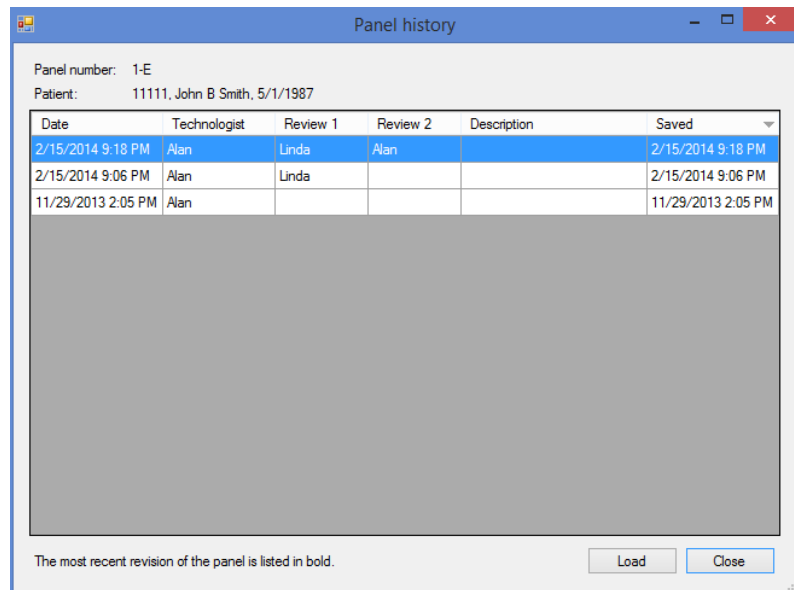


The 'Save Selected Panel' dialog box contains the following fields and controls:

- Panel Number: 345 (dropdown menu)
- Date: 10/21/2013 (calendar icon)
- Reviewed by: Linda
- Patient ID: 12345 (dropdown menu)
- Patient Name: Doe, Jane
- Review Date: 10/17/2013
- Patient Short Note: New Admission
- Full Panel Description: (empty text box)
- ☒ Replace panel previously saved on 10/15/2013
- Save button
- Cancel button

A previously saved panel may be revised and saved again using the same panel number. The older iteration(s) of the panel will remain associated with this panel and may be recalled (but not altered) from the View/Panel history screen on the Results Worksheet. Save dates, technologists and reviewers will be listed on the history.

For a list of which technologists entered which results go to View/Technologists screen on the Results Worksheet



The 'Panel history' dialog box displays the following information:

Panel number: 1-E
Patient: 11111, John B Smith, 5/1/1987

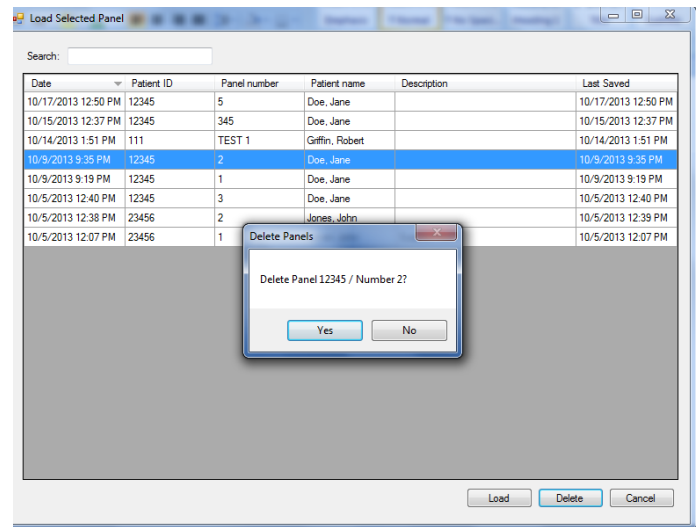
Date	Technologist	Review 1	Review 2	Description	Saved
2/15/2014 9:18 PM	Alan	Linda	Alan		2/15/2014 9:18 PM
2/15/2014 9:06 PM	Alan	Linda			2/15/2014 9:06 PM
11/29/2013 2:05 PM	Alan				11/29/2013 2:05 PM

The most recent revision of the panel is listed in bold.

Load button Close button

To delete a saved panel:

Select a panel in the Load Saved Panel menu and click Delete. The delete button will not be active until ten years have passed since the saving date.

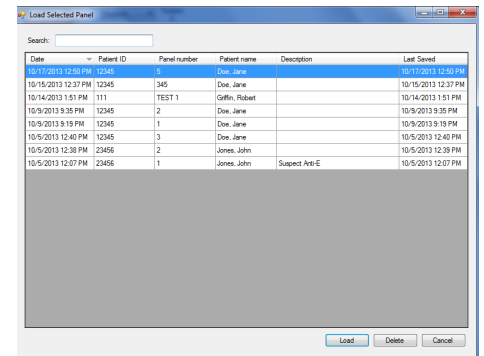


Load Selected Data

To load a saved panel:

Open the Panel menu and select the Load Saved panel option. The Load option is disabled unless there is at least one saved panel. A new screen will appear:

Click on a row and click the Load button. This will add the panel you have selected to the Selected Cells and Results worksheets. Loading a saved panel will empty the Selected Cells and Results screens of any previously entered data. Once a saved panel is loaded, additional cells may be added to the Selected Cells and Results screens by using the Search function.



Selected Cells Worksheet

The **Selected Cells Worksheet** is a worksheet containing all of the cells with check marks on them. Once you have selected the cells you want, it may be called up from the Panel Menu. The cells are displayed in your choice of Expiration Date, Checked, or Donor ID / Lot and vial order. The 28 principal antigens are displayed in the Display Option order you have selected in System Options. If a patient has been selected with the Selected Panel, the patient information will display on the worksheet. Additional antigens appear to the left of the principal antigens. If a selected cell has an expiration date prior to the system date, the cell's first column will be marked OOD (Out of Date). If a selected cell is Frozen, the cell's first column will be marked FZN. The Selected Panel Worksheet may be printed at any time by selecting File/ Print at the top left of the screen. If there are more additional antigens than can print on one line, more lines will be inserted underneath the cell until all additional antigens are printed. The worksheet will display the date and time it was printed. If a patient has been selected with the Selected Panel, the patient information will display on the print-out. The Selected Panel Worksheet prints out with six blank columns on the right for manually entering test results and additional blank rows beneath the last selected cell to the end of the page. A blank worksheet may also be printed from the **Panel** menu

10:42 PM, 2/15/2014

SELECTED PANEL
 Your Facility Name

Patient Name: John B Smith
 Patient ID: 11111
 Conclusion: _____

Technologist: _____
 Date Collected: _____
 Date Tested: _____

	Supplier / Lot	Donor / RhHr - Vial	Rh-Hr				Kell				Duffy				Kidd				Lewis				MNS				P				Lut	Additional Antigens	Test Results									
			D	C	E	c	e	f	w	V	K	k	K	P	J	s	F	y	K	a	X	L	L	S	S	s	M	N	P	L			L	L								
1	Ortho-Cli... RA970	312932 R1R1 #1	+	+	0	0	+	0	+	0	+	0	+	+	+	+	0	0	+	0	+	0	+	0	+	+	0	+														
2	Ortho-Cli... RA970	311489 R1R1 #2	+	+	0	0	+	0	0	0	+	0	+	+	+	+	0	+	+	0	+	+	+	+	+	0	+															
3	Ortho-Cli... RA970	117886 R2R2 #3	+	0	+	+	0	0	0	0	+	+	0	+	0	+	+	+	+	+	+	+	+	+	0	0	+															
4	Ortho-Cli... RA970	304619 Ror #4	+	0	0	+	+	+	0	0	0	+	0	+	0	+	0	0	+	0	+	0	0	+	0	+	+	0	+													
5	Ortho-Cli... RA970	118157 r'r #5	0	+	0	+	+	+	0	0	0	+	0	+	0	0	0	+	+	0	+	+	+	+	+	+	0	+														
6	Ortho-Cli... RA970	312192 r''r #6	0	0	+	+	+	+	0	0	0	+	0	+	+	+	+	+	+	+	0	+	0	+	0	0	+															
7	Ortho-Cli... RA970	102872 rr #7	0	0	0	+	+	+	0	0	+	+	0	+	0	+	+	0	0	0	+	+	+	+	+	0	0	+														
8	Ortho-Cli... RA970	313073 rr #8	0	0	0	+	+	+	0	0	0	+	0	+	+	0	+	0	+	0	+	+	+	+	+	+	0	+														
9	Ortho-Cli... RA970	84063 rr #9	0	0	0	+	+	+	0	0	0	+	0	+	+	0	+	+	+	0	+	+	+	+	+	+	0	+														
10	Ortho-Cli... RA970	310726 rr #10	0	0	0	+	+	+	0	+	0	+	+	+	0	+	+	+	0	0	0	+	0	+	+	+	+	+														
11	Ortho-Cli... RA970	311158 R1R1 #11	+	+	0	0	+	0	0	0	+	+	0	+	+	0	+	0	+	0	+	0	+	0	+	+	0	+														

Review 1: Name _____ Date _____
Review 2: Name _____ Date _____

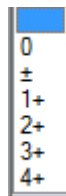
De-selecting a Selected Cell

A cell may be removed from the selected panel preview screen by clicking on the box in the Selected row (the cell will not be deleted from the system).

Evaluating Test Results

Selected Panel Test Results																																																															
File Options View Help																																																															
Patient ID: 38756			Patient Name: Doe, Jane										Short Note: New Admission										Alan					Current User:					Click in Results Box to Indicate Test Outcome																														
Supplier/ Lot #	Donor/ RhHr-Val	Rh-Hr										Kell					Duffy		Kidd	Sex	Lewis	MN			P	Luth	Additional Antigens					Gel	IAT	Enz	DTT	LIS	PeG	Sed																									
		D	C	E	c	e	f	C ⁺	V	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Xg ^a	Xg ^b	Le ^a	Le ^b	S	s	M	N	P1	Lu ^a	Lu ^b																																	
1	Ortho-CI RA965 23287 R1R1 #11	+	+	0	0	+	0	0	0	+	+	0	+	0	+	+	0	+	0	+	0	0	+	+	+	+	0	+	+	+	+	+	+																														
2	Ortho-CI RA965 306104 Ror #4	+	0	0	+	+	+	0	+	0	+	0	+	0	+	+	0	0	+	0	+	0	0	+	0	+	0	+	+	+	+	+	+																														
3	Ortho-CI RA965 308217 R2R2 #2	+	0	+	+	0	0	0	0	0	+	0	+	0	+	+	0	+	0	+	0	0	+	0	+	0	+	0	+	+	+	+	+	+																													
4	Ortho-CI RA965 310235 r #7	0	0	0	+	+	+	0	0	+	+	0	+	+	+	+	0	+	+	+	+	+	0	0	+	+	+	+	0	0	+																																
5	Ortho-CI RA965 311014 r #10	0	0	0	+	+	+	0	0	0	+	0	+	+	+	+	+	0	+	+	+	+	0	+	+	0	+	0	+	0	+																																
6	Ortho-CI RA965 311903 r/r #5	0	0	+	+	+	0	0	0	+	+	0	+	+	+	+	0	0	0	+	0	0	+	+	0	+	+	+	s	0	+																																
7	Ortho-CI RA965 312609 R1R1 #2	+	+	0	0	+	0	0	0	0	+	+	+	0	+	+	+	+	0	+	0	+	0	+	0	+	0	+	0	+	+	+	+	+																													
8	Ortho-CI RA965 312943 r #8	0	0	0	+	+	+	0	0	0	+	0	+	+	+	+	+	+	0	+	+	0	+	+	0	+	0	+	0	+																																	
9	Ortho-CI RA965 312950 r/r #6	0	0	+	+	+	+	0	0	0	+	0	+	+	+	+	+	0	+	+	+	0	+	+	0	+	0	+	s	0	+																																
10	Ortho-CI RA965 312962 R1wR1 #1	+	+	0	0	+	0	+	0	0	+	0	+	+	+	+	+	+	0	+	0	+	0	+	0	+	0	+	+	+	+	+	+	+	+	+	+	+	+																								
11	Ortho-CI RA965 84368 r #9	0	0	0	+	+	+	0	0	0	+	0	+	0	+	+	+	0	+	+	0	0	0	0	+	0	+	0	+	+	+	+	+	+	+	+	+	+	+																								
Auto Control																																																															
Supplier/ Lot #	Donor/ RhHr-Val	Rh-Hr										Kell					Duffy		Kidd	Sex	Lewis	MN			P	Luth																																					
		D	C	E	c	e	f	C ⁺	V	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Xg ^a	Xg ^b	Le ^a	Le ^b	S	s	M	N	P1	Lu ^a	Lu ^b																																	
Homozygous Rule Outs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																						
Heterozygous Rule Outs			0	0						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																						

The Results Worksheet may be called up from the Panel menu whenever selected cells are present. Any antigens that cannot be excluded by the current selection are highlighted in the Count row at the bottom of the screen. Results can be recorded as they are read by clicking in the box in the appropriate test column that is in the same row as the tested cell. The test column box will be highlighted and a drop down box will appear with a choice of results that may be entered by clicking on the desired number. The default choice is 0 through 4+ (Agglutination Grading). Result choices may be seen and entered in the Marsh 0 to 10 scale by choosing that option in the System Options menu. If you are entering results in a column that requires a check cell entry, the check cell box will appear each time you enter a negative result. You must confirm that negative result by



FileViewHelp

Unsaved panel

Review 1

Review 2

Current User: Alan

Click in Results Box to indicate test outcome

Patient 11111, John B Smith, 5/1/1987

Supplier/ Lot #	Donor/ RhHr-Val	Rh-Hr										Kell					Duffy		Kidd	Sex	Lewis	MN			P	Luth	Additional Antigens					Gel	Enz	IAT	DTT	C	D							
		D	C	E	c	e	f	C ⁺	V	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Xg ^a	Xg ^b	Le ^a	Le ^b	S	s	M	N	P1	Lu ^a	Lu ^b														
1	Ortho-CI RA970 312332 R1wR1 #1	+	+	0	0	+	0	+	0	+	0	+	0	+	0	+	+	+	+	0	0	+	0	+	0	+	+	+	+	+	s	0	+											
2	Ortho-CI RA970 311489 R1R1 #2	+	+	0	0	+	0	0	0	0	+	0	+	0	+	0	+	+	+	+	+	+	0	0	+	0	+	+	+	+	+	0	+											
3	Ortho-CI RA970 117886 R2R2 #3	+	+	0	+	+	0	0	0	0	+	0	+	0	+	0	+	+	+	+	+	0	0	+	0	+	+	+	+	+	+	0	+											
4	Ortho-CI RA970 304619 Ror #4	+	0	0	+	+	+	0	0	0	+	0	+	0	+	0	0	0	0	+	0	0	+	0	0	+	0	+	+	+	+	+	0	+										
5	Ortho-CI RA970 118167 r #5	0	+	0	+	+	+	0	0	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	+	+	+	+	+	0	+										
6	Ortho-CI RA970 312192 r #6	0	0	+	+	+	+	0	0	0	+	0	+	0	+	0	+	+	+	+	+	0	0	+	0	+	0	+	0	+	+	+	0	+										
7	Ortho-CI RA970 102872 r #7	0	0	0	+	+	+	0	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	+	+	+	0	0	+										
8	Ortho-CI RA970 313073 r #8	0	0	0	+	+	+	0	0	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	+	+	+	0	+										
9	Ortho-CI RA970 84063 r #9	0	0	0	+	+	+	0	0	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	+	+	+	0	+										
10	Ortho-CI RA970 310726 r #10	0	0	0	+	+	+	0	0	0	+	0	+	0	+	0	+	+	+	+	+	0	0	+	0	0	+	0	+	+	+	+	0	+										
11	Ortho-CI RA970 311158 R1R1 #11	+	+	0	0	+	0	0	0	0	+	0	+	0	+	0	+	+	+	+	0	0	+	0	+	0	+	0	+	+	+	s	0	+										
Auto Control																																												

		Rh-Hr										Kell					Duffy		Kidd	Sex	Lewis	MN			P	Luth						
		D	C	E	c	e	f	C ⁺	V	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Xg ^a	Xg ^b	Le ^a	Le ^b	S	s	M	N	P1	Lu ^a	Lu ^b		
Homozygous Rule Outs	Double Dose	4	3	0	6	9	7	1	1	0	8	0	10	0	10	2	3	4	3	*	3	5	2	5	1	6	*	0	9			
Heterozygous Rule Outs	Single Dose	0	0							2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		

Evaluation:

Enz: Can Not Exclude E: Kpa, Jsa, Fya, Fyb, M, N, S, s

Column Gel: Can Not Exclude E: Kpa, Jsa

These are tentative rule-outs.

Additional confirmatory data based on your own criteria are recommended.

*P1 rule-outs: 6 (need at least 3 negative reactions (8 found) for P1+)

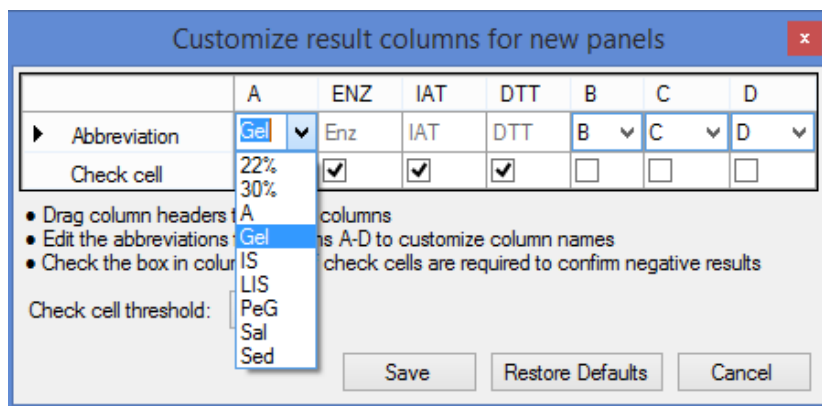
*Xga rule-outs: 5 (need at least 3 negative reactions (7 found) for Xga+)

entering a positive result in the check cell box. Once a choice is entered, move the cursor down to the next tested cell and repeat the procedure.

The number of homozygous and heterozygous rule-outs for each antigen appear in the Count rows below the cell rows and above the Evaluation that specifies which antigens remain to be

excluded. Antigens that cannot be excluded with the cells currently selected are highlighted in the Count rows.

The Results columns default to IAT, ENZ, DTT, and A,B,C, and D respectively. A,B,C, and D columns exclude by the same rules as IAT, and those columns may be renamed and all the columns may be repositioned from the Options Menu. Names are suggested for the columns but you may type any text in the column header box that you choose. Check cell status may be selected for the optional columns and the check cell threshold for all columns may be set.



Click in Results Box to Indicate Test Outcome						
IAT	Enz	DTT	A	B	C	D

Click in Results Box to Indicate Test Outcome						
LIS	IAT	PeG	Enz	DTT	C	D

To remove a result from a box, click once on the box, then click on the blank space above the zero in the choices box. As the results are entered, the excluded antigens are shaded and the exclusions obtained will appear in the Evaluation box at the bottom of the screen. The bottom line of the Results Panel, "Rule Outs", keeps a running tally of the number of times an antigen has been excluded either by homozygous or heterozygous results.

Exclusions are specific to the results column in which they are entered and are so marked. The basis for those exclusions is documented below in the Exclusion Policy section. Results and exclusions are maintained as long as the selected cells are not cleared. If the Selected Cell Worksheet or Results Worksheet is saved, any results entered against those cells will be saved with the panel and will appear on the Results Worksheet screen when the Saved Panel is loaded. If more cells are required for testing than appear on the Results Worksheet screen, simply exit the screen by clicking the X button in the upper right corner of the screen and add cells to the Selected Cell Panel by the Search methods. The current Evaluation box will appear at the bottom of the Search screen. Any new cells selected will be present on the Results Worksheet screen when it is called up again.

[illegible]

Once a result or results have been entered in a Results Worksheet and the worksheet has been saved a user with appropriate privileges may review it. After a panel has been reviewed, no further changes may be made to the worksheet, unless the reviewer unchecks the review box. Only the user who reviewed a panel or an administrator can remove the review from that panel.

SELECTED PANEL TEST RESULTS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
File Options View Help						Patient Name:						Short Note:						Reviewed ☐ Reviewed by: Linda Date: 10/18/2013						Click in Results Box to Indicate Test Outcome																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Patient ID: 23456						Jones, John						Confirmed Anti-E																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
Supplier/ Lot #		Donor/ Rhh-Val		Rh-Hr				Kell				Duffy		Luth		Kidd		MN		Lewis		P Sex		Co		Di		Additional Antigens		IAT	LIS	Enz	DTT	B	C	D																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
				D	C	E	c	e	C ^w	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Lu ^a	Lu ^b	Jk ^a	Jk ^b	M	N	S	s	Le ^a	Le ^b	P ¹	Xg ^a	P ²	Xg ^b	Co ^a	Co ^b	Di ^a	Di ^b	f. V.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					

A second review may be entered after a first review following the same rules. If anyone changes reviews on a saved panel, a prior iteration of the panel will be maintained with the original reviews in **Panel History**.

Print and Print Preview menus are accessed from the file menus of the Selected Cell or Results Worksheets. Antigen Plus should ensure that your printer prints in Landscape (11 x 8½) format. If your print out appears in Portrait format, you may correct this in Windows by minimizing the Antigen Plus program, then invoking the Start, Settings, and Printers commands, and setting up

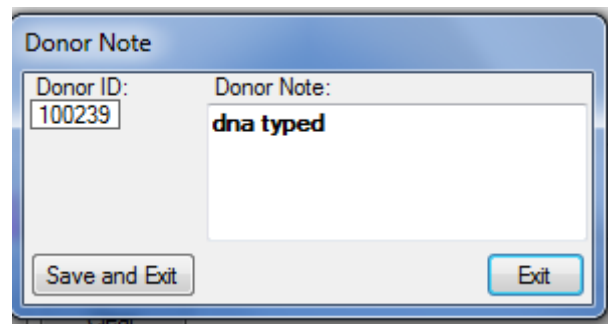
the printer. When you are finished, reactivate Antigen Plus by clicking its icon at the bottom of the screen.

Data Entry

Antigen Plus allows the entry of unique cells and/or lots from suppliers other than those currently licensed by the FDA to sell red blood cell panels in the United States. Most hospital transfusion services will rely solely on commercial suppliers and entry of red cell data may never be necessary or may be restricted to adding or correcting a typing on an existing cell. Red cell phenotype data entry is described at the end of this section.

Donor Note

An optional note may be stored with each Donor ID by selecting Donor Note from the View menu when the donor is displayed in the Donor ID box. Type your note in the Donor Note text box and then select Save and Exit.



Donor Note

Donor ID: 100239

Donor Note: dna typed

Save and Exit Exit

A Donor Note is associated with the Donor ID only, not the Lot, so it will appear with every Lot that a donor ID is in. When a Donor ID has a note on file, that information will be displayed whenever that donor is on the Add/Edit or Search screens.

Donor ID:	Lot Number:	Vial:	Expires:	Supplier:	Enzyme	Donor Note:
100514	8223011-111	1	10/18/2013	Biotest	Treated:	dna typed

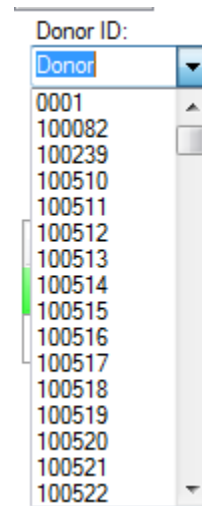
Data Entry of Individual Cells

Data may be entered or changed in a box whenever the cursor is positioned over that box. The cursor can be moved to another box by pointing to it with the mouse and clicking the left mouse button. The cursor also moves to the next box by pressing the Tab key, or to the previous box by pressing the Shift + Tab keys. Previously saved data can be viewed and selected by clicking the little down-arrow to the right of the box, or by pressing the Ctrl + Down Arrow keys while the cursor is in the box. The box will be “opened”, and the data will be displayed in numerical and alphabetical order. Any item in the list can be selected with a mouse click, or by highlighting it with the Up or Down Arrow keys and pressing Enter. Alternatively, items can be scrolled without

opening the box by pressing the Down Arrow key. A list box may be opened at a particular spot in the list by first entering a character or characters in the box and then opening it. A button may be activated or “pushed” by clicking it with the left mouse button, or by moving the cursor to the button and pressing any key. You can tell when the cursor is on a button because its outline becomes darker, and if it has writing on it, the writing is surrounded by a dotted line. As with boxes, the cursor can be moved from button to button by using the Tab or Shift + Tab keys, or by clicking directly with the mouse. In general, the cursor moves from left to right and top to bottom on the screen. A donor cell is identified by its Donor ID and Lot Number. A donor number or lot number may appear any number of times, but the Donor ID - Lot Number combination must be unique. In order to save a cell in the database, it must have a non-blank Donor ID and a non-blank Lot Number. When you are entering several cells from a single antigram or lot panel, the data boxes are blanked after you Save, but remain indexed at the last item entered. Therefore, when you enter one cell and save it, then enter a new Donor ID number, you can Tab to the Lot Number box and press the Down Arrow to recall the previous Lot. Its expiration date and supplier will also appear, saving you from having to re-enter the data.

Donor Number

The Donor No. box will accept up to 16 characters and may be any combination of capital letters and characters except apostrophes. Enter a donor ID and press the Tab key to move on to the Lot Number box. If the donor is already on file, the cell data will be retrieved and displayed.

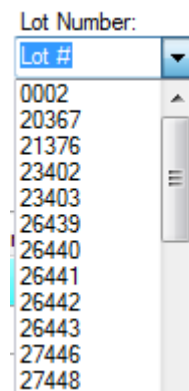


Drop-down (or list) boxes have a scroll bar. One donor may be present on several different panels. If a donor has more than one cell on file, and her previously existing ID is entered, the most recent one found will be displayed. This is to facilitate entering duplicate donors - when you wish to enter a donor who is already on file into a new lot number, the old phenotype will automatically appear, and you then need to enter only the new lot number, check the expiration date, and click the Save button. It is assumed that the phenotype will not have changed from a previous panel.

Lot Number

The Lot Number is used to show the supplier's unique lot number for this cell's panel. All cells with a given Lot Number will have the same supplier and expiration date.

The Lot Number box will accept up to 16 characters and may be any combination of numbers and capital letters. Enter a lot number and press the Tab key to move on to the Vial box. If the lot number was already on file,



the expiration date and supplier will be retrieved and displayed.

Vial

The Vial box will accept any number from 0 through 99. It will also accept a TC (tech cell) vial. Enter a vial number or TC and press the Tab key to move on to the Expires box. Pressing the Up and Down Arrow keys or clicking the little up and down arrows to the right of the box will automatically raise or lower the displayed vial number. TC is located below the 0.

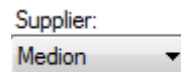
Expiration Date

The Expires box is for the expiration date of all cells in the lot number displayed. You may enter a date in any format that is comfortable for you, such as “20 Dec 10” or “12-20-11”, then press the Tab key to move on to the Supplier box. The date will be re-displayed in the format set in the Windows Control Panel/Regional Settings/Date function. If the date is before the present system date, a bright red Out of Date! will appear under the Expires box. The expiration date is stored with the lot number, so if you change the expiration date of a lot number, then ALL cells with that lot number will have the new expiration date.

Supplier

The Supplier box is populated with default commercial suppliers and any that you have added in the Suppliers table found in the View menu.

When a supplier is changed in the Supplier box, the antigen array below will change to match that Supplier's array.



The supplier is stored with the lot number, so if you change the supplier of a lot number, then ALL cells with that lot number will have the new supplier.

Location

Enter a storage drawer location for a frozen cell. The location is stored independently and will not affect other cells with the same lot number--should there be any. The Location box will accept up to 15 characters in any combination of letters and numbers.

Rh-Hr

Antigen Plus comes with the standard Rh-Hr phenotype designations loaded in the drop down box that is activated by clicking on the down arrow adjacent to the Rh-Hr entry box. Choosing one of these designations by clicking on it will place it in the entry box and will mark the

appropriate pluses and negatives in the Rh-Hr antigen group (see illustration below). If changes are made to that antigen group, the user must manually change or remove the RhHR designation. Note: Antigen Plus no longer specifies the Cw antigen in Rh-Hr designations since we cannot predict 100% when C will be on the same gene complex as Cw.

Additional Antigens

The Additional Antigens box consists of an entry box, check boxes, and a display box directly above them containing this cell's additional antigen phenotype. You may enter an additional antigen in the Add New entry box, or select one from the list by clicking the box. To add what is in the entry box to this cell, check the box. To remove an antigen from a cell uncheck the appropriate box.

The screenshot shows a window titled "Additional Antigens". It contains a grid of checkboxes for various antigens. The first column has a header "Add New..." and a scroll bar below it. The other columns contain the following antigens:

Antigen	Co(b+)	Do(b-)	Kp(a+)
Bg(a-)	Cs(a-)	Do(b+)	Lu:14
Bg(a+)	Dantu-	Ge+	Lu:-14
Bga(+)	Dantu+	He+	LW(a+)
Bp(a-)	Di(a-)	Hut+	LW(b-)
Ch+	Di(a+)	Hy+	Mg-
Co(a-)	Di(b-)	I-	Mi(a-)
Co(a+)	Di(b+)	I+	Mi(a+)
Co(a-b+)	Do(a-)	Jo(a+)	Mo(a-)
Co(b-)	Do(a+)	Jr(a+)	Mt(a-)

.There is no limit on how many additional antigens you may enter. However, once the screen space is used up, further antigens will be stored but not displayed. When there are more additional antigens than can be displayed on a Lot Panel print out, an ellipsis ("...") at the end of the additional antigen list (displayed alphabetically) will indicate the presence of the additional typings. Mousing over the display all of the antigens present along with their associated ISBT numbers.

The screenshot shows the "Additional Antigens" window with a dropdown menu open. The dropdown menu displays a list of antigens and their ISBT numbers:

Antigen	ISBT Number
Bg(a-)	010-010
Bp(a-)	015-002
Co(b-)	002-025
Dantu+	010-001
Di(a-)	002-019
Hut+	014-005
Jo(a+)	002-007
Mi(a+)	013-001
Sc:1	010-003
Wr(a-)	

A table of ISBT numbers used in Antigen Plus can be found in the Appendix.

The reason for the entry-box method of adding additional antigens is to ensure consistency: you must be consistent in your notation in order for a search to work properly. For example, to indicate a Colton b antigen (Co_b) as positive, you may enter Co(b+), CoBPos, or any other notation that is 8 characters or fewer, but you should use the exact same notation for all cells with this antigen. The entry box will contain a list of all the additional antigens previously saved in your inventory, and you should check for an antigen's presence

before entering a new one. The ISBT numbers can be consulted for more precision in nomenclature. A table of ISBT numbers used in Antigen Plus can be found in the Appendix .

Out Of Stock

Click the Out Of Stock button, click OK in response to the pop-up query, and then click the Save button to mark a cell as exhausted. The data will remain on file so that you can recall the phenotype in case the cell shows up in a new lot, and will remain in any saved panels. The cell will not be available in the search process unless you mark the Include in Searches feature in the Out of Stock Inventory box in the System Options menu. When you click the Save button, you will be given the option of marking the entire lot as out of stock. Click Yes or No in the popup window, or type y or n, to indicate your choice. Please note: If you do not click the Save button after marking the cell as out of stock, the cell will remain in stock and the out of stock flag will not reappear on the screen when that cell is recalled.

Sex

Clicking the Sex button will change the button from blank to M to F. This is optional information, and not normally of significance in the selection of panel cells.

Group

The Group button allows you to enter the blood group of the donor cell. Since most commercial panel cells are group O, that is the default setting. To change the blood group to A, B, or AB, click the Group button until one of those characters appears. To leave the blood group unspecified, click the Group button until a blank appears.

Frozen

Click the Frozen box to mark a cell as frozen. The expiration date will be blanked. Frozen cells will be found last in the search process, since searching is done starting with newest cells first.

Antigens

The 28 principal antigens are displayed with colored labels for easy identification. When you are entering a new cell, all the antigens will have a 0 setting. You may change a setting to a +, s, w, or blank by clicking the button with the mouse pointer (right and left mouse clicks scroll through the choices in opposite orders), or by moving to a button with the Tab key and pressing any other key. A blank setting indicates that no information is available. For example, some suppliers may not include the Kell system Kp_b and Js_b, so you may blank these antigens' buttons.

Save

Clicking the Save button will save all the cell data displayed for the unique Donor No. - Lot Number combination. Any items not previously present in the data boxes (Donor, Lot, Expiration Date, Supplier, Additional Antigens, and Rh-Hr) will be added to the lists in those boxes. The cell display is cleared and the cursor returns to the Donor No. box. The Lot Number, Expiration Date, and Supplier are saved as a group with the Lot Number. If you have changed the date or supplier of a lot, then ALL cells with that lot number will have the new date and supplier. A Donor Note is saved only with the Donor ID, and stays with the Donor ID regardless of which Lot it is in.

Delete

Clicking the Delete button will prompt you to make sure, then remove the displayed Donor No. – Lot Number combination from your inventory as long as it has not been used in the last ten years in any saved work. When a cell is deleted, any unique lot, additional antigen, or Rh-Hr information it may have had will also be deleted from the lists in those boxes.

Delete Lot

Clicking the Delete Lot button will prompt you to make sure, then remove ALL cells with the displayed lot number (the ten year rule applies).

Multiple User Procedures

There is no restriction on the number of users who can use Antigen Plus and share its data at the same time. There are, however, some default rules of precedence in cases when new data are added to the system by one of the users and where the same data are altered and saved by more than one user in a session. Your SOP should make note of the following rules:

When a user downloads a new lot into the system, the cells within the lot that lot will be available for searches by other users and will appear in the Maintain Lots screen, but will not be available in the Lot drop down list on the Search or Add/Edit screens until the other user clicks the Refresh Data option in the File Menu (or simply presses the F5 key).

If two users have the same saved panel open, the second one to save will be the current panel iteration even if the first user has changed and/or reviewed the panel. The first user's panel will be available as a prior iteration, but will have to be recreated to be a current one (this can be done by opening the current iteration and making the necessary changes using the prior iteration as a guide). However, the first user's saved panel will appear immediately on the Panel History screen, so to ensure that there are no conflicts, a user who suspects that there may be someone else working on the same panel can check the panel history before saving his/her work.

Exclusion Policy

Antigen Plus - Ab ID excludes antigens in the manner described by the *AABB Technical Manual*, 15th Edition, (ch 19: pg 428-9). Homozygosity is required for the exclusion in the following blood group systems: Rh, Duffy, Kidd, MNS. In the presence of anti-D, the program will exclude E and C on heterozygous cells. Blank antigens will cause the known positive antithetical partner to be considered heterozygous for exclusion. The blank antigens themselves are not considered positive or negative and will not be considered for exclusion.

The blood group antigens that can be excluded on heterozygous cells are K, Kpa, Jsa, and Lua. As the Homozygosity of P and Xga is not easily determined from most panel sheets, the program requires 3 examples of each antigen to be non-reactive with the patient sample before it will exclude either antigen.

It is always advisable to review *AABB Technical Manual*, 15th Edition, (ch 19: pg 429-36) for more detailed information on Complex Antibody Identification including variability of antigen strength, the effect of storage on RBC antigens and use of autologous cells while considering the antigens excluded or not, by the program. Any final decision made by the technologist must be consistent with their facility SOP for Antibody Identification.

The program does not encompass the knowledge of all blood group systems and their patterns of reactivity. Any technologist using the program to automate the exclusion process must apply serological expertise to interpret the program's lists of antigens excluded versus antigens not excluded. The program evaluates each column of reactivity independently. Exclusions obtained from the results recorded in columns A, B, C, and D will be exactly the same as those obtained from identical results recorded in the Liss indirect antiglobulin test (IAT column). There is too much variability in antibody reactivity to risk excluding an antigen on anything but the reactions obtained by the technologist and recorded in Antigen Plus - Ab ID.

Red cell treatments, when performed correctly, do have a standardized effect that is well documented. Antigen Plus - Ab ID does employ that information when the ENZ column and DTT column have results recorded in them. The ENZ column will not exclude Duffy and MNS blood group system antigens. The DTT column will not exclude Kell or Lutheran blood group system antigens.

High frequency antigens and low incidence antigens, which can be used as a search parameter to select cells for the results panel, cannot be used in the exclusion process or listed in the Evaluation box at the bottom of the results panel. As the antigens listed in the Additional Antigens are entered by the individual user, they are not pre-coded by the program. A list of technical tips to assist any technologist who may have an antibody to a high frequency antigen or to a low incidence antigen is included in the Help utility and is reproduced on the following pages.

The following text always appears with any results in the Evaluation box.

These are tentative rule-outs.

Additional confirmatory data based on your own criteria are recommended.

It is the user's responsibility to record accurate test data and to confirm that data according to established protocols.

Technical Information for Further Testing

1. If all cells in the first panel are reactive and the autocontrol is negative, try chemically treated screen cells and see if this alters the reactivity in any way. Chemical treatment of red cells includes: enzymes, DTT, AET or CDP (chloroquine diphosphate). Methods and information on obtaining any of the products required, can be found in the *American Red Cross Immunohematology Methods and Procedures*, D. Mallory, ed. Selecting 2 or 3 cells from the panel, or using the screen cells, will save time, save plasma and still provide new information. If the information is that nothing changed, go to step 2.

[More information on the actions of specific chemicals is listed in step 2,(iii).]

2. If all cells in the first panel tested are reactive and the auto control is negative, perform a common phenotype on the patient's red cells (patient must not have been transfused in the preceding 90 days). Blood group systems to include Rh, Kell, Duffy, Kidd and MNS. Select a cell from any of the panels or screen cells in your inventory that is negative for the same antigens the patient lacks and test it. This is referred to as running a phenotypically matched cell.

EXAMPLE: PATIENT D+C+E-c+e+, K-, Fy (a+b-), Jk(a-b+), M+N+S-s+.

POSSIBLE MATCHES: D-C-E-c+e+, K-, Fy(a-b-), Jk(a-b+), M-N+S-s+
D+C+E-c-e+, K-, Fy(a+b-), Jk(a-b+), M+N-S-s

i) If the phenotypically matched cell does not react with the patient's plasma, select a panel of red cells based on one example of each antigen to be excluded per cell.

EXAMPLE: FOR THE PATIENT LISTED ABOVE THE SELECTION CRITERIA WOULD BE:

CELL 1 E+, K-, Fy(b-), Jk(a-), S-.

CELL 2 E-, K+, Fy(b-), Jk(a-), S-.

CELL 3 E-, K-, Fy(b+), Jk(a-), S-.

CELL 4 E-, K-, Fy(b-), Jk(a+), S-.

CELL 5 E-, K-, Fy(b-), Jk(a-), S+.

This will confirm or exclude which antibody(ies) to the common antigens the patient has formed and what is left to form in the future.

ii) If the phenotypically matched cell(s) is reactive with the patient's plasma and the autocontrol is negative, the most probable cause is an antibody to a high frequency antigen. Use Antigen Plus to select any examples of high frequency antigen-negative red cells in your cell library. I.e.. At(a-), k-, Kp(b-), Js(b-) etc.

iii) If you have a limited rare cell library or failed to obtain a negative reaction with the high frequency antigen-negative red cells available, consider that various red cell treatments which modify or destroy certain antigens on red cells can also be useful. DTT/AET treatment will destroy: Kell (not K_x), Lutheran, Knopps/McCoy, Cartwright, Cromer, Dombrock, Auberger, JMH and Lw_a. Gerbich is destroyed by DTT but not AET. ENZYMES (papain, ficin, trypsin, bromelain) will remove: Duffy, MNS, Chido, Rogers, JMH, Gerbich, Gilfeather, Xg_a, Pr, V_w, Cartwright, Mia, Cl_a, Je_a, Ny_a and most En_a. Chloroquine diphosphate (CDP) will destroy Bg and class I HLA antigens.

3. If all cells in the first panel tested are reactive and the auto control is positive, do a direct antiglobulin test (DAT) on the patient's cells before doing further serum testing.

i) If the DAT is positive, a warm autoantibody should be suspected and may hide underlying alloantibodies in the patient's plasma. The autoantibody should be removed by autoabsorption before further antibody identification can be achieved. Autoabsorption can only be performed using pre-transfusion patient red cells. The patient must not have been pregnant or transfused in the preceding 90 days. For further information and testing methods, refer to the *AABB Technical Manual, Current Edition*, or the *American Red Cross Immunohematology Methods And Procedures*, D. Mallory, ed.

ii) If the DAT is negative, a cold autoantibody should be considered. A cold screen tested from room temperature down to 4°C will indicate if an autologous absorption done at 4°C will be useful to remove the autoantibody. Again, the patient must be untransfused in the preceding 90 days.

iii) If autoabsorption, warm or cold, is not possible, there are alternatives. Allogeneic warm absorption is possible using R1R1, R2R2, and rr cells. A prewarm method may be useful to remove any cold reactivity. Prewarm methods must be used with caution preferably after the clinically significant antibodies have been tentatively identified. Prewarm methods have been documented to remove anti-H activity in a Bombay phenotype and an example of anti-Vel. References on request.

4. If all the cells tested are negative, several things must be considered:

i) Repeat the cell that gave the original positive reaction that initiated the panel, i.e. the antibody screen test or one of the units being crossmatched. Note where the antibody reacts - immediate spin or IAT? Was the panel tested at the same phase the reaction occurred in?

ii) How soon after the original testing, was the panel performed? Was the sample stored properly?

iii) Is the reactive cell homozygous for any common antigen and is there another cell homozygous for the same antigen that can be used to repeat the result?

iv) Will enhancement media help reveal a weak reacting alloantibody pattern, i.e. Enz, PEG, LISS with a longer incubation time, or polybrene?

v) If none of this adds any information about antibody specificity, you may have an antibody directed against a low frequency antigen. While the identity of the antibody is a puzzle, it is rarely a significant problem when looking for compatible units of red cells for transfusion. If you have time to play with it, use Antigen Plus to locate as many low incidence antigen positive cells as you have listed under special antigens. If none of them react, and you still wish to resolve the specificity, send the sample to a reference lab for crosstesting. Most reference labs keep their unidentified lows in hopes of finding another example.

5. If your routine test method can detect weak reacting autoantibodies at any phase of testing, positive antibody screen results can lead to a common panel result of several weak reactions with no specificity determined. Antigen Plus will perform exclusions based on its policy and may well exclude all common specificities depending on the number of reactions and phenotype of the cells which do not react. The technologist should follow his or her Blood Bank SOP for antibody identification which should address this type of panel testing outcome. Depending on method used, patient population and number of occurrences, the most common choices are likely to include:

i) Try more sensitive method if an alloantibody may be just forming or was not stimulated in the recent past.

ii) Repeat the original test by a less sensitive method, e.g. from solid phase testing back to tube LISS-IAT (a common approach to dealing with the very sensitive capabilities of solid phase testing.)

iii) Seen only at immediate spin – assess possible clinical significance and drop the IS test if appropriate.

Use the prewarm method only after significant antibodies (anti-Vel, anti-PP₁P_k, anti-H in a Bombay) have been excluded.

Backing Up

If you are using a local database (only one computer is running Antigen Plus) you should frequently backup your data onto a backup drive, external hard drive or tape backup system. The Backup Data option on the main File menu will prompt you for the location of a directory: select a directory and then click Backup to copy the file [your database name].bak to it.

Please note: The backup utility will overwrite an existing backup unless you have marked the existing file as Read-only. In that case, you must back up to a different directory.

If you are using a shared SQL Server database anywhere on your system, the backup must be done through SQL Server. This will likely be covered in your institutional backup systems, but can be done manually using a tool such as SQL Server Management Studio (downloadable from Microsoft).

Additional Information

About Antigen Plus

Antigen Plus is written using Microsoft Visual Studio and SQL Server. It was designed for the reference laboratory by Michael W. Lankiewicz, M.D., a hematologist with an overworked staff, in order to save untold hours of searching and drudgery; and programmed by Peter Rowny, a blood donor, with additional improvements for the hospital transfusion service designed by Dawn M. Rumsey, ART(CSMLS) BB(ASCP)^{CM}.

COPYING TEXT FROM THE SCREEN

The text in the Full description box on the Save and Load panel screens and the text in the Help screens can be copied into another application by highlighting the text by placing the mouse cursor at the beginning of the text to be copied, holding down the right mouse button and dragging the cursor across the text to be copied. The text will be highlighted. Release the mouse button and press the "Ctrl" and "C" keys on your keyboard simultaneously. The text will then be copied to the Windows Clipboard and can be copied into any Windows application that has a Paste function.

COPYING TEXT TO THE FULL DESCRIPTION BOX

Text from the Windows clipboard may be copied into the Full description box on the Save screen. When the cursor is flashing in that box press the "Ctrl" and "V" keys on your keyboard simultaneously. The text you have copied from another application will be pasted into the description of the panel and may be saved with the Panel Key name by clicking the Save button on the screen.

Programming Notes

Antigen Plus is written in Visual Basic Studio and uses a SQL Server database. Users familiar with SQL Server may open the databases and produce reports, run queries, and generally explore record layouts and file structure for purposes of importing data held in other databases. Be sure to back up the original database before attempting any of these procedures.

Appendix

Guide to ISBT numbers used in Antigen Plus

(taken from ISBT web site)

[http://www.isbtweb.org/fileadmin/user_upload/WP_on_Red_Cell_Immunogenetics_and/Updates/
Table_of_blood_group_antigens_within_systems_v3.3_131028.pdf](http://www.isbtweb.org/fileadmin/user_upload/WP_on_Red_Cell_Immunogenetics_and/Updates/Table_of_blood_group_antigens_within_systems_v3.3_131028.pdf)