

# REDCap API

## What is an API?

The acronym "API" stands for "Application Programming Interface". An API is just a defined way for external applications to connect to REDCap remotely, and is used for programmatically retrieving or modifying data or settings within REDCap, such as performing automated data imports/exports to/from a specified REDCap project. REDCap API is used to make applications, websites, widgets, and other projects that interact with REDCap. Programs talk to the REDCap API over HTTP, the same protocol that your browser uses to visit and interact with web pages.

## API security: Best Practices

Although API requests to REDCap are done using SSL (HTTPS), which means that the traffic to and from the REDCap server is encrypted, there is still more that can be done to ensure the highest level of security when using the API. This is especially important if you are moving sensitive data into or out of REDCap. One thing that is *highly* recommended is for your API script/program (i.e. the thing making the request to the REDCap API) to validate the SSL certificate of the REDCap web server when it makes the API request.

## How to prevent Man in the Middle attacks?

Preventing MiM attacks is pretty simple. Essentially all you need to do is to force your API script to validate the SSL certificate of the REDCap server. REDCap's SSL certificate will always be valid, but the hacker's fake certificate can never be determined to be valid if you attempt to validate it. In many programs or programming languages that can make API requests, validating an SSL certificate is often as easy as setting a flag. For example, [cURL](#) is popularly used by many API scripts in programming languages such as PHP, R, SAS, and many more in order to make the web request to REDCap. **So if your API script is utilizing cURL, all you need to do is modify your script so that it sets the cURL option named CURLOPT\_SSL\_VERIFYPEER to have a value of TRUE.** Once done, your API script will attempt to make the API request to REDCap *only* if it can validate REDCap's SSL certificate. **Thus by adding the SSL certificate check, you have completely prevented the possibility of MiM attacks and are using the most secure form of communication with the REDCap API.** If you are not using cURL, there are plenty of other examples on the web for how to validate an SSL certificate in different programming languages. Such examples can be found simply by Googling the name of your programming language + "verify ssl certificate" (e.g., "[Java verify ssl certificate](#)"), which should provide you with many helpful results.

**REMINDER:** Please remember that while REDCap itself has many security layers to help protect you and to ensure the highest level of security and data integrity, **it is *your* responsibility to ensure that you are using the most secure methods and best practices when using the REDCap API.**

## Supported Actions currently in BCCHR REDCap API (LTS version 9.0\*)

Supported Methods
<b>Arms</b>
Export Arms
Import Arms
Delete Arms
<b>Events</b>
Export Events
Import Events
Delete Events
<b>Field Names</b>
Export List of Export Field Names
<b>Files</b>
Export a File
Import a File
Delete a File
<b>Instruments</b>
Export Instruments (Data Entry Forms)
Export PDF file of Instruments
Export Instrument-Event Mappings
Import Instrument-Event Mappings
<b>Metadata</b>
Export Metadata (Data Dictionary)
Import Metadata (Data Dictionary)
<b>Projects</b>
Create Project
Import Project Info
Export Project Info
Export Project XML
<b>Records</b>
Export Records
Import Records
Delete Records
Generate Next Record Name
<b>Repeating Instruments and Events</b>
Export Repeating Instruments and Events
Import Repeating Instruments and Events
<b>Reports</b>
Export Reports
<b>REDCap</b>
Export REDCap Version

<b>Surveys</b>
Export a Survey Link
Export Survey Participants
Export a Survey Queue Link
Export a Survey Return Code
<b>Users &amp; User Privileges</b>
Export Users
Import Users

## Demo

I'm going to demonstrate a simple API by using PHP programming code -

### Exporting records for a project

Connecting to Redcap - You'll need to know your API token (issued by REDCap administrator) and URL of REDCap. If you use PHP program language, there is inbuilt REDCap API class file called 'RestCall Request.php' (You can find this file in API examples folder (under API page).

```

Export
<?php
$data = array(
    'token' => 'XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX',
    'content' => 'record',
    'format' => 'json',
    'type' => 'flat',
    'rawOrLabel' => 'raw',
    'rawOrLabelHeaders' => 'raw',
    'exportCheckboxLabel' => 'false',
    'exportSurveyFields' => 'false',
    'exportDataAccessGroups' => 'false',
    'returnFormat' => 'json'
);
$ch = curl_init();
curl_setopt($ch, CURLOPT_URL, 'https://rc-demo.bcchr.ca/redcap_demo/api/');
curl_setopt($ch, CURLOPT_RETURNTRANSFER, true);
curl_setopt($ch, CURLOPT_SSL_VERIFYPEER, true);
curl_setopt($ch, CURLOPT_VERBOSE, 0);
curl_setopt($ch, CURLOPT_FOLLOWLOCATION, true);
curl_setopt($ch, CURLOPT_AUTOREFERER, true);
curl_setopt($ch, CURLOPT_MAXREDIRS, 10);
curl_setopt($ch, CURLOPT_CUSTOMREQUEST, 'POST');
curl_setopt($ch, CURLOPT_FRESH_CONNECT, 1);
curl_setopt($ch, CURLOPT_POSTFIELDS, http_build_query($data, '', '&'));
$output = curl_exec($ch);
print $output;
curl_close($ch);

```

### Result: when there is no API token or invalid token

ERROR: You do not have permissions to use the API

```

RestCallRequest Object
(
    [url:protected] => https://rc.cfri.ca/redcap/api/
    [verb:protected] => POST
    [requestBody:protected] => content=record&type=flat&format=csv&token=INSERT+YOUR+API+token+here
    [requestLength:protected] => 0
    [username:protected] =>
    [password:protected] =>
    [acceptType:protected] => text/xml
    [responseBody:protected] => ERROR: You do not have permissions to use the API
    [responseInfo:protected] => Array
        (
            [url] => https://rc.cfri.ca/redcap/api/
            [content_type] => text/html; charset=utf-8
            [http_code] => 403
            [header_size] => 351
            [request_size] => 198
            [filetime] => -1
            [ssl_verify_result] => 0
            [redirect_count] => 0
            [total_time] => 0.125461
            [nameLookup_time] => 0.004569
            [connect_time] => 0.007045
            [pretransfer_time] => 0.035511
            [size_upload] => 68
            [size_download] => 49
            [speed_download] => 390
            [speed_upload] => 542
            [download_content_length] => -1
            [upload_content_length] => 0
            [starttransfer_time] => 0.125357
            [redirect_time] => 0
            [certinfo] => Array
                (
                )
            )
        )
    [usingFiles:protected] =>
)

```



## HTTP Status Codes

The REDCap API attempts to return appropriate [HTTP status codes](#) for every request.

- **200 OK:** Success!
- **400 Bad Request:** The request was invalid. An accompanying message will explain why.
- **401 Unauthorized:** API token was missing or incorrect.
- **403 Forbidden:** You do not have permissions to use the API.
- **404 Not Found:** The URI you requested is invalid or the resource does not exist.
- **406 Not Acceptable:** The data being imported was formatted incorrectly.
- **500 Internal Server Error:** The server encountered an error processing your request.
- **501 Not Implemented:** The requested method is not implemented.

## API examples

The REDCap API can be called from a variety of clients using any popular client-side or web development language that you are able to implement (e.g .NET, Python, PHP, Java). Below you may download a ZIP file containing several examples of how to call the API using various software languages. The files contained therein may be modified however you wish.

**NOTE: The files included in the ZIP file below are *\*not\** officially sanctioned REDCap files** but are merely examples of how one might make API requests using specific software languages. Please be aware that the files in the ZIP could potentially change from one REDCap version to the next.

[redcap-api-examples.zip](#)

If you need any assistance on how to use REDCap API to connect external application, please contact us at [redcap@healthresearchbc.ca](mailto:redcap@healthresearchbc.ca).