

Cardio API Specification Doc

Version	Date	Author	Description
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Introduction

Description

The Cardio API is a risk calculator API intended to help users find an estimate for their cardiovascular risk.

When considering drug therapy for primary prevention of ASCVD, clinicians and patients should begin by calculating the 10-year and lifetime ASCVD risk estimates to identify patients in higher-risk groups who are likely to have greater net benefit and lower number needed to treat for both statins and antihypertensive therapy.

This API was developed according to the 2013 ACC/AHA Guideline on the Assessment of Cardiovascular Risk and the Treatment¹ of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults².

The 10-year calculated ASCVD risk (`compute_ten_year_score`) is a quantitative estimation of absolute risk based upon data from representative population samples.

The 10-year risk estimate for "optimal risk factors" is represented by the following specific risk factor numbers for an individual of the same age, sex and race: Total cholesterol of ≤ 170 mg/dL, HDL-cholesterol of ≥ 50 mg/dL, untreated systolic blood pressure of ≤ 110 mm Hg, no diabetes history, and not a current smoker.

While the risk estimate is applied to individuals, it is based on group averages.

Just because two individuals have the same estimated risk does not mean that they will or will not have the same event of interest.

Example: If the 10-year ASCVD risk estimate is 10%, this indicates that among 100 patients with the entered risk factor profile, 10 would be expected to have a heart attack or stroke in the next 10 years.

The 10-year risk for ASCVD is categorized as:

Low-risk (<5%)

Borderline risk (5% to 7.4%)

Intermediate risk (7.5% to 19.9%)

High risk ($\geq 20\%$)

The lifetime calculated ASCVD risk (`compute_lifetime_risk`) represents a quantitative estimation

¹ https://professional.heart.org/professional/GuidelinesStatements/ASCVDRiskCalculator/UCM_457698_

² <https://www.ahajournals.org/doi/10.1161/01.cir.0000437741.48606.98>

of absolute risk for a 50 year old man or woman with the same risk profile.
This estimation of risk is based on the grouping of risk factor levels into 5 strata.

All risk factors are optimal
≥1 risk factors are not optimal
≥1 risk factors are elevated
1 major risk factor
≥2 major risk factors

The division of lifetime risk by these 5 strata leads to thresholds in the data with large apparent changes in lifetime risk estimates.

Example: An individual that has all optimal risk factors except for a systolic blood pressure of 119 mm Hg has a lifetime ASCVD risk of 5%. In contrast, a similar individual that has all optimal risk factors except for a systolic blood pressure of 120 mm Hg has a lifetime ASCVD risk of 36%. This substantial difference in lifetime risk is due to the fact that they are in different stratum.

- Optimal risk levels for lifetime risk are represented by the simultaneous presence of all of the following: Untreated total cholesterol <180 mg/dL, untreated blood pressure <120/<80 mm Hg, no diabetes history, and not a current smoker
- Nonoptimal risk levels for lifetime risk are represented by 1 or more of the following: Untreated total cholesterol of 180 to 199 mg/dL, untreated systolic blood pressure of 120 to 139 mm Hg or diastolic blood pressure of 80 to 89 mm Hg, and no diabetes history and not a current smoker
- Elevated risk levels for lifetime risk are represented by 1 or more of the following: Untreated total cholesterol of 200 to 239 mg/dL, untreated systolic blood pressure of 140 to 159 mm Hg or diastolic blood pressure of 90 to 99 mm Hg, and no diabetes history and not a current smoker
- Major risk levels for lifetime risk are represented by any of the following: Total cholesterol ≥240 mg/dL or treated, systolic blood pressure ≥160 mm Hg or diastolic blood pressure ≥100 mm Hg or treated, or diabetes, or current smoker

Optimal ASCVD Risk (`compute_optimal_lifetime`): Predicted 10-year ASCVD risk for someone with the same age and race/ethnicity category who has an optimal risk factor profile (total cholesterol, 170 mg/dL; HDL-cholesterol, 60 mg/d; SBP, 110 mm Hg; nonsmoker; non-diabetic; and no blood pressure-lowering drugs).

The 10-year risk reduction (`compute_ten_year_risk_reduction`) for ASCVD

Roadmap

1.0.0 (Jun/2020) : First version of the api implemented the algorithm defined by 2013 ACC/AHA.

2.0.0 (Jul/2002) : Implement QRisk3-2018 Risk calculator algorithm.

Methods

1. login

Request

Method	URL
POST	token

Type	Params	Values
HEAD POST	Authorization grant_type	string string

Authorization

`Authorization` header must be sent with the user and credentials encoded in Base64.

Grant_type

`Grant_type` query param must be "client_credentials"

Response

Status	Response
200	<pre>{ "access_token": "01234567-8abc-def0-1234-5678abcdef012345", "scope": "am_application_scope default", "token_type": "Bearer", "expires_in": 3894 }</pre>

	<p>access_token (string) - all further API calls must have this key in Header</p> <p>scope (string) - scope associated to the access_key.</p> <p>token_type (string) - type of the access_token.</p> <p>expire (number) - the amount of second before to expire the access_token.</p>
403	{"error": "API key is missing."}
400	{"error": "Please provide username."}
400	{"error": "Please provide password."}
401	{"error": "Invalid API key."}
401	{"error": "Incorrect username or password."}
500	{"error": "Something went wrong. Please try again later."}

4. get ascvd

Calculate the 10-years risk and some other related values.

Request

Method	URL
GET	ascvd

Type	Params	Values
HEAD	access_token	string
QUERY_PARAM	<age>	number
QUERY_PARAM	<gender>	male female
QUERY_PARAM	<systolic>	number
QUERY_PARAM	<total_cholesterol>	number

QUERY_PARAM	<hdl>	number
QUERY_PARAM	<diabetic>	true false
QUERY_PARAM	<smoker>	current former never
QUERY_PARAM	<hypertensive>	true false
QUERY_PARAM	<race>	white aa

age

Current Age, enter a value between 20-79 years.

gender

Gender in string format , only available values are : male | female.

systolic

Systolic Blood Pressure (mm Hg) : Value must be between 90-200

total_cholesterol

Total Cholesterol (mmol/L) : Value must be between 130 - 320

hdl

HDL Cholesterol (mmol/L) : Value must be between 20 - 100

diabetic

History of Diabetes? : True | False

smoker

Smoker in some of this grades:

- Current : Smokes every day or on some days.
- Former: Does not currently smoke and has been abstinent for at least 7 days in a row.
- Never: Has not smoked regularly and doesn't currently smoke.

hypertensive

On Hypertension Treatment?

race

Race/Ethnic groups, there are only two available values , white (white) and african-american (aa).

Response

Status	Response
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200	<p>A json with the calculated results.</p> <p>Example response:-</p> <pre>{ "compute_lifetime_risk": 27, "compute_optimal_lifetime": 8, "compute_ten_year_risk_reduction": 0.9, "compute_ten_year_score": 1.7 }</pre>
400	<pre>{"error": "Validation exception."}</pre>
404	<pre>{"error": "No results for the given source."}</pre>
500	<pre>{"error": "Something went wrong. Please try again later."}</pre>

compute_lifetime_risk

The lifetime calculated ASCVD risk (`compute_lifetime_risk`) represents a quantitative estimation of absolute risk for a 50 year old man or woman with the same risk profile. It's represented in a % like :

Lifetime ASCVD Risk: 50%

compute_ten_year_score

The 10-year calculated ASCVD risk (`compute_ten_year_score`) is a quantitative estimation of absolute risk based upon data from representative population samples. It's represented in a % like :

9.4% (Intermediate) Current 10-Year ASCVD Risk.

compute_optimal_lifetime

Predicted 10-year ASCVD risk for someone with the same age and race/ethnicity category who has an optimal risk factor profile (total cholesterol, 170 mg/dL; HDL-cholesterol, 60 mg/d; SBP, 110 mm Hg; nonsmoker; non-diabetic; and no blood pressure–lowering drugs). It's represented in a % like :

Optimal ASCVD Risk: 1.9%

compute_ten_year_risk_reduction

The 10-year calculated ASCVD risk calculated for someone with the same age and race/ethnicity category who has an optimal risk factor profile that uses statin and/or aspirin . It's represented in a % .

Glossary

Conventions

- **Client** - Client application.
- **Status** - HTTP status code of response.
- All the possible responses are listed under 'Responses' for each method. Only one of them is issued per request server.
- All response are in JSON format.
- All request parameters are mandatory unless explicitly marked as `[optional]`
- The type of values accepted for a *request* parameter are shown the the values column like this `[10|<any number>]`. The `|` symbol means *OR*. If the parameter is `[optional]`, the default value is shown in blue bold text, as **10** is written in `[10|<any number>]`.

Status Codes

All status codes are standard HTTP status codes. The below ones are used in this API.

2XX - Success of some kind

4XX - Error occurred in client's part

5XX - Error occurred in server's part

Status Code	Description
200	OK
201	Created
202	Accepted (Request accepted, and queued for execution)
400	Bad request
401	Authentication failure
403	Forbidden
404	Resource not found
405	Method Not Allowed
409	Conflict

412	Precondition Failed
413	Request Entity Too Large
500	Internal Server Error
501	Not Implemented
503	Service Unavailable