Automatic stress-test protocol

For bike ergometer tests

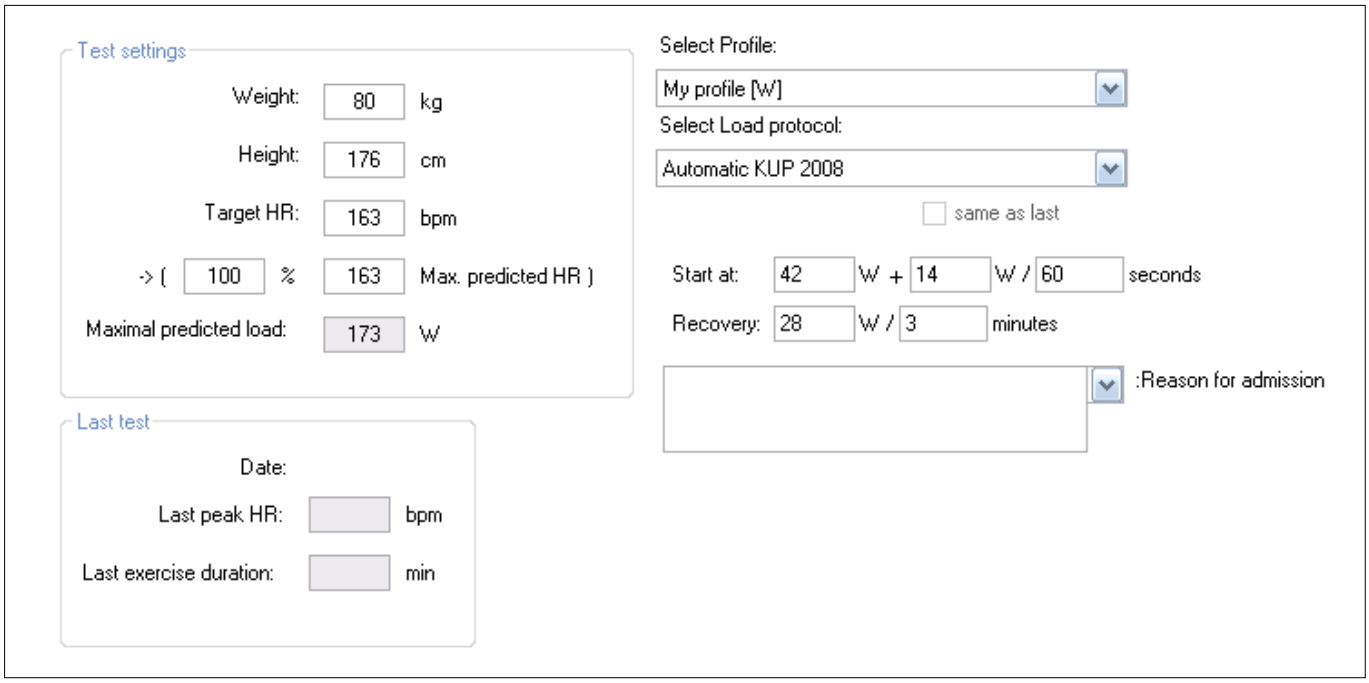
BTL CardioPoint

Introduction

Most of the cardiology guidelines for stress-testing recommend that the physician creates a unique load protocol for each tested patient. The reason for that is obvious, each patient exhibits a different physical performance and the load protocol should respect that. However, at the same time, it is clear that the creation of a unique and personalized stress-test protocol is a time-consuming activity that results in a significant increase of examination duration (and thus a decrease in laboratory efficiency). Therefore, BTL has come up with its Automatic stress-test protocol feature added to the BTL CardioPoint-Ergo software. This software calculates the stress-test protocol completely and automatically based on the predicted load and the recommended test duration of 10 minutes.

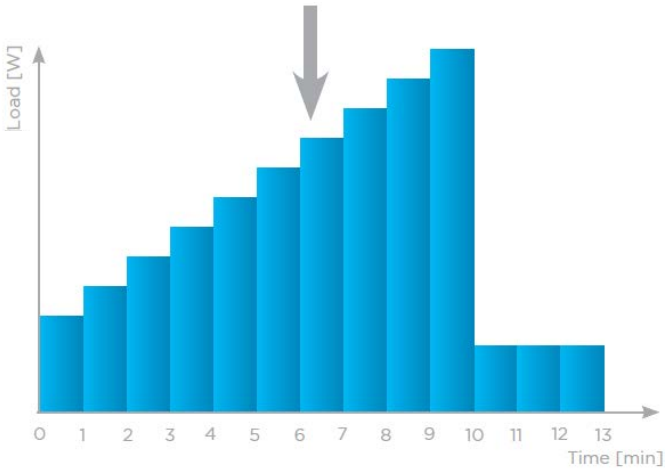
How does it work?

First, the software calculates the maximum load prediction for a particular patient. Depending on the selected formula, each prediction takes into account the patient's age, sex, weight and height. Next, the protocol steps are automatically calculated so that the test will take 10 minutes, within which the patient will reach the predicted load.



When starting the test, the physician needs to enter the current patient's weight and height to receive a maximal predicted load. In this example, the maximum predicted load for a 56-year old man with a weight of 80 kg and height of 176 cm is 173 W .

The stress-test protocol is automatically calculated based on patient's data. In this example, the test starts at 42 W and every 60 seconds the load is increased by 14 W. Once the test is finished, the recovery phase holds the load at 28 W for 3 minutes.



How is the load prediction calculated?

The BTL CardioPoint-Ergo software allows the physician to select from 8 available formulas. The physician can choose the most suitable one for the patient's maximal load prediction calculation.

Calculation from METs to Watts:

BTL CardioPoint software calculates the prediction in METs. For bike load prediction, the METs are later converted into Watts using following formula:

Bike:
Watts = patientWeightKg * (METs * 3.5 - 2 * 3.5) / (1.8 * 6.12)

Predictions:

Cooper:
This formula is applicable for children between 6 – 17 years old only:
- For boys: METs = ((43.6 * patientHeightCm – 4547) / patientWeightKg) / 3.5
- For girls: METs = ((22.5 * patientHeightCm – 1837) / patientWeightKg) / 3.5

Jones:
- For men: METs = (60 - 0.55 * age_in_years) / 3.5
- For women: METs = (48 - 0.37 * age_in_years) / 3.5

Jones 2:
- This formula is applicable for healthy adults and bike tests only:
- For men: METs = ((0.046 * patientHeightCm - 0.021 * age_in_years - 4.31) * 1000 /patientWeightKg) / 3.5

- For women: METs = ((0.046 * patientHeightCm - 0.021 * age_in_years - 0.62 - 4.31) * 1000 / patient WeightKg) / 3.5

Morris:
This formula is applicable for eldery men only:
- METs = 18.0 - 0.15 * patientAge

Morris 2:
This formula is applicable for healthy active or healthy sedentary men only:
- METs = 14.7 - 0.11 * patientAge

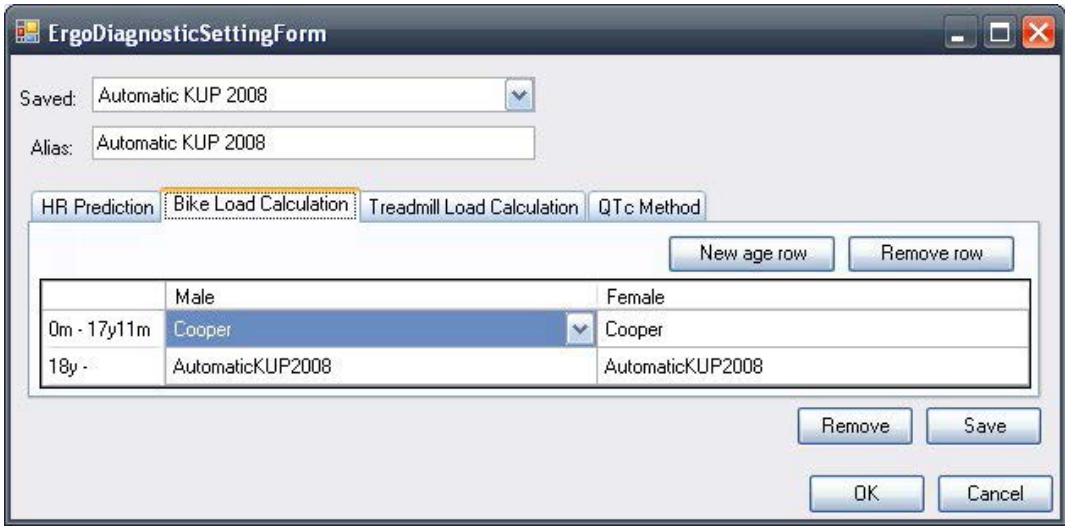
StJames:
This formula is applicable for women only:
- METs = 14.7 - 0.13 * age_in_years

Washington:
This formula is applicable for men only:
- METs = 18 - 0.15 * age_in_years

Automatic KUP 2008:
These formulas are applicable for the bike test only:
- For men: bodySurface_m2 = 0.007148 * patient-Weight_kg ^ 0.425 * patientHeight_cm ^ 0.725; watts = 6.773 + 136.141 * bodySurface m^2 - 0.916 * bodySurface_m2 *patientAge_years
- For women: bodySurface_m2 = 0.007148 * patientWeight_kg ^ 0.425 * patientHeight_cm^ 0.725;
- watts = 3.933 + 86.641 * bodySurface_m2 - 0.346 * bodySurface_m2 * patientAge_years 5

It is possible to predefine which prediction will be applied for the different age and gender groups. By default, the Automatic KUP 2008 prediction is applied for all patients older than 18 years. For younger patients, the Cooper prediction is selected.

Examples



The physician may decide to use any prediction formula for a particular age and gender group.

Summary

The availability of automatic stress-test protocol in the BTL CardioPoint-Ergo significantly improves the stress-test information value. It allows the physician to optimize the burden on the patient during the test. Furthermore, the physician may select from among 8 available load predictions to increase the precision of the calculated maximal load. Since the software calculates the protocol completely and automatically, it will be a very time–saving feature for the physician and/or the staff.

LITERATURE:

1 Austrian Journal for Cardiology, 2008, 15 (www.kup.at/kardiologie): Wonisch M, Berent R, Klicpera M, Laimer H, Marko C, Pokan R, Schmid P, Schwann H: Praxisleitlinien Ergometrie

2 ACSM's guidelines for exercise testing and prescription, Franklin Barry A. et al, Lippincott Williams & Wilkins, 2000, ISBN 0683303554

BTL CardioPoint

ECG STRESS HOLTER ABPM SPIRO

About BTL CardioPoint

The BTL CardioPoint is a versatile software solution integrating ECG, Stress test, Holter, ABPM and Spirometry into one unified platform with one patient database and the same logic of controls for each module. The software has a fully customizable interface, and its layout and work steps can be easily adapted. The operator is allowed to arbitrarily add or move tables, ECG strips and other windows. Fast and intuitive work is ensured by an ergonomically optimized user interface with shortened mouse tracks and hotkeys. Colour schemes are designed for both dark and light ambience. The BTL CardioPoint can be used as a stand-alone cardiology system, or it can be seamlessly integrated into an existing ambulatory or hospital system. The BTL CardioPoint is software that adapts to the user, instead of the user having to adapt to the software.