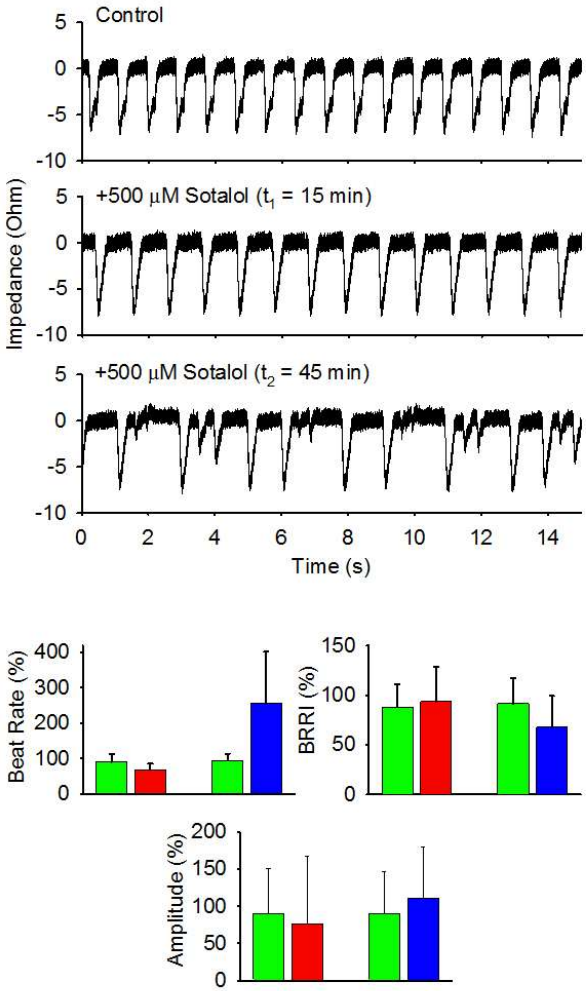
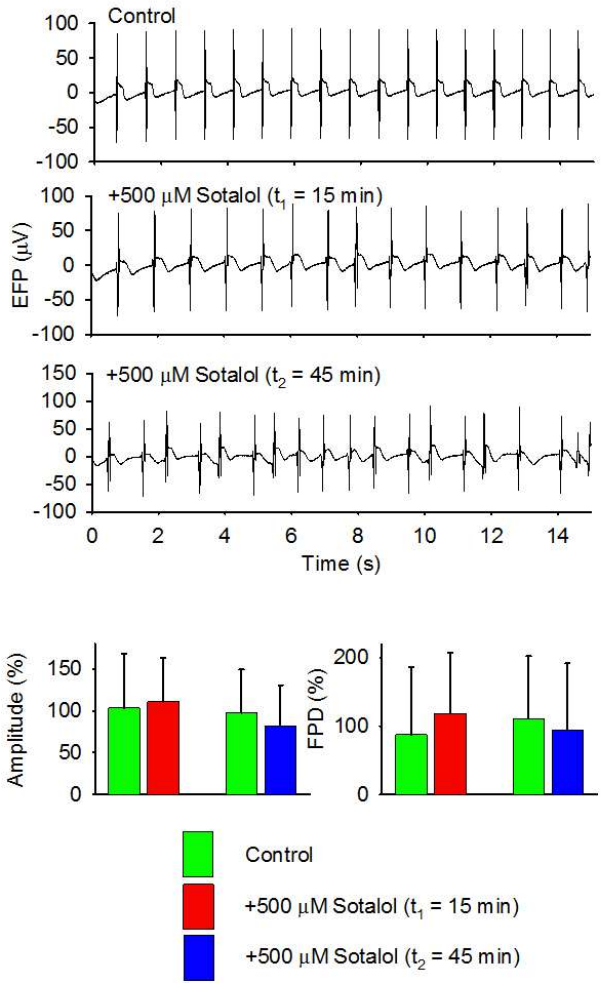
Detection of Cardioactive Drugs using the CardioExcyte96™

Cardiovascular toxicity represents one of the main causes for drug withdrawal and contribute to high attrition rates during the drug discovery process. Early testing using *in vitro* systems that reflect the physiological complexity of human cardiomyocytes are an urgent need. Stem cell derived human cardiomyocytes (SC-hCMs) represent a relevant preclinical test system and are able to assist in the assessment of the cardiac risk associated with drugs, are affordable and reduce the use of animals in early drug testing.
While classical electrophysiogical studies offer insight onto a target ion channel, drug actions on the synchronized cardiac system can be explored by analyzing electrical field potentials and corresponding contractility (impedance) of beating SC-hCMs measured with the CardioExcyte96™.

Impedance



Electrical Field Potential



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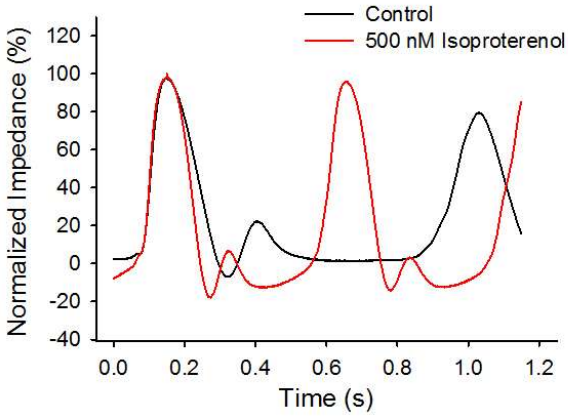
Detection of Cardioactive Drugs using the CardioExcyte96

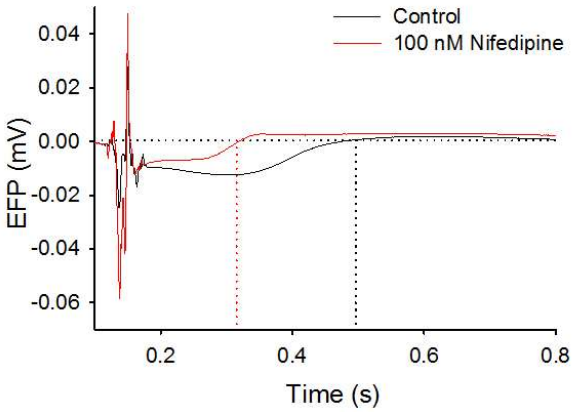
B'SYS GmbH offers plate based assays using the novel Nanion CardioExcyte96™, combining impedance (IMP, cell contractility) and electrical field potential (EFP) measurements to investigate short- and long-term pharmacological effects on cardiomyocytes. Analysis includes beat rate, beating accuracy, the determination of amplitude, rise/fall time and pulse width of the IMP signal as well as the amplitude and field potential duration of the EFP signal. The assay provides information on drug induced alteration or impairment of contractility and EFP of SC-hCMs.

Impedance



Isoproterenol (β-adrenergic agonist) increases the beat rate.

Electrical Field Potential



Nifedipine ($Ca_V1.2$ blocker) shortens the FPD.

Test Item	Beat Rate	Beat Rate Regularity Index (BRRI)	IMP Amplitude	EFP Amplitude	Field Potential Duration (FPD)
30 µM Quinidine	↓	↓	↓	↓	↑
100 nM Nifedipine	↑	≈	↓	≈	↓
50 nM Cisapride	≈	≈	↑	↑	↑
500 µM Sotalol	≈ (t_1) ↑ (t_2)	≈ (t_1) ↓ (t_2)	≈ (t_1) ≈ (t_2)	≈ (t_1) ↓ (t_2)	↑ (t_1) ↓ (t_2)
100 nM JNJ 303	≈	≈	≈	≈	↑
500 nM Isproterenol	↑	≈	↓	↓	≈

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