

# COMPARISON OF INTRAOCULAR PRESSURE MEASUREMENTS WITH THE REICHERT® PT100, THE KEELER® PULSAIR INTELLIPUFF PORTABLE NON CONTACT TONOMETERS AND GOLDMANN APPLANATION TONOMETRY

*Department of Ophthalmology, University Hospital of Grenoble, Joseph Fourier University, Grenoble, France*

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## ABSTRACT

**Purpose:** To compare the intraocular pressure (IOP) measurements by two portable tonometers, the Keeler Pulsair Intellipuff and the Reichert PT100, with Goldmann applanation tonometry (GAT). To evaluate the influence of central corneal thickness (CCT) on IOP measurements.

**Design:** Prospective cross-sectional study.

### Methods:

**Setting:** Department of Ophthalmology, University Hospital of Grenoble.

**Study population:** Normotensive and hypertensive patients recruited from the outpatient clinic. Inclusion criteria were men or women, aged over 18, able to understand the instructions and to give an informed consent. Exclusion criteria were corneal disease and corneal surgery in the past six months.

**Procedures:** IOP was measured by the Keeler Pulsair Intellipuff, the Reichert PT100 and GAT in one eye of each patient and in a random order. CCT was measured with the Accutome PachPen pachymeter.

**Statistics:** Linear regression and Pearson coefficient were used to evaluate the correlation among the methods, and Bland-Altman plots were used to evaluate the agreement.

**Main outcomes measures:** Average of three IOP measurements with each tonometers and CCT.

**Results:** 137 eyes of 137 patients were included. The mean  $\pm$  SD IOP measurements were 17.91  $\pm$  8.90 mmHg, 19.60  $\pm$  9.62 and 20.81  $\pm$  11.91 mmHg with the GAT, the Intellipuff and the PT100 respectively. Measurements by the two non-contact tonometers were significantly correlated with GAT (Intellipuff  $r = 0.92$ ,  $p < 0.001$ ; PT100  $r = 0.92$ ,  $p < 0.001$ ). The agreement between the Intellipuff and GAT was better than between the PT100 and GAT (Intellipuff – GAT: median of the difference 1.67, tenth percentile - 1.33, ninetieth percentile 4.13; PT100 – GAT: median of the difference 1.67, tenth percentile - 0.67, ninetieth percentile 9.33). The PT100 significantly overestimated more the IOP in case of IOP  $> 20$  mmHg, whereas the Intellipuff did not (correlation between PT100 – GAT and the mean of PT100 and GAT,  $r = 0.57$ ,  $p < 0.0001$ ; correlation between Intellipuff – GAT and the mean of Intellipuff and GAT,  $r = 0.06$ ,  $p = 0.453$ ). The differences between the measurements of the two non-contact tonometers and the GAT were significantly correlated to the central CCT (correlation between PT100 – GAT and CCT,  $r = 0.21$ ,  $p = 0.013$ ; correlation between Intellipuff – GAT and CCT,  $r = 0.20$ ,  $p = 0.021$ ).

**Conclusions:** The Intellipuff non-contact tonometer agrees significantly better with GAT than the PT100 non-contact tonometer, particularly in hypertensive and glaucomatous patients. As non-contact tonometry is usually used for ocular hypertension and glaucoma screening, these findings should be considered.

## Keeler China

联系电话: 010-51261868 邮编: 100020

全国客户服务热线: 400 875 0008

联系地址: 北京市朝阳区朝外大街乙 12 号, 昆泰国际大厦 1601 室或 1012B 室

**Keeler**  
Ophthalmic Instruments

# REICHERT® PT100、KEELER® PULSAIR INTELLIPUFF 便携式非接触眼压计及 GOLDMANN 压平式眼压计眼内压测量值的比较

法国, 格勒诺布尔, 约瑟夫傅立叶大学, 格勒诺布尔大学医院, 眼科  
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## 摘要

**目的:** 比较 Keeler Pulsair Intellipuff 及 Reichert PT100 两种便携式眼压计, 与 Goldmann 压平式眼压计 (GAT) 测量所得的眼内压 (IOP)。评估中央角膜厚度 (CCT) 对眼内压测量的影响。

**设计:** 前瞻性、横断面研究

**方法:**

**地点:** 格勒诺布尔大学医院眼科

**研究人群:** 门诊招募的正常眼压和高眼压患者。入选标准为年龄在 18 岁以上的男性或女性, 能够理解说明并签署知情同意。排除标准为 6 个月内的角膜疾病和角膜手术。

**操作:** 利用 Keeler Pulsair Intellipuff、Reichert PT100 及 GAT 以随机顺序测量每位患者每只眼的眼内压。利用 Accutome PachPen 角膜厚度仪测量中央角膜厚度。

**统计:** 采用线性回归和 Pearson 系数评估各种方法之间的相关性, 及 Bland-Altman 图表评估一致性。

**主要测量结果:** 每种眼压计所得眼压及中央角膜厚度取三次测量平均值。

**结果:** 137 名患者的 137 只眼入组。GAT、Intellipuff 及 PT100 的平均  $\pm$  标准差 IOP 测量值分别为  $17.91 \pm 8.90$  毫米汞柱、 $19.60 \pm 9.62$  及  $20.81 \pm 11.91$  毫米汞柱。两种非接触式眼压计的测量值与 GAT 有显著相关性 (Intellipuff 组  $r = 0.92$ ,  $p < 0.001$ ; PT100 组  $r = 0.92$ ,  $p < 0.001$ )。Intellipuff 与 GAT 的一致性优于 PT100 与 GAT (Intellipuff-GAT: 中位数的差异为 1.67, 十分位为 -1.33, 九十分位为 4.13; PT100-GAT: 中位数的差异为 1.67, 十分位为 -0.67, 九十分位为 9.33)。在 IOP > 20 毫米汞柱时, PT100 显著高估了眼压值, 而 Intellipuff 没有 (PT100-GAT 的相关性及 PT100 与 GAT 的平均值,  $r = 0.57$ ,  $p < 0.0001$ ; Intellipuff-GAT 的相关性及 Intellipuff 与 GAT 的平均值,  $r = 0.06$ ,  $p = 0.453$ )。两种非接触式眼压计与 GAT 测量值间的差异与中央角膜厚度有显著相关性 (PT100-GAT 与 CCT 的相关性,  $r = 0.21$ ,  $p = 0.013$ ; Intellipuff-GAT 与 CCT 的相关性,  $r = 0.20$ ,  $p = 0.021$ )。

**结论:** Intellipuff 非接触式眼压计与 GAT 的一致性显著优于 PT100 非接触式眼压计, 尤其是在高眼压和青光眼患者中。由于非接触式眼压计常用于高眼压和青光眼的筛查, 对这些发现应当予考虑。

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