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Is it possible to find reliable biomarkers to diagnose suicide risk?

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Commentary

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Suicide remains a major public health problem around the world. For example, in the USA, there is about one suicide death every 11 min (CDC, 2020). In 2020, an estimated 12.2 million US adults really thought about suicide, 3.2 million planned a suicide attempt, and 1.2 million attempted suicide.

Probably, a hard and dedicated work of psychiatrists and other mental health professionals around the world reduces suicides. Absence of suicides produces no data. It is likely that many suicidal individuals are identified and effectively treated. However, suicide prevention remains an incredibly difficult task.

Multiple research observations have shown that the majority of individuals who die by suicide denied suicidal ideation the final time they were asked by a medical professional. Usually, their death by suicide took place within the month of their last visit (Harmer *et al.*, 2022). One study showed that most (66%) individuals at elevated suicide risk denied suicidal ideation despite being asked. Within 2 days, 50% of these persons who had denied suicidal ideation died by suicide. Studies indicate that suicidal ideation is a weak predictor of heightened lifetime suicide risk. Also, suicide ideation does not predict impending suicide death.

The best predictor of suicide death is a prior suicide attempt (Bostwick *et al.*, 2016). However, only less than 10% of suicide attempters will go on to die by suicide. More than 50% of suicide death occurred without a prior attempt.

Clearly, our ability to predict suicide is poor. There is a great need to identify reliable diagnostic biomarkers of suicide risk to stratify treatment according to the risk and develop therapeutics targeting the pathophysiology of suicide. Targeting individuals at high risk for suicide could help reduce the huge public health toll related to suicide.

Many studies over many years tried to find biological markers for suicidal behavior (Sudol & Mann, 2017). Different biological parameters that may be linked to suicidality including indices related to major neurotransmitters (serotonin, catecholamines, GABA, and glutamate), the hypothalamic pituitary adrenal axis, the inflammation, and lipids have been examined. A lot of interesting and probably important observations have been made. However, at the present time, we do not have a test to diagnose suicide risk. Nothing even close.

Is it possible to find reliable, practical, usable diagnostic biomarkers for suicide risk? Apparently, it's a very difficult task. There are multiple obstacles. One of the problems is the fact that suicidality is a heterogenous condition, i.e. there may be multiple different underlying psychobiological mechanisms. Various biological, psychological, and social factors may contribute to the psychobiology of suicidal behavior (Sher & Oquendo, 2023). It is possible that there are different biomarkers for different types of suicide such as impulsive and planned suicides. It is interesting to speculate that genetic studies may help to find diagnostic biomarkers for suicidality.

We need a strategic approach: it is necessary to create a framework by identifying the challenges to finding biomarkers for suicide as well as potential areas for biomarker identification. Obviously, such approach needs sufficient resources. Suicide research is costly and time intensive. Therefore, it is necessary to educate policymakers regarding the importance of research on the psychobiology of suicide.

Suicide risk evaluation presently depends on a patient's voluntary self-report and a clinician's judgment. Finding dependable diagnostic biomarkers for suicidality may facilitate the identification of high-risk patients and concentrate intense preventive interventions on high-risk individuals. We really need a reliable diagnostic test that may help to recognise suicide risk.

References

CDC (2020) *CDC WONDER: Underlying Cause of Death, 1999–2019*. Atlanta, GA: US Department of Health and Human Services, CDC. https://wonder.cdc.gov/Deaths-by-Underlying-Cause.html (accessed 23 December 2022).

Harmer B, Lee S, Duong TVH and Saadabadi A (2022) *Suicidal Ideation*. 2022 May 18. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing. URL: https://www.ncbi.nlm.nih.gov/books/NBK565877/ (accessed 21 December 2022).

Bostwick JM, Pabbati C, Geske JR and McKean AJ (2016) Suicide attempt as a risk factor for completed suicide: even more lethal than we knew. *American Journal of Psychiatry* **173**(11),1094–1100.

Sudol K and Mann JJ (2017) Biomarkers of suicide attempt behavior: towards a biological model of risk. *Current Psychiatry Reports* **19**(6), 31.

Sher L and Oquendo MA (2023) Suicide: an overview for clinicians. *Medical Clinics of North America* **107**(1), 119–130.

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