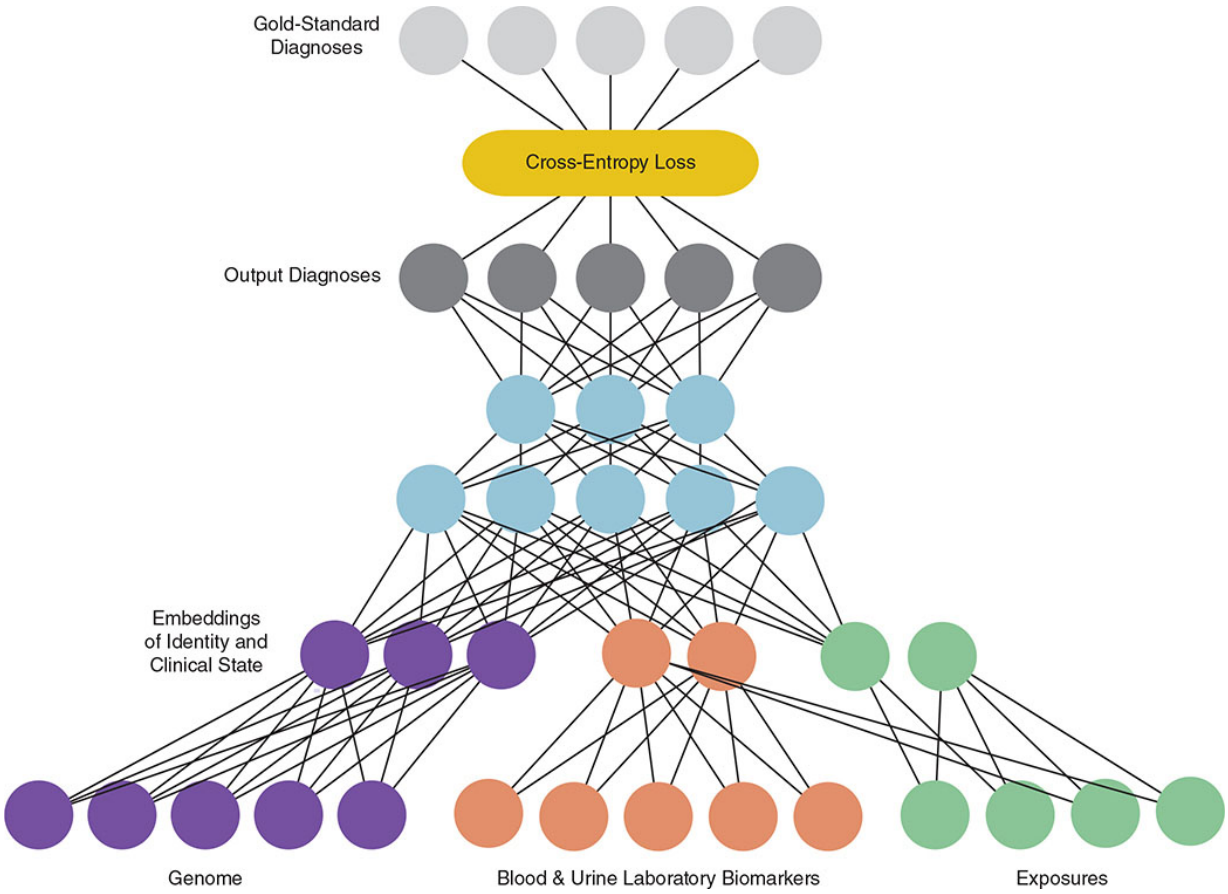

FIGURE 488-4 Machine learning and precision medicine: deeper representations of clinical state and identity. Diverse data streams (e.g., genome; blood and urine biomarkers, including triglycerides and LDL cholesterol; and exposures) are combined alongside labeled output diagnoses in a deep-learning model. In the process of training this model, a lower-dimensional representation of the high-dimensional input data ("embedding") is learned.

CONCLUSION

Modern machine learning offers a powerful set of techniques to learn feature representations directly from data, already performing on par with expert physicians on select tasks. If carefully trained and judiciously applied to key areas of clinician workflow, the representational power of new machine-learning methods makes them likely to touch every area of clinical practice.

■ FURTHER READING