

Financial Results

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QIAGEN N.V. and Subsidiaries Consolidated Balance Sheets

(in thousands)	Notes	As of December 31,	
		2021	2020
Assets			
Current assets:			
Cash and cash equivalents	(3)	\$880,516	\$597,984
Short-term investments	(7)	184,785	117,249
Accounts receivable, net of allowance for credit losses of \$23,124 and \$27,052 in 2021 and 2020, respectively	(3, 24)	362,131	380,519
Inventories, net	(3)	327,525	291,181
Prepaid expenses and other current assets (of which \$16,956 and \$25,429 in 2021 and 2020 due from related parties, respectively)	(8, 24)	354,645	237,472
Total current assets		2,109,602	1,624,405
Long-term assets:			
Property, plant and equipment, net of accumulated depreciation of \$632,416 and \$630,443 in 2021 and 2020, respectively	(9)	638,183	559,372
Goodwill	(11)	2,350,763	2,364,031
Intangible assets, net of accumulated amortization of \$806,787 and \$809,724 in 2021 and 2020, respectively	(11)	627,436	726,194
Fair value of derivative instruments - long-term	(14)	190,430	379,080
Other long-term assets (of which \$10,843 in 2020 due from related parties)	(10, 12, 24)	157,644	161,658
Deferred tax assets	(17)	72,896	54,879
Total long-term assets		4,037,352	4,245,214
Total assets		\$6,146,954	\$5,869,619

The accompanying notes are an integral part of these consolidated financial statements.

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QIAGEN N.V. and Subsidiaries Consolidated Balance Sheets

(in thousands, except par value)	Notes	As of December 31,	
		2021	2020
Liabilities and equity			
Current liabilities:			
Current portion of long-term debt	(16)	\$847,626	\$42,539
Accounts payable	(24)	101,224	118,153
Accrued and other current liabilities	(10,13,24)	568,620	411,483
Total current liabilities		1,517,470	572,175
Long-term liabilities:			
Long-term debt, net of current portion	(16)	1,094,144	1,880,210
Fair value of derivative instruments - long-term	(14)	191,879	393,455
Other long-term liabilities	(12, 15)	209,320	186,724
Deferred tax liabilities	(17)	37,591	39,216
Total long-term liabilities		1,532,934	2,499,605
Commitments and contingencies	(20)		
Equity:			
Preference shares, 0.01 EUR par value, authorized—450,000 shares, no shares issued and outstanding		—	—
Financing preference shares, 0.01 EUR par value, authorized—40,000 shares, no shares issued and outstanding		—	—
Common Shares, 0.01 EUR par value, authorized—410,000 shares, issued—230,829 shares in 2021 and 2020, respectively		2,702	2,702
Additional paid-in capital		1,818,508	1,834,169
Retained earnings		1,791,740	1,323,091
Accumulated other comprehensive loss	(18)	(326,670)	(243,822)
Less treasury shares, at cost—3,755 and 2,844 shares in 2021 and 2020, respectively	(18)	(189,730)	(118,301)
Total equity		3,096,550	2,797,839
Total liabilities and equity		\$6,146,954	\$5,869,619

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QIAGEN N.V. and Subsidiaries Consolidated Statements of Income (Loss)

(in thousands, except par value)	Notes	Years ended December 31,		
		2021	2020	2019
Net sales	(3, 4, 24)	\$2,251,657	\$1,870,346	\$1,526,424
Cost of sales:				
Cost of sales		733,719	574,467	449,651
Acquisition-related intangible amortization		67,118	63,164	71,511
Total cost of sales		800,837	637,631	521,162
Gross profit		1,450,820	1,232,715	1,005,262
Operating expenses:				
Research and development	(3)	189,964	149,072	157,448
Sales and marketing		456,392	413,684	391,906
General and administrative	(3)	128,076	111,678	112,262
Acquisition-related intangible amortization		18,542	20,811	29,973
Restructuring, acquisition, integration and other, net	(1, 6)	27,762	150,005	199,778
Long-lived asset impairments	(6)	—	1,034	140,031
Total operating expenses		820,736	846,284	1,031,398
Income (loss) from operations		630,084	386,431	(26,136)
Other income (expense):				
Interest income		9,555	10,032	22,113
Interest expense		(54,477)	(71,317)	(74,185)
Other income, net	(6)	40,671	114,326	432
Total other (expense) income, net		(4,251)	53,041	(51,640)
Income (loss) before income tax (benefit) expense		625,833	439,472	(77,776)
Income tax expense (benefit)	(3, 17)	113,234	80,284	(36,321)
Net income (loss)		\$512,599	\$359,188	(\$41,455)
Basic earnings (loss) per common share	(19)	\$2.25	\$1.57	(\$0.18)
Diluted earnings (loss) per common share	(19)	\$2.21	\$1.53	(\$0.18)
Weighted-average common shares outstanding:				
Basic	(19)	227,983	228,427	226,777
Diluted	(19)	232,034	234,214	226,777

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QIAGEN N.V. and Subsidiaries Consolidated Statements of Comprehensive Income (Loss)

(in thousands)	Notes	Years ended December 31,		
		2021	2020	2019
Net income (loss)		\$512,599	\$359,188	(\$41,455)
Other comprehensive income (loss) to be reclassified to profit or loss in subsequent periods:				
Gains (losses) on cash flow hedges (net of tax of \$0, \$2,845 and \$0)	(14)	16,780	(8,536)	11,547
Reclassification adjustments on cash flow hedges (net of tax of \$0, \$4,666 and \$0)	(14)	(17,010)	13,999	(3,888)
Cash flow hedges, net of tax		(230)	5,463	7,659
Net investment hedge	(14)	24,743	(26,442)	5,505
Gain (loss) on pension (net of tax of \$5, \$16 and \$359)		11	(38)	(437)
Foreign currency translation adjustments (net of tax of \$1,674, \$946 and \$454)		(107,372)	86,814	(11,702)
Total other comprehensive (loss) income		(82,848)	65,797	1,025
Comprehensive income (loss)		\$429,751	\$424,985	(\$40,430)

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QIAGEN N.V. and Subsidiaries Consolidated Statements of Changes in Equity

(in thousands)	Notes	Common Shares		Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Treasury Shares		Total Equity
		Shares	Amount				Shares	Amount	
Balance at December 31, 2018		230,829	\$2,702	\$1,742,191	\$1,379,624	(\$310,644)	(5,320)	(\$178,903)	\$2,634,970
ASC 842 impact of change in accounting policy		—	—	—	(316)	—	—	—	(316)
Net loss		—	—	—	(41,455)	—	—	—	(41,455)
Conversion of warrants	(18)	—	—	(31,067)	(37,698)	—	2,056	68,761	(4)
Total other comprehensive income		—	—	—	—	1,025	—	—	1,025
Purchase of treasury shares	(18)	—	—	—	—	—	(1,987)	(74,450)	(74,450)
Issuance of common shares in connection with stock plan	(22)	—	—	—	(121,698)	—	3,622	123,773	2,075
Tax withholding related to vesting of stock awards	(22)	—	—	—	—	—	(1,448)	(51,147)	(51,147)
Share-based compensation	(22)	—	—	65,893	—	—	—	—	65,893
Balance at December 31, 2019		230,829	\$2,702	\$1,777,017	\$1,178,457	(\$309,619)	(3,077)	(\$111,966)	\$2,536,591
ASC 326 impact of change in accounting policy		—	—	—	(15,074)	—	—	—	(15,074)
Net income		—	—	—	359,188	—	—	—	359,188
Conversion of warrants	(18)	—	—	(7,547)	(22,725)	—	807	30,272	—
Termination of warrants	(18)	—	—	(30,289)	(144,337)	—	—	—	(174,626)
Equity component of convertible debt, net	(16)	—	—	54,052	—	—	—	—	54,052
Total other comprehensive income		—	—	—	—	65,797	—	—	65,797
Purchase of treasury shares	(18)	—	—	—	—	—	(1,346)	(63,995)	(63,995)
Issuance of common shares in connection with stock plan	(22)	—	—	—	(32,418)	—	1,085	40,079	7,661
Tax withholding related to vesting of stock awards	(22)	—	—	—	—	—	(313)	(12,691)	(12,691)
Share-based compensation	(22)	—	—	40,936	—	—	—	—	40,936
Balance at December 31, 2020		230,829	\$2,702	\$1,834,169	\$1,323,091	(\$243,822)	(2,844)	(\$118,301)	\$2,797,839
ASU 2020-06 impact of change in accounting policy	(2)	—	—	(54,052)	263	—	—	—	(53,789)
Net income		—	—	—	512,599	—	—	—	512,599
Total other comprehensive loss		—	—	—	—	(82,848)	—	—	(82,848)
Purchase of treasury shares	(18)	—	—	—	—	—	(1,891)	(99,987)	(99,987)
Issuance of common shares in connection with stock plan	(22)	—	—	—	(44,213)	—	1,441	52,132	7,919
Tax withholding related to vesting of stock awards	(22)	—	—	—	—	—	(461)	(23,574)	(23,574)
Share-based compensation	(22)	—	—	38,391	—	—	—	—	38,391
Balance at December 31, 2021		230,829	\$2,702	\$1,818,508	\$1,791,740	(\$326,670)	(3,755)	(\$189,730)	\$3,096,550

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QIAGEN N.V. and Subsidiaries Consolidated Statements of Cash Flows

(in thousands)	Notes	Years ended December 31,		
		2021	2020	2019
Cash flows from operating activities:				
Net income (loss)		\$512,599	\$359,188	(\$41,455)
Adjustments to reconcile net income to net cash provided by operating activities, net of effects of businesses acquired:				
Depreciation and amortization		214,931	205,014	231,458
Non-cash impairments	(6)	–	1,432	144,830
Amortization of debt discount and issuance costs		32,294	42,318	40,763
Share-based compensation expense	(22)	38,391	40,936	65,893
Deferred tax benefit	(17)	(5,288)	(6,706)	(55,362)
Loss (Gain) on marketable securities		6,550	(1,992)	2,867
Gain on sale of investment	(10)	(36,086)	(121,813)	–
Reversals of contingent consideration	(15)	–	–	(10,433)
Other items, net including fair value changes in derivatives		5,622	11,696	(3,394)
Net changes in operating assets and liabilities:				
Accounts receivable	(3)	(7,402)	(14,711)	(39,578)
Inventories	(3)	(81,803)	(107,573)	(30,028)
Prepaid expenses and other current assets	(8)	13,918	1,061	18,626
Other long-term assets		1,400	316	(1,406)
Accounts payable		(5,975)	8,442	9,252
Accrued and other current liabilities	(13)	(71,681)	(22,141)	19,913
Income taxes	(17)	(12,832)	4,682	(6,782)
Other long-term liabilities		34,363	57,657	(14,321)
Net cash provided by operating activities				
639,001				
Cash flows from investing activities:				
Purchases of property, plant and equipment		(189,904)	(132,787)	(117,950)
Purchases of intangible assets	(11)	(16,630)	(171,450)	(156,934)
Proceeds from (purchases of) investments, net	(10)	(2,645)	25,638	(5,170)
Cash paid for acquisitions, net of cash acquired	(5)	–	(239,572)	(68,058)
Purchases of short-term investments	(7)	(397,650)	(49,770)	(293,959)
Proceeds from redemptions of short-term investments	(7)	359,560	181,223	396,098
Proceeds from divestiture	(5)	–	1,845	1,000
Cash received (paid) for collateral asset	(14)	44,900	(53,417)	22,685
Other investing activities		(57)	(4,991)	10
Net cash used in investing activities				
(202,426)				

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		2021	2020	2019
Cash flows from financing activities:				
Proceeds from short-term debt	(16)	–	59,345	–
Repayment of short-term debt	(16)	–	(58,705)	–
Proceeds from long-term debt, net of issuance costs	(16)	–	497,646	–
Repayment of long-term debt	(16)	(41,345)	(296,400)	(506,400)
Payment for termination of warrants	(18)	–	(174,627)	–
Payment of intrinsic value of cash convertible notes	(16)	–	(237,438)	(133,763)
Proceeds from exercise of call option related to cash convertible notes	(16)	–	239,836	134,737
Purchase of treasury shares	(18)	(99,987)	(63,995)	(74,450)
Proceeds from issuance of common shares		7,919	7,662	2,075
Tax withholding related to vesting of stock awards		(23,574)	(13,841)	(49,998)
Other financing activities		6,621	(9,610)	(11,281)
Net cash used in financing activities		(150,366)	(50,127)	(639,080)
Effect of exchange rate changes on cash, cash equivalents and restricted cash		(3,677)	4,196	826
Net increase (decrease) in cash, cash equivalents and restricted cash		282,532	(31,406)	(529,689)
Cash, cash equivalents and restricted cash, beginning of period		597,984	629,390	1,159,079
Cash, cash equivalents and restricted cash, end of period		\$880,516	\$597,984	\$629,390
Supplemental cash flow disclosures:				
Cash paid for interest		\$21,588	\$25,351	\$29,721
Cash paid for income taxes, net of refunds		\$102,083	\$42,572	\$41,474
Supplemental disclosure of non-cash investing activities:				
Equity securities acquired in non-monetary exchange	(10)	\$35,705	\$122,368	\$657
Intangible asset received in exchange for note receivable	(24)	\$14,989	\$–	\$–

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December 31, 2021

1. Corporate Information and Basis of Presentation

Corporate Information

QIAGEN N.V. is a public limited liability company (naamloze vennootschap) under Dutch law with a registered office at Hulsterweg 82, 5912 PL Venlo, The Netherlands. QIAGEN N.V., a Netherlands holding company, and subsidiaries (we, our or the Company) is a leading global provider of Sample to Insight solutions that enable customers to gain valuable molecular insights from samples containing the building blocks of life. Our sample technologies isolate and process DNA, RNA and proteins from blood, tissue and other materials. Assay technologies make these biomolecules visible and ready for analysis. Bioinformatics software and knowledge bases interpret data to report relevant, actionable insights. Automation solutions tie these together in seamless and cost-effective workflows. We provide solutions to more than 500,000 customers around the world in Molecular Diagnostics (human healthcare) and Life Sciences (academia, pharma R&D and industrial applications, primarily forensics). As of December 31, 2021, we employed more than 6,000 people in over 35 locations worldwide.

Basis of Presentation

The accompanying consolidated financial statements were prepared in accordance with U.S. generally accepted accounting principles (GAAP) and all amounts are presented in U.S. dollars rounded to the nearest thousand, unless otherwise indicated. The consolidated financial statements have been prepared on a historical cost basis, except for derivative financial instruments, contingent consideration and available-for-sale financial instruments that have been measured at fair value.

We undertake acquisitions to complement our own internal product development activities. In September 2020, we completed the acquisition of the remaining shares in NeuMoDx Molecular, Inc. (NeuMoDx), a privately-held U.S. company that designs and develops molecular diagnostics solutions for hospital and clinical reference laboratories. In 2019, we completed three immaterial acquisitions, including the January 2019 acquisition of N-of-One, Inc., a privately-held U.S. molecular decision support company and pioneer in clinical interpretation services for complex genomic data located in Concord, Massachusetts. Accordingly, at their respective acquisition dates, all the assets acquired and liabilities assumed were recorded at their respective fair values and our consolidated results of operations include the operating results from the acquired companies from the acquisition date.

Certain prior year amounts have been reclassified to conform to the current year presentation.

2. Effects of New Accounting Pronouncements

The following new Financial Accounting Standards Board (FASB) Accounting Standards Updates (ASU) were adopted in 2021, 2020 and 2019:

Adoption of New Accounting Standards in 2021

ASU 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes*, removed certain exceptions for recognizing deferred taxes for investments, performing intraperiod tax allocations and calculating income taxes in interim periods. The ASU also adds guidance to reduce complexity in certain areas, including recognizing deferred taxes for tax goodwill and allocating income taxes to members of a consolidated group. We adopted the ASU on the effective date of January 1, 2021 and the adoption of this guidance did not have an impact on our consolidated financial statements on the date of adoption.

ASU 2020-06, *Debt-Debt with Conversion and Other Options (Subtopic 470-20) and Derivatives and Hedging—Contracts in Entity's Own Equity (Subtopic 815-40): Accounting for Convertible Instruments and Contracts in an Entity's Own Equity*, reduced the number of accounting models for convertible instruments. The ASU also amended diluted earnings per share (EPS) calculations for convertible instruments, which will result in more dilutive EPS results, and also amended the requirements for a

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contract (or embedded derivative) that is potentially settled in an entity's own shares to be classified in equity. ASU 2020-06 was effective for annual periods beginning on January 1, 2022, with earlier adoption on January 1, 2021 permitted. We adopted ASU 2020-06 early on January 1, 2021 and this resulted in a decrease of \$54.1 million to additional paid in capital and an increase of \$0.3 million to retained earnings for the conversion feature to the liability for our 2027 Convertible Notes further discussed in Note 16 "Debt".

Adoption of New Accounting Standards in 2020

ASU 2016-13, *Financial Instruments—Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*, replaced the incurred loss impairment methodology with a methodology that reflects expected credit losses and requires consideration of a broader range of reasonable and supportable information to form credit loss estimates. We adopted Topic 326 on January 1, 2020 using the modified retrospective approach by recognizing the effect of initially applying Topic 326 as an after-tax \$15.1 million (\$19.6 million pre-tax) adjustment to the opening balance of retained earnings at January 1, 2020 for credit losses on loans, notes and accounts receivable. The adoption did not have an impact on our consolidated statements of income or cash flows.

ASU 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction between Topic 808 and Topic 606*, precludes an entity from presenting consideration from a transaction in a collaborative arrangement as revenue from contracts with customers if the counterparty is not a customer of that transaction. We adopted ASU 2018-18 on January 1, 2020 without any cumulative effect.

ASU 2020-03, *Codification Improvements to Financial Instruments*, was issued to improve and clarify various financial instrument topics, including Topic 326 issued in 2016. The ASU includes seven issues that describe areas of improvement and the related amendments to GAAP. They are intended to make the standards easier to understand and apply and to eliminate inconsistencies. They are narrow in scope and are not expected to significantly change practice for most entities. We adopted ASU 2020-03 on January 1, 2020 without any effect.

ASU 2020-01, *Investments—Equity Securities (Topic 321), Investments—Equity Method and Joint Ventures (Topic 323), and Derivatives and Hedging (Topic 815)—Clarifying the Interactions between Topic 321, Topic 323, and Topic 815*, addresses accounting for the transition into and out of the equity method and measuring certain purchased options and forward contracts to acquire investments. We adopted ASU 2020-01 on June 30, 2020 without any impact.

Adoption of New Accounting Standards in 2019

The FASB issued guidance codified in Accounting Standards Codification (ASC) Topic 842, *Leases (Topic 842)*, which supersedes the lease requirements in ASC Topic 840 and aims to increase transparency and comparability among organizations and requires disclosure of key information about leasing arrangements. The main principle of ASC 842 requires lessees to recognize the assets and liabilities that arise from nearly all leases on the consolidated balance sheet. We adopted these standards as per the effective date of January 1, 2019, using the modified retrospective approach and did not restate comparative periods. Our initial lease liabilities and right-of-use assets totaled \$57.7 million and \$57.4 million, respectively, as recorded in our consolidated balance sheet as of January 1, 2019, primarily relating to leased office space. The difference between the additional lease assets and lease liabilities was recorded as a \$0.3 million adjustment to retained earnings.

ASU 2017-12, *Derivatives and Hedging (Topic 815): Targeted Improvements to Accounting for Hedging Activities*, makes more financial and nonfinancial hedging strategies eligible for hedge accounting. It also amends the presentation and disclosure requirements and changes how companies assess effectiveness. We adopted ASU 2017-12 on January 1, 2019 without any cumulative effect.

ASU 2017-04, *Intangibles—Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment*, removes Step 2 of the goodwill impairment test. We adopted ASU 2017-04 on January 1, 2019 and apply the new guidance prospectively as required.

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ASU 2018-13, *Fair Value Measurement (Topic 820): Disclosure Framework*, provides guidance that eliminates, adds and modifies certain disclosure requirements for fair value measurements. We adopted ASU 2018-13 on January 1, 2019 and applied the entire standard to disclosures as required beginning in 2019.

ASU 2018-15, *Intangibles--Goodwill and Other--Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract*, provides guidance on a customer's accounting for implementation, set-up, and other upfront costs incurred in a cloud computing arrangement that is hosted by the vendor, i.e. a service contract. We adopted ASU 2018-15 on January 1, 2019 and applied the guidance to all implementation costs prospectively.

ASU 2018-17, *Consolidation (Topic 810): Targeted Improvements to Related Party Guidance for Variable Interest Entities*, amended how a decision maker or service provider determines whether its fee is a variable interest entity (VIE) when a related party under common control also has an interest in the VIE. We adopted ASU 2018-17 on January 1, 2019, on a prospective basis.

New Accounting Standards Not Yet Adopted

The following new FASB Accounting Standards Update was not yet adopted as of December 31, 2021:

ASU 2021-04, *Issuer's Accounting for Certain Modifications or Exchanges of Freestanding Equity-Classified Written Call Options*, clarifies and reduces diversity in an issuer's accounting for modifications or exchanges of freestanding equity-classified written call options (for example, warrants) that remain equity classified after modification or exchange. The amendments affect all entities that issue freestanding written call options that are classified in equity. Specifically, the amendments affect those entities when a freestanding equity-classified written call option is modified or exchanged and remains equity classified after the modification or exchange. The amendments that relate to the recognition and measurement of EPS for certain modifications or exchanges of freestanding equity-classified written call options affect entities that present EPS in accordance with the guidance in Topic 260, Earnings Per Share. The amendments are effective for all entities for fiscal years beginning after December 15, 2021, including interim periods within those fiscal years. An entity should apply the amendments prospectively to modifications or exchanges occurring on or after the effective date of the amendments. Early adoption is permitted for all entities, including adoption in an interim period. We adopted ASU 2021-04 prospectively effective January 1, 2022.

3. Summary of Significant Accounting Policies

Principles of Consolidation

The consolidated financial statements include the accounts of QIAGEN N.V. and its wholly-owned subsidiaries. All significant intercompany accounts and transactions have been eliminated. Investments in either common stock or in-substance common stock of companies where we exercise significant influence over the operations but do not have control, and where we are not the primary beneficiary, are accounted for using the equity method. All other investments are accounted for as discussed under "Non-marketable Investments" below. When there is a portion of equity in an acquired subsidiary not attributable, directly or indirectly, to the Company, we record the fair value of the noncontrolling interests at the acquisition date and classify the amounts attributable to noncontrolling interests separately in equity in the consolidated financial statements. Any subsequent changes in the Company's ownership interest while the Company retains its controlling financial interest in its subsidiary are accounted for as equity transactions.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities and disclosure of contingencies at the date of the financial statements as well as the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

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Concentrations of Risk

We buy materials for products from many suppliers, and are not dependent on any one supplier or group of suppliers for the business as a whole. However, key components of certain products, including certain instrumentation components and chemicals, are available only from a single source. If supplies from these vendors were delayed or interrupted for any reason, we may not be able to obtain these materials timely or in sufficient quantities in order to produce certain products and sales levels could be negatively affected. Additionally, our customers include researchers at pharmaceutical and biotechnology companies, academic institutions, and government and private laboratories. Fluctuations in the research and development budgets of these researchers and their organizations for applications in which our products are used could have a significant effect on the demand for our products.

The financial instruments used in managing our foreign currency, equity and interest rate exposures have an element of risk in that the counterparties may be unable to meet the terms of the agreements. We attempt to minimize this risk by limiting the counterparties to a diverse group of highly-rated international financial institutions. The carrying values of our financial instruments incorporate the non-performance risk by using market pricing for credit risk. However, we have no reason to believe that any counterparties will default on their obligations. In order to minimize our exposure with any single counterparty, we have entered into master agreements which allow us to manage the exposure with the respective counterparty on a net basis.

Other financial instruments that potentially subject us to concentrations of credit risk are cash and cash equivalents, short-term investments, and accounts receivable. We attempt to minimize the risks related to cash and cash equivalents and short-term investments by dealing with highly-rated financial institutions and investing in a broad and diverse range of financial instruments. We have established guidelines related to credit quality and maturities of investments intended to maintain safety and liquidity. Concentration of credit risk with respect to accounts receivable is limited due to a large and diverse customer base, which is dispersed over different geographic areas. Allowances are maintained for potential credit losses and such losses have historically been within expected ranges.

Foreign Currency Translation

Our reporting currency is the U.S. dollar and the functional currencies of our subsidiaries are generally the local currency of the respective countries in which they are headquartered. All amounts in the financial statements of entities whose functional currency is not the U.S. dollar are translated into U.S. dollar equivalents at exchange rates as follows: (1) assets and liabilities at period-end rates, (2) income statement accounts at average exchange rates for the period, and (3) components of equity at historical rates. Translation gains or losses are recorded in equity, and transaction gains and losses are reflected in net income (loss) as a component of other income, net. Realized gains or losses on the value of derivative contracts entered into to hedge the exchange rate exposure of receivables and payables are also included in net income (loss) as a component of other income, net. The net loss on foreign currency transactions was \$9.0 million, \$4.1 million, and \$5.7 million in 2021, 2020 and 2019, respectively, and is included in other income, net.

The exchange rates of key currencies were as follows:

(US\$ equivalent for one)	Closing rate at December 31,		Annual average rate		
	2021	2020	2021	2020	2019
Euro (EUR)	1.1326	1.2271	1.1832	1.1411	1.1196
Pound Sterling (GBP)	1.3479	1.3649	1.3758	1.2836	1.2768
Swiss Franc (CHF)	1.0963	1.1360	1.0940	1.0659	1.0062
Australian Dollar (AUD)	0.7253	0.7720	0.7514	0.6905	0.6954
Canadian Dollar (CAD)	0.7869	0.7849	0.7977	0.7463	0.7535
Japanese Yen (JPY)	0.0087	0.0097	0.0091	0.0094	0.0092
Chinese Yuan (CNY)	0.1574	0.1530	0.1550	0.1450	0.1448

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Appendix**Segment Information**

We determined that we operate as one operating segment in accordance with the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) Topic 280, Segment Reporting. Our chief operating decision maker (CODM) makes decisions based on the Company as a whole. In addition, we have a common basis of organization and types of products and services which derive revenues and consistent product margins. Accordingly, we operate and make decisions as one reporting unit.

Revenue Recognition

We recognize revenue when control of promised goods or services transfers to our customers in an amount that reflects the consideration that is expected to be received in exchange for those goods or services. The majority of our sales revenue is recognized when products are shipped to the customers at which point control transfers.

Warranty

We provide warranties on our products against defects in materials and workmanship for a period of one year. A provision for estimated future warranty costs is recorded in cost of sales at the time product revenue is recognized. Product warranty obligations are included in accrued and other current liabilities in the accompanying consolidated balance sheets.

Research and Development

Research and product development costs are expensed as incurred. Research and development expenses consist primarily of salaries and related expenses, facility costs, and amounts paid to contract research organizations and laboratories for the provision of services and materials as well as costs for internal use or clinical trials.

Government Grants

We recognize government grants when there is reasonable assurance that all conditions will be complied with and the grant will be received. Our government grants generally represent subsidies for specified activities and are therefore recognized when earned as a reduction of the expenses recorded for the activity that the grants are intended to compensate. Thus, when the grant relates to research and development expense, the grant is recognized over the same period that the related costs are incurred. Otherwise, amounts received under government grants are recorded as liabilities in the balance sheet. When the grant relates to an asset, the nominal amount of the grant is deducted from the carrying amount of the asset and recognized over the same period that the related asset is depreciated.

Borrowing Costs

Borrowing costs directly attributable to the acquisition, construction or production of an asset that takes a substantial period of time to get ready for its intended use or sale are capitalized as part of the cost of the respective assets (qualifying asset) when such borrowing costs are significant. All other borrowing costs are expensed in the period they occur.

Shipping and Handling Income and Costs

Shipping and handling costs charged to customers are recorded as revenue in the period that the related product sale revenue is recorded. Associated costs of shipping and handling are included in sales and marketing expenses. For the years ended December 31, 2021, 2020 and 2019, shipping and handling costs totaled \$31.7 million, \$32.1 million and \$27.9 million, respectively.

Advertising Costs

The costs of advertising are expensed as incurred and are included as a component of sales and marketing expense. Advertising costs for the years ended December 31, 2021, 2020 and 2019 were \$13.5 million, \$9.5 million and \$8.1 million, respectively.

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General and Administrative

General and administrative expenses primarily represent the costs required to support administrative infrastructure. These costs include licensing costs in connection with continued investments in information technology improvements, including cyber security, across the organization as well as personnel in administrative functions.

Restructuring, Acquisition, Integration and Other

We incur indirect acquisition and business integration costs in connection with business combinations which are expensed when incurred. These costs represent incremental costs that we believe would not have been incurred absent the business combinations. Major components of these costs include consulting and related fees incurred to integrate or restructure the acquired operations, payroll and related costs for employees remaining with the Company on a transitional basis and public relations, advertising and media costs for re-branding of the combined organization.

Restructuring costs include personnel costs (principally termination benefits) as well as contract and other costs, primarily contract termination costs. Termination benefits are accounted for in accordance with FASB ASC Topic 712, Compensation - Nonretirement Postemployment Benefits, and are recorded when it is probable that employees will be entitled to benefits and the amounts can be reasonably estimated. Estimates of termination benefits are based on the frequency of past termination benefits, the similarity of benefits under the current plan and prior plans, and the existence of statutory required minimum benefits. Contract and other costs are accounted for in accordance with FASB ASC Topic 420, Exit or Disposal Cost Obligations and are recorded when the liability is incurred. The specific restructuring measures and associated estimated costs are based on management's best business judgment under the existing circumstances at the time the estimates are made. If future events require changes to these estimates, such adjustments will be reflected in the period of the revised estimate.

On March 3, 2020, QIAGEN and Thermo Fisher Scientific Inc. (NYSE: TMO) announced that their boards of directors, as well as the Managing Board of QIAGEN N.V., unanimously approved Thermo Fisher's proposal to acquire QIAGEN. On August 13, 2020, QIAGEN announced that Thermo Fisher did not achieve the minimum 66.67% acceptance threshold from QIAGEN shareholders. For the year ended December 31, 2020, we incurred related expenses of \$125.5 million, which includes the \$95.0 million expense reimbursement which was paid when the minimum acceptance threshold was not met. These costs are recorded within restructuring, acquisition, integration and other expenses, net in the accompanying consolidated statement of income.

Income Taxes

We account for income taxes under the liability method. Under this method, total income tax expense is the amount of income taxes expected to be payable for the current year plus the change from the beginning of the year for deferred tax assets and liabilities established for the expected future tax consequences resulting from differences in the financial statement carrying amount and the tax basis of assets and liabilities. Deferred tax assets and/or liabilities are determined by multiplying the differences between the financial statement carrying amount and the tax bases of assets and liabilities by the enacted tax rates expected to be in effect when such differences are recovered or settled. Deferred tax assets are reduced by a valuation allowance to the amount more likely than not to be realized. The effect on deferred taxes of a change in tax rates is recognized in income in the period that includes the enactment date.

Tax benefits are initially recognized in the financial statements when it is more likely than not that the position will be sustained upon examination by the tax authorities. Such tax positions are initially and subsequently measured as the largest amount of tax benefit that is greater than 50 percent likely of being realized upon settlement with the taxing authority using the cumulative probability method, assuming the tax authority has full knowledge of the position and all relevant facts. Our policy is to recognize interest accrued related to unrecognized tax benefits in interest expense and penalties within the income tax expense.

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Derivative Instruments

We enter into derivative financial instrument contracts to minimize the variability of cash flows or income statement impact associated with the anticipated transactions being hedged or to hedge fluctuating interest rates. As changes in foreign currency or interest rate impact the value of anticipated transactions, the fair value of the forward or swap contracts also changes, offsetting foreign currency or interest rate fluctuations. Derivative instruments are recorded on the balance sheet at fair value. Changes in fair value of derivatives are recorded in current earnings or other comprehensive income, depending on whether a derivative is designated as part of a hedge transaction.

Share-Based Payments

Compensation cost for all share-based payments is recorded based on the grant date fair value, less an estimate for pre-vesting forfeitures, recognized in expense over the service period using an accelerated method.

Forfeiture Rate - This is the estimated percentage of grants that are expected to be forfeited or canceled on an annual basis before becoming fully vested. We estimated the forfeiture rate based on historical forfeiture experience.

Restricted Stock Units and Performance Stock Units - Restricted stock units and performance stock units represent rights to receive Common Shares at a future date. The fair market value of restricted and performance stock units is determined based on the number of stock units granted and the fair market value of our shares on the grant date. The fair market value at the time of the grant, less an estimate for pre-vesting forfeitures, is recognized in expense over the vesting period. At each reporting period, the estimated performance achievement of the performance stock units is assessed and any change in the estimated achievement is recorded on a cumulative basis in the period of adjustment.

Cash and Cash Equivalents

Cash and cash equivalents consist of cash on deposit in banks and other cash invested temporarily in various instruments that are short-term and highly liquid, and having an original maturity of less than three months at the date of purchase. Cash equivalents are carried at amortized cost which approximates fair value. Cash and cash equivalents as of December 31, 2021 and 2020 consist of the following:

(in thousands)	2021	2020
Cash at bank and on hand	\$235,381	\$245,373
Money market funds	366,117	273,584
Commercial paper	179,844	—
Short-term bank deposits	99,174	79,027
Cash and cash equivalents	\$880,516	\$597,984

Short-Term Investments

Short-term investments include cash investments with original maturities of more than three months which are classified as “available for sale” and stated at fair value, which is equivalent to the amortized cost, in the accompanying consolidated balance sheet. Interest income is accrued when earned and changes in fair market values are reflected in other income, net. The amortization of premiums and accretion of discounts to maturity arising from acquisition is included in interest income. A decline in fair value that is judged to be other-than-temporary is accounted for as a realized loss and the write-down is included in the consolidated statements of income. Realized gains and losses, determined on a specific identification basis on the sale of short-term investments, are included in income.

Short-term investments consisting of marketable equity securities are reported at fair value with gains and losses recorded in earnings.

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Fair Value of Financial Instruments

The carrying amount of cash and cash equivalents, notes receivable, accounts receivable, accounts payable and accrued liabilities approximate their fair values because of the short maturities of those instruments. The carrying value of our variable rate debt and leases approximates their fair values because of the short maturities and/or interest rates which are comparable to those available to us on similar terms. The fair values of the zero coupon convertible debt and the Cash Convertible Notes are based on an estimation using available over-the-counter market information. The fair values of the Private Placement Senior Notes were estimated using the changes in the U.S. Treasury rates and the fair value of the German Private Placement is based on an estimation using changes in the euro swap rates.

Accounts Receivable, Loans and Other Receivables and Allowance for Credit Losses

Our accounts receivable consist of unsecured customer obligations and we are at risk to the extent such amounts become uncollectible. Accounts receivable are carried at face value less an allowance for doubtful accounts as of December 31, 2019, and following the adoption of ASU 2016-13, Financial Instruments-Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments, less an allowance for expected credit losses. We continually monitor accounts receivable balances, and until December 31, 2019, provided for an allowance for doubtful accounts at the time collection became questionable based on payment history or age of the receivable. Since January 1, 2020, we maintain allowances for credit losses resulting from the expected failure or inability of our customers to make required payments. We recognize the allowance for expected credit losses at inception and reassess regularly considering historical experience with bad debts, the aging of the receivables, credit quality of the customer base, current economic conditions and other reasonable and supportable expectations for future conditions, if applicable. Once a receivable is determined to be uncollectible, the balance is charged against the allowance.

We sell our products worldwide through sales subsidiaries and distributors. There is no concentration of credit risk with respect to trade accounts receivable as we have a large number of internationally dispersed customers. Trade accounts receivable are non-interest bearing and mostly have payment terms of 30-90 days. For all years presented, no single customer represented more than ten percent of accounts receivable or consolidated net sales.

Following the adoption of Topic 326, we are required to use the new forward-looking expected credit loss model that replaced the previous incurred credit loss model. The new model generally results in earlier recognition of allowances for credit losses and requires consideration of a broader range of information to estimate expected credit losses over the entire lifetime of the assets. Accordingly, with the adoption of Topic 326, we recorded allowances for credit losses of \$8.1 million for accounts receivable, \$10.2 million for other receivables and \$1.3 million for loan receivables. The allowances reflect the forward-looking expected impact of non-payment of the contractual amounts due.

The changes in the allowance for credit losses on accounts receivable and loans and other receivables for the year ended December 31, 2021 and 2020 and in the allowance for doubtful accounts for the year December 31, 2019 are as follows:

(in thousands)	Accounts Receivable			Loans and Other Receivables	
	2021	2020	2019	2021	2020
Balance at beginning of year	\$27,052	\$12,115	\$9,270	\$9,132	\$—
ASC 326 adoption impact	—	8,089	—	—	11,543
Provisions for expected credit losses	18	16,439	8,701	2,155	1,325
Deductions from allowance	(1,249)	(9,868)	(5,777)	(6,049)	(3,916)
Recoveries collected	288	—	—	12	—
Currency translation adjustments and other	(2,985)	277	(79)	(108)	180
Balance at end of year	\$23,124	\$27,052	\$12,115	\$5,142	\$9,132

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For the years ended December 31, 2021 and 2020, additions charged to expense include forward-looking expected impacts of the global economic uncertainty caused by COVID-19.

Inventories

Inventories are stated at the lower of cost or net realizable value, determined on either a weighted average cost basis or a standard cost basis which is regularly adjusted to actual. Inventories include material, direct labor and overhead costs and are reduced for estimated obsolescence. Inventories consisted of the following as of December 31, 2021 and 2020:

(in thousands)	2021	2020
Raw materials	\$94,748	\$65,449
Work in process	67,679	74,398
Finished goods	165,098	151,334
Total inventories, net	\$327,525	\$291,181

Property, Plant and Equipment

Property, plant and equipment are stated at cost less accumulated amortization. Capitalized internal-use software costs include only those direct costs associated with the actual development or acquisition of computer software solely to meet internal needs and cloud-based applications to deliver our service and comprise costs associated with the design, coding, installation and testing of the system. Costs associated with preliminary development, such as the evaluation and selection of alternatives, as well as training, maintenance and support are expensed as incurred. Costs for software to be sold, leased or otherwise marketed that are related to the conceptual formulation and design are expensed as incurred. Costs incurred to produce software products and the software components of products to be sold, leased or marketed after technological feasibility is established are capitalized and amortized in accordance with the accounting standards for the costs of software to be sold, leased, or otherwise marketed. All other depreciation is computed using the straight-line method over the estimated useful lives of the assets (3 to 40 years). Amortization of leasehold improvements is computed on a straight-line basis over the lesser of the remaining life of the lease or the estimated useful life of the improvement asset. We have a policy of capitalizing expenditures that materially increase assets' useful lives and charging ordinary maintenance and repairs to operations as incurred. When property or equipment is disposed of, the cost and related accumulated depreciation and amortization are removed from the accounts and any gain or loss is included in earnings.

Business Combinations

We include the results of operations of the businesses that we acquire as of the acquisition date. The purchase price of an acquired business is allocated to the individual assets acquired and liabilities assumed based on their fair values at the date of acquisition. Those fair values are determined using income, cost and market approaches, most of which depend upon significant inputs that are not observable in the market, or level 3 measurements. The excess of purchase price over the fair value of identifiable assets acquired and liabilities assumed is recorded as goodwill. Acquisition-related expenses are recognized separately from the business combinations and are expensed as incurred.

The purchase price for some business combinations includes consideration that is contingent on the achievement of net sales or earnings targets by the acquired business. Contingent consideration is measured initially and on a recurring basis at fair value. Payments to settle the acquisition-date fair value of contingent consideration are presented as financing activities on the statement of cash flows; any payments in excess of the acquisition-date fair value are presented as operating activities.

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Acquired Intangibles and Goodwill

Acquired intangibles with alternative future uses are carried at cost less accumulated amortization and consist of licenses to technology held by third parties and other acquired intangible assets. Amortization related to patents are computed over the estimated useful life of the underlying patent, which has historically ranged from 1 to 20 years. Purchased intangible assets acquired in business combinations, other than goodwill, are amortized over their estimated useful lives unless these lives are determined to be indefinite. Intangibles are assessed for recoverability considering the contract life and the period of time over which the intangible will contribute to future cash flow. The unamortized cost of intangible assets, where cash flows are independent and identifiable from other assets, is evaluated periodically and adjusted, if necessary, if events and circumstances indicate that a decline in value below the carrying amount has occurred. Intangible asset impairments recorded during the years ended December 31, 2020 and 2019 are further discussed in Note 6 "Restructuring and Impairments".

Amortization expense related to developed technology and patent and license rights which have been acquired in a business combination is included in cost of sales. Amortization of trademarks, customer base and non-compete agreements which have been acquired in a business combination is recorded in operating expense under the caption 'acquisition-related intangible amortization'. Amortization expenses of intangible assets not acquired in a business combination are recorded within either the cost of sales, research and development or sales and marketing line items based on the use of the asset.

We dispose the gross carrying amount and accumulated amortization of fully amortized intangible assets from historic business combinations once they are considered fully integrated into our business.

The fair value of in-process research and development (IPR&D) acquired in a business combination is capitalized as an indefinite-lived intangible asset until completion or abandonment of the related research and development activities. IPR&D is tested for impairment annually or when any event or circumstance indicates that the fair value may be below the carrying value. If and when research and development is complete, the associated asset is amortized over the estimated useful life.

Goodwill represents the difference between the purchase price and the estimated fair value of the net assets acquired arising from business combinations. Goodwill is subject to impairment tests annually or earlier if indicators of potential impairment exist. We have elected to perform our annual test for indications of impairment as of October 1st of each year. Following the annual impairment tests for the years ended December 31, 2021, 2020 and 2019, goodwill has not been impaired.

Non-Marketable Investments

We have investments in non-marketable equity securities issued by privately held companies. These investments are included in other long-term assets in the accompanying consolidated balance sheets. Non-marketable investments through which we exercise significant influence but do not have control are accounted for using the equity method. We monitor for changes in circumstances that may require a reassessment of the level of influence. Our non-marketable equity securities not accounted for under the equity method are accounted for under the measurement alternative. Under the measurement alternative, the carrying value is measured at cost, less any impairment, plus or minus changes resulting from observable price changes in orderly transactions for identical or similar investments of the same issuer. Adjustments are determined primarily based on a market approach as of the transaction date.

Investments are evaluated periodically, or when impairment indicators are noted, to determine if declines in value are other-than-temporary. In making that determination, we consider all available evidence relating to the realizable value of a security. This evidence includes, but is not limited to, the following:

- adverse financial conditions of a specific issuer, segment, industry, region or other variables;
- the length of time and the extent to which the fair value has been less than cost; and
- the financial condition and near-term prospects of the issuer.

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We consider whether the fair values of any of our non-marketable investments have declined below their carrying value whenever adverse events or changes in circumstances indicate that recorded values may not be recoverable. If any such decline is considered to be other than temporary (based on various factors, including historical financial results, product development activities and the overall health of the affiliate's industry), then a write-down of the investment would be recorded in operating expense to its estimated fair value. Investment impairments recorded during the years ended December 31, 2020 and 2019 are discussed in Note 10 "Investments."

Variable Interest Entities

We evaluate at the inception of each arrangement whether we have made an investment in an entity that is considered a variable interest entity (VIE) or if we hold other variable interests in an arrangement that is considered a variable interest entity (VIE). We consolidate VIEs when we are the primary beneficiary. The primary beneficiary of a VIE is the party that meets both of the following criteria: (1) has the power to make decisions that most significantly affect the economic performance of the VIE; and (2) has the obligation to absorb losses or the right to receive benefits that in either case could potentially be significant to the VIE. Periodically, we assess whether any changes in our interest or relationship with the entity affect our determination of whether the entity is still a VIE and, if so, whether we are the primary beneficiary. If we are not the primary beneficiary in a VIE, we account for the investment or other variable interests in a VIE as an investment in a non-marketable investment or in accordance with other applicable GAAP.

Impairment of Long-Lived Assets

We review our long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset or a group of assets may not be recoverable. We consider, amongst other indicators, a history of operating losses or a change in expected sales levels to be indicators of potential impairment. Assets are grouped and evaluated for impairment at the lowest level for which there are identifiable cash flows that are largely independent of the cash flows of other groups of assets. If an asset is determined to be impaired, the loss is measured as the amount by which the carrying amount of the asset exceeds fair value which is determined by applicable market prices, when available. When market prices are not available, we generally measure fair value by discounting projected future cash flows of the asset. Considerable judgment is necessary to estimate discounted future cash flows. Accordingly, actual results could differ from such estimates.

4. Revenue

Nature of Goods and Services

Our revenues are reported net of sales and value added taxes and accruals for estimated rebates and returns and are derived primarily from the sale of consumable and instrumentation products, and to a much lesser extent, from the sale of services, intellectual property and technology. Revenue is recognized upon transfer of control of promised products or services to customers in an amount that reflects the consideration we expect to receive in exchange for those products or services. We enter into contracts that can include various combinations of products and services, which are generally distinct and accounted for as separate performance obligations. The transaction price is allocated to performance obligations based on their relative stand-alone selling prices.

We offer warranties on our products. Certain of our warranties are assurance-type in nature and do not cover anything beyond ensuring that the product is functioning as intended. Based on the guidance in Topic 606, assurance-type warranties do not represent separate performance obligations. The Company also sells separately-priced service contracts which qualify as service-type warranties and represent separate performance obligations.

We sell our products and services both directly to customers and through distributors generally under agreements with payment terms typically less than 90 days and in most cases not exceeding one year and therefore contracts do not contain a significant financing component.

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Consumable and Related Revenue

Consumable Products

In the last three years, revenue from consumable product sales has accounted for approximately 78-81% of our net sales and revenue is recognized when performance obligations under the terms of a contract with a customer are satisfied. The majority of our contracts have either a single performance obligation to transfer a single consumable product or multiple performance obligations to transfer multiple products concurrently. Accordingly, we recognize revenue when control of the products has transferred to the customer, which is generally at the time of shipment of products as this is when title and risk of loss have been transferred. In addition, invoicing typically occurs at this time so this is when we have a present right to payment. Revenue is measured as the amount of consideration we expect to receive in exchange for transferring products and is generally based upon a negotiated formula, list or fixed price.

Related Revenue

Revenues from related products include software-as-a-service (SaaS), licenses, intellectual property and patent sales, royalties and milestone payments and over the last three years has accounted for approximately 6-10% of our net sales.

SaaS arrangements: Revenue from SaaS arrangements, which allow customers to use hosted software over the contract period without taking possession of the software, is recognized over the duration of the agreement unless the terms of the agreement indicate that revenue should be recognized in a different pattern, for example based on usage.

Licenses: Licenses for on-site software, which allow customers to use the software as it exists when made available, are sold as perpetual licenses or term licenses. Revenue from on-site licenses are recognized upfront at the point in time at the later of when the software is made available to the customer and the beginning of the license term. When a portion of the transaction price is allocated to a performance obligation to provide support and/or updates, revenue is recognized as the updates/support are provided, generally over the life of the license. Fees from research collaborations include payments for technology transfer and access rights. Royalties from licensees of intellectual property are based on sales of licensed products and revenues are recognized at the later of (i) when the related sales occur, or (ii) when the performance obligation to which some or all of the royalty has been allocated has been satisfied (or partially satisfied).

Milestone Payments: At the inception of each companion diagnostic co-development arrangement that includes development milestone payments, which represent variable consideration, we evaluate whether the milestones are probable of being reached and estimate the amount to be included in the transaction price using the most likely amount method. If it is probable that a significant revenue reversal would not occur, the associated milestone value is included in the transaction price. Milestone payments that are not within our control, such as milestones which are achieved through regulatory approvals, are considered to be constrained and excluded from the transaction price until those approvals are received. Revenue is recognized following the input method as this is considered to best depict the timing of the transfer of control. This involves measuring actual hours incurred to date as a proportion of the total budgeted hours of the project. At the end of each subsequent reporting period, the proportion of completion is trueed-up. We also re-evaluate the probability of achievement of development milestones and any related constraint on a periodic basis, and if necessary, adjust our estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis, which would affect revenues and earnings in the period of adjustment.

Instruments

Revenue from instrumentation includes the instrumentation equipment, installation, training and other instrumentation services, such as extended warranty services or product maintenance contracts and over the last three years has accounted for approximately 11-14% of net sales. Revenue from instrumentation equipment is recognized when the customer obtains control of the instrument which is predominantly at the time of delivery or when title has transferred to the customer. Service revenue is recognized over the term of the service period as the customers benefit from the service throughout the service period. Revenue related to services performed on a time-and-materials basis is recognized when performed.

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Contract Estimates

The majority of our revenue is derived from contracts (i) with an original expected length of one year or less and (ii) contracts for which we recognize revenue at the amount in which we have the right to invoice as product is delivered. We have elected the practical expedient not to disclose the value of remaining performance obligations associated with these types of contracts.

However, we have certain companion diagnostic co-development contracts to provide research and development activities in which our performance obligations extend over multiple years. As of December 31, 2021, we had \$54.5 million of remaining performance obligations for which the transaction price is not constrained related to these contracts which we expect to recognize over the next 12 to 18 months.

Revenue expected to be recognized in any future year related to remaining performance obligations, excluding revenue pertaining to contracts that have an original expected duration of one year or less, contracts where revenue is recognized as invoiced and contracts with variable consideration related to undelivered performance obligations, is not material.

Contract Balances

The timing of revenue recognition, billings and cash collections can result in billed accounts receivable, unbilled receivables (contract assets), and customer advances and deposits (contract liabilities) in the consolidated balance sheet.

Contract assets as of December 31, 2021 and 2020 totaled \$14.1 million and \$8.5 million, respectively, and are included in prepaid expenses and other current assets in the accompanying consolidated balance sheets and relate to the companion diagnostic co-development contracts discussed above.

Contract liabilities primarily relate to non-cancellable advances or deposits received from customers before revenue is recognized and is primarily related to instrument service and Software as a Service (SaaS) arrangements. As of December 31, 2021 and 2020, contract liabilities totaled \$74.7 million and \$68.9 million, respectively, of which \$63.4 million and \$57.1 million is included in accrued and other current liabilities, respectively, and \$11.3 million and \$11.8 million in included in other long-term liabilities, respectively. During the years ended December 31, 2021 and 2020, we satisfied the associated performance obligations and recognized revenue of \$54.9 million and \$48.1 million, respectively, related to advance customer payments previously received.

Disaggregation of Revenue

We disaggregate our revenue based on product type and customer class as shown in the tables below for the years ended December 31, 2021, 2020 and 2019:

(in thousands)	2021	2020	2019
Consumables and related revenues	\$1,027,215	\$774,234	\$665,866
Instruments	116,449	129,742	71,266
Molecular Diagnostics	1,143,664	903,976	737,132
Consumables and related revenues	959,093	841,201	688,281
Instruments	148,900	125,169	101,011
Life Sciences	1,107,993	966,370	789,292
Total	\$2,251,657	\$1,870,346	\$1,526,424

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Additionally, we disaggregate our revenue based on product category as shown in the tables below for the years ended December 31, 2021, 2020 and 2019:

(in thousands)	2021	2020	2019
Sample technologies	\$850,636	\$803,867	\$548,365
Diagnostic solutions	638,759	460,757	465,503
PCR / Nucleic acid amplification	433,972	363,552	224,685
Genomics / NGS	245,066	165,570	183,768
Other	83,224	76,600	104,103
Total	\$2,251,657	\$1,870,346	\$1,526,424

Refer to Note 21 "Segment Information" for disclosure of revenue by geographic region.

5. Acquisitions

Business Combinations and Asset Acquisitions

For acquisitions which have been accounted for as business combinations, the acquired companies' results have been included in the accompanying consolidated statements of income (loss) from their respective dates of acquisition. Our acquisitions have historically been made at prices above the fair value of the acquired net assets, resulting in goodwill, due to expectations of synergies of combining the businesses. These synergies include use of our existing infrastructure, such as sales force, shared service centers, distribution channels and customer relations, to expand sales of an acquired business' products; use of the infrastructure of the acquired businesses to cost-effectively expand sales of our products; and elimination of duplicative facilities, functions and staffing.

If the acquired net assets do not constitute a business under the acquisition method of accounting, the transaction is accounted for as an asset acquisition and no goodwill is recognized. In an asset acquisition, the amount allocated to acquired in-process research and development with no alternative future use is charged to expense at the acquisition date.

2020 Business Combinations

On September 17, 2020, we completed the acquisition of the remaining 80.1% of NeuMoDx Molecular, Inc. (NeuMoDx) shares, a privately-held U.S. company in which we held a minority interest. NeuMoDx designs and develops molecular diagnostics solutions for hospital and clinical reference laboratories. Prior to acquisition, we held a 19.9% investment in NeuMoDx with a carrying value of \$41.0 million. The cash consideration for the remaining shares totaled \$251.7 million. We incurred \$2.5 million acquisition related costs to effect the business combination, of which \$1.8 million was incurred during the year ended December 31, 2020, and are included in restructuring, acquisition, integration and other, net.

The acquisition date fair value of the minority interest investment was \$52.7 million and a gain of \$11.7 million was recorded in restructuring, acquisition, integration and other, net in the accompanying consolidated statement of income for the year ended December 31, 2020. The fair value of the minority interest investment was determined using an implied purchase price reduced by a 20% control premium.

The final purchase price allocation differed from the preliminary purchase price allocation primarily as a result of updates to the acquisition date value of the liability related to acquired litigation, the final valuation and allocation of amounts among the acquired intangible assets as set forth in an independent appraisal, and related deferred tax impacts as follows:

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(in thousands)	Final	Preliminary ⁽¹⁾	Difference
Purchase Price:			
Cash consideration	\$251,730	\$251,730	\$—
Fair value of minority interest	52,727	52,727	—
	\$304,457	\$304,457	\$—
Preliminary Allocation:			
Cash and cash equivalents	\$12,291	\$12,291	\$—
Accounts receivable	5,691	5,691	—
Inventories	20,271	18,866	1,405
Prepaid expenses and other current assets	5,961	5,943	18
Accounts payable	(12,450)	(11,168)	(1,282)
Accruals and other current liabilities	(69,585)	(18,770)	(50,815)
Other long-term liabilities	(4,101)	(4,101)	—
Fixed and other long-term assets	7,076	6,698	378
Developed technology	101,000	119,100	(18,100)
In-process research and development	55,000	64,800	(9,800)
Patents and license rights	770	770	—
Customer backlog	400	900	(500)
Goodwill	191,343	149,877	41,466
Deferred tax asset	30,057	—	30,057
Deferred tax liability on fair value of identifiable intangible assets acquired	(39,267)	(46,440)	7,173
Total	\$304,457	\$304,457	\$—

⁽¹⁾ As of September 30, 2020

The final purchase price allocation includes \$55.0 million for the acquisition date value of the liability related to acquired litigation. The final settlement amount, discussed further in Note 20 "Commitments and Contingencies" was \$53.0 million. The \$2.0 million difference between the final purchase price allocation and final settlement amount was recorded to restructuring, acquisition, integration and other expense, net in the year ended December 31, 2021. The in-process research and development recognized relates to technologies that remain in development and have not yet obtained regulatory approvals. The technologies within in-process research and development are expected to be completed within the next five years. The weighted average amortization period for the acquired intangibles is 10 years. The goodwill acquired is not deductible for tax purposes.

Pro forma results

The following unaudited pro forma information assumes that the above acquisition occurred at the beginning of the periods presented. For the year ended December 31, 2020, pro forma net sales would have been \$1.90 billion, pro forma net income would have been \$347.0 million and pro forma diluted net income per common share would have been \$1.48. These unaudited pro forma results are intended for informational purposes only and are not necessarily indicative of the results of operations that would have occurred had the acquisition been in effect at the beginning of the periods presented, or of future results of the combined operations.

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2019 Business Combinations

In January 2019, we completed the acquisition of N-of-One, Inc., a privately-held U.S. molecular decision support company and pioneer in clinical interpretation services for complex genomic data located in Concord, Massachusetts. The cash consideration, net of cash acquired, was \$24.5 million. This acquisition was not significant to the overall consolidated financial statements and as of December 31, 2019, the allocation of the purchase price was final. The acquisition did not have a material impact to net sales, net income or earnings per share and therefore no pro forma information has been provided herein.

In the third quarter of 2019, we acquired two additional companies for total cash consideration, net of cash acquired, of \$43.5 million. The purchase price allocations for these acquisitions were final as of March 31, 2020. These acquisitions were not significant to the overall consolidated financial statements and the acquisitions did not have a material impact to net sales, net income or earnings per share. Thus, no pro forma information has been provided herein.

2019 Asset Acquisition

On January 31, 2019, we acquired the digital PCR asset of Formulatrix, Inc., a developer of laboratory automation solutions. We paid Formulatrix \$125.0 million in cash upon closing. During 2020, we paid the remaining \$135.9 million of milestone payments.

6. Restructuring and Impairments

As part of our restructuring activities, we incur expenses that qualify as exit and disposal costs under U.S. GAAP including severance and employee costs as well as contract and other costs, primarily contract termination costs, as well as inventory write-offs and other implementation costs primarily related to consulting fees. Personnel related costs primarily relate to cash severance and other termination benefits including accelerated share-based compensation. We also incur expenses that are an integral component of, and are directly attributable to, our restructuring activities which do not qualify as exit and disposal costs under U.S. GAAP, which consist of asset-related costs such as intangible asset impairments and other asset related write-offs.

Personnel costs are primarily determined based on established benefit arrangements, local statutory requirements, or historical benefit practices. We recognize these benefits when payment is probable and estimable. Other benefits which require future service and are associated to non-recurring benefits are recognized ratably over the future service period. Other assets, including inventory, are impaired or written-off if the carrying value exceeds the fair value. All other costs are recognized as incurred.

2019 Restructuring

In the second half of 2019, we decided to suspend development of NGS-related instrument systems and entered into a new strategic partnership with Illumina to commercialize IVD kits worldwide on Illumina's diagnostic sequencers. In order to align our business with this new strategy, we began restructuring initiatives to target resource allocation to growth opportunities in our Sample to Insight portfolio. In addition, we implemented measures to shift commercial operations activities, transition manufacturing activities into a regional structure, and expand the scope of activities at our shared service centers.

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Total cumulative pre-tax costs for the program, which concluded in 2021, were \$313.2 million as summarized below.

Classification and Type of Charge (in thousands)	Note	2021	2020	2019	Total cumulative charges
Restructuring, acquisition, integration and other, net					
Personnel related ⁽¹⁾	(22)	\$845	\$904	\$70,578	\$72,327
Contract and other costs ⁽¹⁾		1,762	1,835	52,249	55,846
Accounts receivable ⁽²⁾		(246)	(622)	10,825	9,957
Inventories		–	1,014	12,336	13,350
Prepaid expenses and other assets ⁽²⁾		–	127	17,012	17,139
		2,361	3,258	163,000	168,619
Long-lived asset impairments					
Property, plant and equipment	(9)	–	1,034	98,472	99,506
Intangible assets	(11)	–	–	40,301	40,301
		–	1,034	138,773	139,807
Other income, net					
Equity method investment impairment	(10)	–	–	4,799	4,799
Total		\$2,361	\$4,292	\$306,572	\$313,225

⁽¹⁾ During the year ended December 31, 2019, personnel related and contract and other costs include \$2,956 and \$15,676, respectively, due to related parties.

⁽²⁾ During the year ended December 31, 2019, accounts receivable and prepaid expenses and other assets includes \$5,984 and \$2,270, respectively due from related parties.

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Of the total costs incurred, \$1.5 million and \$11.2 million are accrued as of December 31, 2021 and 2020, respectively, in accrued and other current liabilities in the accompanying consolidated balance sheets as summarized in the following table including the cash components of the restructuring activity.

(in thousands)	Personnel Related	Contract and Other Costs	Total
Liability at December 31, 2019	\$27,999	\$32,233	\$60,232
Additional costs incurred in 2020	4,542	3,300	7,842
Release of accrual	(3,638)	(1,465)	(5,103)
Payments	(24,355)	(27,347)	(51,702)
Foreign currency translation adjustment	139	(242)	(103)
Liability at December 31, 2020	4,687	6,479	11,166
Additional costs incurred in 2021	1,725	7,294	9,019
Release of accrual	(880)	(5,532)	(6,412)
Payments	(5,273)	(6,690)	(11,963)
Foreign currency translation adjustment	(144)	(161)	(305)
Liability at December 31, 2021	\$115	\$1,390	\$1,505

7. Short-Term Investments

As of December 31, 2021 and 2020, short-term investments consisted of the following:

(in thousands)	2021	2020
Commercial paper	\$139,785	\$—
Money market deposits	45,000	—
Marketable equity securities	—	117,249
Total	\$184,785	\$117,249

At December 31, 2021, we had \$184.8 million of commercial paper and money market deposits due from financial and nonfinancial institutions. These instruments are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market and carried at fair market value, which is equal to the cost. All instruments are classified as current assets in the accompanying balance sheet as they have a maturity of less than one year or are redeemable at our discretion. Interest income is determined using the effective interest rate method.

At December 31, 2020, short-term investments include the fair value of our marketable equity securities totaling \$117.2 million. These investments, further discussed in Note 10 "Investments", are reported at fair value with gains and losses recorded in earnings.

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8. Prepaid Expenses and Other Current Assets

Prepaid expenses and other current assets are summarized as follows as of December 31, 2021 and 2020:

(in thousands)	Note	2021	2020
Fair value of derivative instruments	(14)	\$ 175,284	\$ 14,127
Prepaid expenses		60,629	61,159
Income tax receivable	(17)	45,116	16,424
Value added tax		22,884	31,128
Other receivables		19,201	32,901
Contract assets	(4)	14,082	8,539
Cash collateral	(14)	11,200	56,100
Loan receivables		6,249	17,094
Total prepaid expenses and other current assets		\$354,645	\$237,472

9. Property, Plant and Equipment

Property, plant and equipment of December 31, 2021 and 2020 were as follows:

(in thousands)	Estimated useful life (in years)	2021	2020
Land	—	\$26,732	\$18,903
Buildings and improvements	5-40	371,834	362,902
Machinery and equipment	3-10	343,968	322,379
Computer software	3-10	281,226	260,730
Furniture and office equipment	3-10	106,016	108,339
Construction in progress	—	140,823	116,562
		1,270,599	1,189,815
Less: Accumulated depreciation and amortization		(632,416)	(630,443)
Property, plant and equipment, net		\$638,183	\$559,372

Asset impairment charges for the years ended December 31, 2020 and 2019 were as follows:

(in thousands)	2020	2019
Machinery and equipment	\$77	\$9,177
Computer software	—	44,649
Furniture and office equipment	315	4,030
Construction in progress	642	41,870
Total impairment in property, plant and equipment	\$1,034	\$99,726

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During the year ended December 31, 2020, \$1.0 million of impairments were related to the 2019 Restructuring program discussed in Note 6 "Restructuring and Impairments". In 2019, \$98.5 million of impairments were related to the 2019 Restructuring program while the remaining \$1.2 million were related to other identified impairments during the year.

For the years ended December 31, 2021, 2020 and 2019 depreciation and amortization expense totaled \$85.4 million, \$78.6 million and \$86.0 million, respectively. For the years ended December 31, 2021, 2020 and 2019 amortization related to computer software to be sold, leased or marketed totaled \$9.2 million, \$7.4 million and \$18.3 million, respectively. Impairment charges related to computer software to be sold, leased or marketed are included in computer software and construction in progress in the table above and totaled \$65.9 million for the year ended December 31, 2019. As of December 31, 2021 and 2020, the unamortized balance of computer software to be sold, leased or marketed was \$56.9 million and \$50.5 million, respectively.

Repairs and maintenance expense was \$16.2 million, \$13.8 million and \$10.7 million in 2021, 2020 and 2019, respectively. For the year ended December 31, 2021, construction in progress primarily includes amounts related to projects to expand production lines and increase capacity of manufacturing as well as ongoing software development projects. For the years ended December 31, 2021, 2020 and 2019, interest capitalized in connection with construction projects was not significant.

10. Investments

Non-Marketable Investments

We have made strategic investments in certain privately-held companies without readily determinable market values.

Non-Marketable Investments Accounted for Under the Equity Method

A summary of our non-marketable investments accounted for as equity method investments is as follows:

(\$ in thousands)	Ownership Percentage	Equity investments as of December 31,		Share of income (loss) for the years ended December 31,		
		2021	2020	2021	2020	2019
PreAnalytiX GmbH	50.00%	\$10,291	\$4,761	\$10,412	\$3,070	\$3,971
Apis Assay Technologies Ltd	19.00%	3,713	1,940	1,773	1,221	(51)
TVM Life Science Ventures III	3.10%	3,669	1,545	(264)	630	(330)
Suzhou Fuda Business Management and Consulting Partnership	33.67%	2,832	3,301	—	—	—
Actome GmbH	12.50%	1,045	—	(31)	—	—
Hombrechtikon Systems Engineering AG	19.00%	(413)	(530)	97	97	(1,124)
MAQGEN Biotechnology Co., Ltd	40.00%	—	—	—	—	(383)
		\$21,137	\$11,017	\$11,987	\$5,018	\$2,083

Of the \$21.1 million of non-marketable investments accounted for as equity method investments, \$21.5 million is included in other long-term assets and \$0.4 million, where we are committed to fund losses, is included in other long-term liabilities in the accompanying consolidated balance sheet as of December 31, 2021.

During 2021, we made a \$1.1 million investment in Actome GmbH (Actome) and as of December 31, 2021 we hold a 12.5% ownership stake in this company that is accounted for under the equity method as we have the ability to exercise significant influence.

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TVM Life Science Ventures III (TVM) is a limited partnership and we account for our 3.1% investment under the equity method as we have the ability to exercise significant influence over the limited partnership. This investment is valued at net asset value (NAV) reported by the counterparty, adjusted as necessary. During 2021, we made \$2.4 million in additional cash payments to TVM and have \$10.3 million of unfunded commitments through 2029 related to this investment. We do not have the right to redeem these funds under the normal course of operations of this partnership.

During the years ended December 31, 2021, 2020 and 2019, we received dividends of \$4.7 million, \$4.4 million and \$4.1 million, respectively, from PreAnalytix GmbH. These dividends are included in Other items, net including fair value changes in derivatives in the accompanying consolidated statements of cash flows as they are a return on investment and therefore classified as cash flows from operating activities.

As of December 31, 2021, four of our equity method investments are variable interest entities and we are not the primary beneficiary as we do not hold the power to direct the activities that most significantly impact the economic performance. Therefore, these investments are not consolidated. As of December 31, 2021, these investments had a total net carrying value of \$8.0 million, of which \$8.4 million, representing our maximum exposure to loss, is included in other long-term assets and \$0.4 million is included in other long-term liabilities in the accompanying consolidated balance sheet. As of December 31, 2020, these investments held a balance of \$3.0 million, of which \$3.5 million is included in other long-term assets and \$0.5 million is included in other long-term liabilities in the accompanying consolidated balance sheet.

During 2019, we recorded an impairment of \$4.8 million in other income, net in the accompanying consolidated statements of income, following changes in circumstances of MAQGEN Biotechnology Co., Ltd that indicated the carrying value was no longer recoverable. Accordingly, the investment was fully impaired.

Non-Marketable Investments Not Accounted for Under the Equity Method

At December 31, 2021 and 2020, we had investments in non-publicly traded companies that do not have readily determinable fair values with carrying amounts that totaled \$3.9 million and \$4.1 million, respectively. These investments which are measured at cost, less any impairment, plus or minus changes resulting from observable price changes in orderly transactions for the identical or a similar investment of the same issuer. Changes resulting from impairment and observable price changes are recognized in the statements of income during the period the change is identified.

The changes in non-marketable investments not accounted for under the equity method for the years ended December 31, 2021 and 2020 are as follows:

(in thousands)	2021	2020
Balance at beginning of year	\$4,142	\$70,849
Full acquisition of equity securities	—	(41,001)
Sale of equity securities	—	(23,812)
Loss on sale of equity securities	—	(2,250)
Impairments	—	(398)
Cash investments in equity securities, net	81	173
Foreign currency translation adjustments	(278)	581
Balance at end of year	\$3,945	\$4,142

We made additional investments of \$0.1 million in non-marketable investments not accounted for under equity method for the year ended December 31, 2021.

In 2020, we acquired the remaining shares of NeuMoDx as further discussed in Note 5 "Acquisitions". Invitae Corporation (Invitae), a publicly traded company (NVTA), completed the acquisition of ArcherDX, Inc. (ArcherDX), a company in which we held an approximate 8% investment. In exchange for our shares in ArcherDX, we initially

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received cash of \$21.1 million and 2.4 million shares in Invitae followed by an additional 0.4 million shares for milestone achievement, as shown in the marketable equity securities table below. For the year ended December 31, 2020, we recognized a total gain of \$123.3 million in other income, net in the accompanying consolidated statement of income as a result of this transaction. Additionally in 2020, we sold two other investments. One investment was sold for its book value and we received \$3.7 million in cash. The other investment had a carrying value of \$2.5 million and was sold for cash of \$0.3 million and the shares in OncoCyte Corporation (OncoCyte), shown in the marketable equity securities table below. A loss of \$2.3 million was recognized in other income, net on the sale of this investment. We also recorded a \$0.4 million impairment in other income, net following indications that the carrying value was no longer recoverable. Accordingly, the investment was fully impaired. Finally, we made additional investments of \$0.2 million in non-marketable investments not accounted for under the equity method during the year ended December 31, 2020.

For non-marketable investments not accounted for under the equity method as of both December 31, 2021 and 2020, cumulative upward adjustments for price changes was \$0.7 million. These adjustments were due to equity offerings at a higher price from the issuer in orderly transactions for identical or similar investments as those we hold.

Marketable Equity Securities

As of December 31, 2020, we held investments in marketable equity securities that have readily determinable fair values. These investments are reported at fair value with gains and losses recorded in earnings. These marketable investments were all sold in 2021.

The changes in marketable equity securities during the year ended December 31, 2021 are as follows:

(in \$ thousands, except shares data)	Invitae		OncoCyte		Oncimmune Holdings plc (Oncimmune)		HTG Molecular Diagnostics, Inc (HTGM)	
	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount
Balance at December 31, 2020	2,769,189	\$115,780	88,101	\$211	560,416	\$1,258	55,556	\$266
Shares received upon milestone achievement	1,100,190	35,338	30,152	147	86,218	220	—	—
(Loss) gain on change in fair value	—	(3,066)	—	123	—	61	—	65
Sale of investment	(3,869,379)	(148,052)	(118,253)	(481)	(646,634)	(1,539)	(55,556)	(331)
Balance at December 31, 2021	—	\$—	—	\$—	—	\$—	—	\$—

During 2021, we sold all shares received from Invitae upon milestone achievement and realized a gain of \$32.3 million in other income, net in the accompanying consolidated statement of income. We are entitled to up to 0.6 million Invitae shares and up to approximately \$3.0 million from OncoCyte in the future upon achievement of certain milestones.

As of December 31, 2020, we held marketable equity securities in short-term investment and other long-term assets in the accompanying consolidated balance sheet as follows:

(in thousands, except shares held)	Short-Term			Long-Term
	Invitae	OncoCyte	Oncimmune	HTGM
Shares held	2,769,189	88,101	560,416	55,556
Cost basis	\$100,822	\$230	\$657	\$2,000
Fair value	\$115,780	\$211	\$1,258	\$266
Total cumulative unrealized gain (loss)	\$14,958	(\$19)	\$601	(\$1,734)

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In 2020, HTGM completed a 15:1 reverse stock split.

During the year ended December 31, 2020, unrealized losses recognized for the change in fair market value of all marketable equity securities totaled \$5.7 million of which \$5.4 million is attributable to short-term and \$0.3 million to long-term investments.

11. Goodwill and Intangible Assets

The following sets forth the intangible assets by major asset class as of December 31, 2021 and 2020:

(in thousands)	Weighted Average Life (in years)	2021		2020	
		Gross Carrying Amount	Accumulated Amortization	Gross Carrying Amount	Accumulated Amortization
Amortized Intangible Assets:					
Patent and license rights	11.41	\$297,986	(\$202,569)	\$298,395	(\$197,038)
Developed technology	10.70	810,420	(400,021)	860,129	(378,705)
Customer base, trademarks, and non-compete agreements	12.36	263,878	(204,197)	314,876	(233,981)
	11.00	\$1,372,284	(\$806,787)	\$1,473,400	(\$809,724)
Unamortized Intangible Assets:					
In-process research and development		\$61,939		\$62,518	
Goodwill		2,350,763		2,364,031	
		\$2,412,702		\$2,426,549	

The in-process research and development as of December 31, 2021 is from the acquisitions of NeuMoDx in 2020 and STAT-Dx in 2018. The estimated fair value of acquired in-process research and development projects which have not reached technological feasibility at the date of acquisition are capitalized and subsequently tested for impairment through completion of the development process, at which point the capitalized amounts are amortized over their estimated useful life. If a project is abandoned rather than completed, all capitalized amounts are written-off immediately.

The changes in intangible assets, excluding goodwill, for the years ended December 31, 2021 and 2020 are as follows:

(in thousands)	2021	2020
Balance at beginning of year	\$726,194	\$632,434
Additions	23,969	24,007
Additions from acquisitions	—	157,170
Amortization	(104,371)	(103,230)
Disposals	(4,571)	(537)
Foreign currency translation adjustments	(13,785)	16,350
Balance at end of year	\$627,436	\$726,194

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Cash paid for purchases of intangible assets during the year ended December 31, 2021 totaled \$16.6 million, of which \$8.4 million is related to current year payments for assets that were accrued as of December 31, 2020 and \$0.2 million is related to prepayments recorded in other long-term assets in the accompanying consolidated balance sheet. Intangible additions of \$24.0 million includes \$15.0 million associated to a fully paid-up technology license received in exchange for a convertible note as discussed further in FN 24 "Related Party Transactions", \$8.1 million of cash paid during the year and \$0.9 million of additions which were previously recorded as prepayments.

Cash paid for intangible assets during the year ended December 31, 2020 totaled \$171.5 million of which \$146.1 million is related to payments in 2020 for licenses that were accrued as of December 31, 2019, \$24.0 million of current year additions and \$1.4 million for prepayments recorded in other long-term assets in accompanying consolidated balance sheet.

Amortization expense on intangible assets totaled approximately \$104.4 million, \$103.2 million and \$122.6 million, respectively, for the years ended December 31, 2021, 2020 and 2019. During the year ended December 31, 2019, we recorded an impairment charge of \$40.3 million related to the restructuring activities discussed further in Note 6 "Restructuring and Impairments" of which \$28.1 million is related to patent and license rights and \$12.1 million is related to developed technology.

Amortization of intangibles for the next five years is expected to be approximately:

Years ended December 31, (in thousands)	
2022	\$90,798
2023	\$88,438
2024	\$84,768
2025	\$72,974
2026	\$64,946

The changes in goodwill for the years ended December 31, 2021 and 2020 are as follows:

(in thousands)	2021	2020
Balance at beginning of year	\$2,364,031	\$2,140,503
Business combinations	—	157,627
Purchase adjustments	33,716	3,382
Foreign currency translation adjustments	(46,984)	62,519
Balance at end of year	\$2,350,763	\$2,364,031

The changes in the carrying amount of goodwill during the year ended December 31, 2021 resulted primarily from changes in foreign currency translation partially offset by purchase adjustments related to the acquisition of NeuMoDx discussed in in Note 5 "Acquisitions". The changes in goodwill during the year ended December 31, 2020 resulted primarily from the acquisition of NeuMoDx and changes in foreign currency translation.

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12. Leases

We have operating leases primarily for real estate. The leases generally have terms which range from one year to 15 years, some include options to extend or renew, and some include options to early terminate the leases. As of December 31, 2021 and 2020, no such options have been recognized as part of the right-of-use assets and lease liabilities.

Operating leases can contain variable lease charges based on an index like consumer prices or rates. During the years ended December 31, 2021 and 2020, amounts recorded as variable lease payments not included in the operating lease liability were not material.

When the interest rate implicit in each lease is not readily determinable, we apply our incremental borrowing rate in determining the present value of lease payments. All operating lease expense is recognized on a straight-line basis over the lease term. For the years ended December 31, 2021 and 2020, we recognized \$27.2 million and \$25.0 million in total lease costs, respectively.

Supplemental balance sheet and other information related to operating leases as of December 31, 2021 and 2020 are as follows:

(in thousands, except lease term and discount rate)	Location in balance sheet	2021	2020
Operating lease right-of-use assets	Other long-term assets	\$100,894	\$102,522
Current operating lease liabilities	Accrued and other current liabilities	\$22,048	\$23,450
Long-term operating lease liabilities	Other long-term liabilities	\$76,534	\$85,585
Weighted average remaining lease term		7.80 years	7.04 years
Weighted average discount rate		1.90%	1.89%

Supplemental cash flow information related to operating leases for the years ended December 31, 2021 and 2020 are as follows:

(in thousands)	2021	2020
Cash paid for operating leases included in operating cash flows	\$27,429	\$24,193
Operating lease right-of-use assets obtained in exchange for lease obligations	\$26,784	\$58,992

Future maturities of operating lease liabilities as of December 31, 2021 are as follows:

Years ending December 31, (in thousands)	
2022	\$23,641
2023	19,441
2024	13,930
2025	9,270
2026	7,031
Thereafter	32,054
Total lease payments	105,367
Less: imputed interest	(6,785)
Total	\$98,582

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As of December 31, 2021, we do not have any material operating leases that have not yet commenced. We did not hold any material finance leases as of December 31, 2021 and 2020.

13. Accrued and Other Current Liabilities

Accrued and other current liabilities at December 31, 2021 and 2020 consist of the following:

(in thousands)	Note	2021	2020
Fair value of derivative instruments	(14)	\$ 181,858	\$ 51,464
Payroll and related accruals		100,756	99,085
Other liabilities		66,589	67,244
Deferred revenue	(4)	63,368	57,066
Accrued expenses		54,271	51,026
Income tax payable	(17)	27,669	14,354
Accrued contingent consideration and milestone payments	(15)	24,100	23,593
Operating lease liabilities	(12)	22,048	23,450
Accrued royalties	(20)	12,559	7,427
Cash collateral	(14)	9,200	600
Accrued interest on long-term debt	(16)	4,488	4,575
Restructuring	(6)	1,714	11,599
Total accrued and other current liabilities		\$ 568,620	\$ 411,483

14. Derivatives and Hedging Objective and Strategy

In the ordinary course of business, we use derivative instruments, including swaps, forwards and/or options, to manage potential losses from foreign currency exposures and interest bearing assets or liabilities. The principal objective of such derivative instruments is to minimize the risks and/or costs associated with our global financial and operating activities. We do not utilize derivative or other financial instruments for trading or other speculative purposes. We recognize all derivatives as either assets or liabilities on the balance sheet on a gross basis, measure those instruments at fair value and recognize the change in fair value in earnings in the period of change, unless the derivative qualifies as an effective hedge that offsets certain exposures. We have agreed with almost all of our counterparties with whom we had entered into cross-currency swaps, interest rate swaps or foreign exchange contracts, to enter into bilateral collateralization contracts under which we will receive or provide cash collateral, as the case may be, for the net position with each of these counterparties. As of December 31, 2021, cash collateral positions consisted of \$9.2 million recorded in accrued and other current liabilities and \$11.2 million recorded in prepaid expenses and other current assets. As of December 31, 2020, we had cash collateral positions consisting of \$0.6 million recorded in accrued and other current liabilities and \$56.1 million recorded in prepaid expenses and other current assets in the accompanying consolidated balance sheets.

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Non-Derivative Hedging Instrument

Net Investment Hedge

We are party to a foreign currency non-derivative hedging instrument that is designated and qualifies as net investment hedge. The objective of the hedge is to protect part of the net investment in foreign operations against adverse changes in the exchange rate between the Euro and the functional currency of the U.S. dollar. The non-derivative hedging instrument is the German private corporate bond (Schuldschein) which was issued in the total amount of \$331.1 million as described in Note 16 "Debt". Of the \$331.1 million, which is held in both U.S. dollars and Euros, €255.0 million was designated as the hedging instrument as of December 31, 2020 against a portion of our Euro net investments in our foreign operations. As further described in Note 16, two tranches of the Schuldschein matured and were paid during 2021 and as a result, €220.5 million remained designated as a hedging instrument as of December 31, 2021. The relative changes in both the hedged item and hedging instrument are calculated by applying the change in spot rate between two assessment dates against the respective notional amount. The effective portion of the hedge is recorded in the cumulative translation adjustment account within other accumulated comprehensive loss. Based on the spot rate method, the unrealized loss recorded in equity as of December 31, 2021 and 2020 is \$2.1 million and \$26.9 million, respectively. Since we are using the debt as the hedging instrument, which is also remeasured based on the spot rate method, there is no hedge ineffectiveness related to the net investment hedge as of December 31, 2021 and 2020.

Derivatives Designated as Hedging Instruments

Cash Flow Hedges

As of December 31, 2021 and 2020, we held derivative instruments that are designated and qualify as cash flow hedges, where the effective portion of the gain or loss on the derivative is reported as a component of other comprehensive loss and reclassified into earnings in the same period or periods during which the hedged transaction affects earnings. Gains and losses on the derivative representing either hedge ineffectiveness or hedge components excluded from the assessment of effectiveness are recognized in current earnings. To date, we have not recorded any hedge ineffectiveness related to any cash-flow hedges in earnings. Based on their valuation as of December 31, 2021, we expect approximately \$3.4 million of derivative losses included in accumulated other comprehensive loss will be reclassified into income during the next 12 months. The cash flows derived from derivatives are classified in the consolidated statements of cash flows in the same category as the consolidated balance sheets account of the underlying item.

We use interest rate derivative contracts to align our portfolio of interest bearing assets and liabilities with our risk management objectives. We are party to five cross currency interest rate swaps through 2025 for a total notional amount of €180.0 million which qualify for hedge accounting as cash flow hedges. We determined that no ineffectiveness exists related to these swaps. As of December 31, 2021 and 2020, interest receivables of \$1.4 million and \$1.1 million, respectively are recorded in prepaid expenses and other current assets in the accompanying consolidated balance sheets.

Fair Value Hedges

As of December 31, 2021 and 2020, we held derivative instruments that qualify for hedge accounting as fair value hedges. For derivative instruments that are designated and qualify as a fair value hedge, the effective portion of the gain or loss on the derivative is reflected in earnings. This effect on earnings is offset by the change in the fair value of the hedged item attributable to the risk being hedged that is also recorded in earnings. To date, there has been no ineffectiveness. The cash flows derived from derivatives are classified in the consolidated statements of cash flows in the same category as the consolidated balance sheets account of the underlying item.

We hold interest rate swaps which effectively fix the fair value of a portion of our fixed rate private placement debt and qualify for hedge accounting as fair value hedges. We determined that no ineffectiveness exists related to these swaps. As of both December 31, 2021 and 2020, interest receivables of \$0.6 million are recorded in prepaid and other current assets in the accompanying consolidated balance sheets.

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Derivatives Not Designated as Hedging Instruments

Call Options

We entered into Call Options which, along with the sale of the Warrants, represent the Call Spread Overlay entered into in connection with the Cash Convertible Notes and which are more fully described in Note 16 "Debt". In these transactions, the Call Options are intended to address the equity price risk inherent in the cash conversion feature of each instrument by offsetting cash payments in excess of the principal amount due upon any conversion of the Cash Convertible Notes. Accordingly, the derivative is presented as either current or long-term based upon the classification of the related debt. As of December 31, 2021, the 2023 Notes may be surrendered for conversion through the close of business on March 31, 2022 as discussed in Note 16 "Debt". Accordingly, the related call options have been reclassified to current as of December 31, 2021

Aside from the initial payment of premiums for the Call Options, we will not be required to make any cash payments under the Call Options. We will, however, be entitled to receive under the terms of the Call Options, an amount of cash generally equal to the amount by which the market price per share of our common stock exceeds the exercise price of the Call Options during the relevant valuation period. The exercise price under the Call Options is equal to the conversion price of the Cash Convertible Notes.

The Call Options, for which our common stock is the underlying security, are derivative assets that require mark-to-market accounting treatment. The Call Options are measured and reported at fair value on a recurring basis, within Level 2 of the fair value hierarchy. The change in fair value is recognized immediately in our consolidated statements of income in other income, net.

Cash Convertible Notes Embedded Cash Conversion Option

The embedded cash conversion option within the Cash Convertible Notes discussed in Note 16 "Debt" is required to be separated from the Cash Convertible Notes and accounted for separately as a derivative liability, with changes in fair value reported in our consolidated statements of income in other income, net until the cash conversion option settles or expires. The embedded cash conversion option is measured and reported at fair value on a recurring basis, within Level 2 of the fair value hierarchy.

Because the terms of the Cash Convertible Notes' embedded cash conversion option are substantially similar to those of the Call Options, discussed above, we expect the effect on earnings from these two derivative instruments to mostly offset each other.

Embedded Conversion Option

During 2017, we purchased a convertible note for \$3.0 million from a publicly listed company considered a related party. The embedded conversion option within the convertible note was required to be separated from the convertible note and accounted for separately as a derivative liability, with changes in fair value reported in our consolidated statements of income (loss) in other income, net. The embedded cash conversion option was measured and reported at fair value on a recurring basis, within Level 2 of the fair value hierarchy. During 2020, \$3.2 million was collected including the principal and accrued interest. For further discussion of the inputs used to determine the fair value of the embedded cash conversion option, refer to Note 15 "Financial Instruments and Fair Value Measurements".

Foreign Exchange Contracts

As a globally active enterprise, we are subject to risks associated with fluctuations in foreign currencies in our ordinary operations. This includes foreign currency-denominated receivables, payables, debt, and other balance sheet positions including intercompany items. We manage balance sheet exposure on a group-wide basis using foreign exchange forward contracts, foreign exchange options and cross-currency swaps.

We are party to various foreign exchange forward, option and swap arrangements which had, at both December 31, 2021 and 2020, aggregate notional values of \$1.3 billion, which expire at various dates through December 2022. The transactions have been entered into to offset the effects from short-term balance sheet exposure to foreign currency exchange risk. Changes in the fair value of these arrangements have been recognized in other income, net.

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Fair Values of Derivative Instruments

The following table summarizes the fair value amounts of derivative instruments reported in the consolidated balance sheets as of December 31, 2021 and 2020:

(in thousands)	2021		2020	
	Current Asset	Long-Term Asset	Current Asset	Long-Term Asset
Assets:				
Derivative instruments designated as hedges				
Interest rate contracts - fair value hedge ⁽¹⁾	\$ 1,971	\$—	\$—	\$5,042
Total derivative instruments designated as hedges	\$ 1,971	\$—	\$—	\$5,042
Undesignated derivative instruments				
Equity options	\$ 162,141	\$ 190,430	\$ 2,415	\$ 374,038
Foreign exchange forwards and options	11,172	—	11,712	—
Total undesignated derivative instruments	\$ 173,313	\$ 190,430	\$ 14,127	\$ 374,038
Total Derivative Assets	\$ 175,284	\$ 190,430	\$ 14,127	\$ 379,080

(in thousands)	2021		2020	
	Current Liability	Long-Term Liability	Current Liability	Long-Term Liability
Liabilities:				
Derivative instruments designated as hedges				
Interest rate contracts - cash flow hedge ⁽¹⁾	\$—	(\$628)	\$—	(\$17,409)
Interest rate contracts - fair value hedge ⁽¹⁾	—	—	—	—
Total derivative instruments designated as hedges	\$—	(\$628)	\$—	(\$17,409)
Undesignated derivative instruments				
Equity options	(\$ 162,608)	(\$ 191,251)	(\$ 5,966)	(\$ 376,046)
Foreign exchange forwards and options	(19,250)	—	(45,498)	—
Total undesignated derivative instruments	(\$ 181,858)	(\$ 191,251)	(\$ 51,464)	(\$ 376,046)
Total Derivative Liabilities	(\$ 181,858)	(\$ 191,879)	(\$ 51,464)	(\$ 393,455)

⁽¹⁾ The fair value amounts for the interest rate contracts do not include accrued interest.

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Gains and Losses on Derivative Instruments

The following tables summarize the gains and losses on derivative instruments for the years ended December 31, 2021, 2020 and 2019:

(in thousands)	2021	2020	2019
	Other income, net	Other income, net	Other income, net
Total amounts presented in the Consolidated Statements of Income in which the effects of cash flow and fair value hedges are recorded	\$40,671	\$114,326	\$432
Gains (Losses) on Derivatives in Cash Flow Hedges			
Interest rate contracts			
Amount of (loss) gain reclassified from accumulated other comprehensive loss	(\$17,010)	\$18,666	(\$3,888)
Amounts excluded from effectiveness testing	—	—	—
Gains (Losses) on Derivatives in Fair Value Hedges			
Interest rate contracts			
Hedged item	3,072	(2,568)	(3,668)
Derivatives designated as hedging instruments	(3,072)	2,568	3,668
Gains (Losses) Derivatives Not Designated as Hedging Instruments			
Embedded conversion option			
Equity options	(23,882)	322,580	(104,125)
Cash convertible notes embedded cash conversion option	28,154	(321,213)	106,998
Foreign exchange forwards and options	10,333	(12,429)	1,835
Total (losses) gains	(\$2,405)	\$7,604	\$471

Balance Sheet Line Items in which the Hedged Item is Included

The following tables summarizes the balance sheet line items in which the hedged item is included as of December 31, 2021 and 2020:

(in thousands)	Carrying Amount of the Hedged Assets (Liabilities)		Cumulative Amount of Fair Value Hedging Adjustment Included in the Carrying Amount of Hedged Assets (Liabilities)	
	2021	2020	2021	2020
Balance Sheet line items in which the Hedged Item is included				
Current portion of long-term debt	(\$128,916)	\$—	\$1,971	\$—
Long-term debt	\$—	(\$131,923)	\$—	\$5,042

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15. Financial Instruments and Fair Value Measurements

Assets and liabilities are measured at fair value according to a three-tier fair value hierarchy which prioritizes the inputs used in measuring fair value as follows:

- *Level 1.* Observable inputs, such as quoted prices in active markets;
- *Level 2.* Inputs, other than the quoted price in active markets, that are observable either directly or indirectly; and
- *Level 3.* Unobservable inputs in which there is little or no market data, which require the reporting entity to develop its own assumptions.

The following table presents our fair value hierarchy for our financial assets and liabilities measured at fair value on a recurring basis as of December 31, 2021 and 2020:

(in thousands)	2021				2020			
	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total
Assets:								
Cash equivalents	\$366,117	\$179,844	\$—	\$545,961	\$273,584	\$—	\$—	\$273,584
Short-term investments	—	139,785	—	139,785	—	—	—	—
Marketable equity securities	—	—	—	—	117,515	—	—	117,515
Non-marketable equity securities	—	—	3,945	3,945	—	—	4,142	4,142
Equity options	—	352,571	—	352,571	—	376,453	—	376,453
Foreign exchange forwards and options	—	11,172	—	11,172	—	11,712	—	11,712
Interest rate contracts	—	1,971	—	1,971	—	5,042	—	5,042
	\$366,117	\$685,343	\$3,945	\$1,055,405	\$391,099	\$393,207	\$4,142	\$788,448
Liabilities:								
Foreign exchange forwards and options	\$—	(\$19,250)	\$—	(\$19,250)	\$—	(\$45,498)	\$—	(\$45,498)
Interest rate contracts	—	(628)	—	(628)	—	(17,409)	—	(17,409)
Equity options	—	(353,859)	—	(353,859)	—	(382,012)	—	(382,012)
Contingent consideration	—	—	(24,100)	(24,100)	—	—	(23,593)	(23,593)
	\$—	(\$373,737)	(\$24,100)	(\$397,837)	\$—	(\$444,919)	(\$23,593)	(\$468,512)

The carrying values of financial instruments, including cash and cash equivalents, accounts receivable, accounts payable and other accrued liabilities, approximate their fair values due to their short-term maturities.

Our assets and liabilities measured at fair value on a recurring basis consist of marketable securities discussed in Note 10 "Investments", which are classified in Level 1, short-term investments, which are classified in Level 2 of the fair value hierarchy, derivative contracts used to hedge currency and interest rate risk and derivative financial instruments entered into in connection with the Cash Convertible Notes discussed in Note 16 "Debt", which are classified in Level 2 of the fair value hierarchy, contingent consideration accruals which are classified in Level 3 of the fair value hierarchy, and are shown in the tables below and non-marketable equity securities remeasured during the year ended December 31, 2021 and 2020 are classified within Level 3 in the fair value hierarchy. There were no transfers between levels for the year ended December 31, 2021.

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In determining fair value for Level 2 instruments, we apply a market approach, using quoted active market prices relevant to the particular instrument under valuation, giving consideration to the credit risk of both the respective counterparty to the contract and the Company. To determine our credit risk, we estimated our credit rating by benchmarking the price of outstanding debt to publicly-available comparable data from rated companies. Using the estimated rating, our credit risk was quantified by reference to publicly-traded debt with a corresponding rating. The Level 2 derivative financial instruments include the Call Options asset and the embedded conversion option liability. See Note 16 "Debt", and Note 14 "Derivatives and Hedging", for further information. The derivatives are not actively traded and are valued based on an option pricing model that uses observable market data for inputs. Significant market data inputs used to determine fair values included our common stock price, the risk-free interest rate, and the implied volatility of our common stock. The Call Options asset and the embedded cash conversion option liability were designed with the intent that changes in their fair values would substantially offset, with limited net impact to our earnings. Therefore, the sensitivity of changes in the unobservable inputs to the option pricing model for such instruments is substantially mitigated.

Our Level 3 instruments include non-marketable equity security investments. Under the measurement alternative, the carrying value is measured at cost, less any impairment, plus or minus changes resulting from observable price changes in orderly transactions for identical or similar investments of the same issuer. Adjustments are determined primarily based on a market approach as of the transaction date.

Our Level 3 instruments also include contingent consideration liabilities. We value contingent consideration liabilities using unobservable inputs, applying the income approach, such as the discounted cash flow technique, or the probability-weighted scenario method. Contingent consideration arrangements obligate us to pay the sellers of an acquired entity if specified future events occur or conditions are met such as the achievement of technological or revenue milestones. We use various key assumptions, such as the probability of achievement of the milestones (0% to 100%) and the discount rate (between 6.5% and 6.9%), to represent the non-performing risk factors and time value when applying the income approach. We regularly review the fair value of the contingent consideration, and reflect any change in the accrual in the consolidated statements of income (loss) in the line items commensurate with the underlying nature of milestone arrangements.

Refer to Note 10 "Investments" for the change in non-marketable equity securities with Level 3 inputs during the year ended December 31, 2021 and 2020. For contingent consideration liabilities with Level 3 inputs, the following table summarizes the activity for the years ended December 31, 2021 and 2020:

(in thousands)	2021	2020
Balance at beginning of year	(\$23,593)	(\$162,160)
Additions from acquisitions	(507)	(3,223)
Payments	—	141,790
Balance at end of year	(\$24,100)	(\$23,593)

As of December 31, 2021, we had \$24.1 million accrued for contingent consideration which is included in accrued and other current liabilities in the accompanying consolidated balance sheet. During 2021, the \$0.5 million of additions relates to the time value increases of existing contingent consideration liabilities related to the 2018 acquisition of STAT-Dx. During 2020, the payments of \$141.8 million and time value increases of \$3.2 million both relate to the STAT-Dx acquisition as well as the 2019 asset acquisition of Formulatrix.

The estimated fair value of long-term debt as disclosed in Note 16 "Debt" was based on current interest rates for similar types of borrowings. The estimated fair values may not represent actual values of the financial instruments that could be realized as of the balance sheet date or that will be realized in the future.

The fair values of the financial instruments are presented in Note 16 "Debt" and were determined as follows:

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Cash Convertible Notes and Convertible Notes: Fair value is based on an estimation using available over-the-counter market information on the Cash Convertible Notes due in 2023 and 2024 as well as the Convertible Notes due in 2027.

U.S. Private Placement: Fair value of the outstanding bonds is based on an estimation using the changes in the U.S. Treasury rates.

German Private Placement: Fair value is based on an estimation using changes in the euro swap rates.

There were no adjustments in the years ended December 31, 2021 and 2020 for nonfinancial assets or liabilities required to be measured at fair value on a nonrecurring basis.

16. Debt

At December 31, 2021 and 2020, total long-term debt, net of debt issuance costs of \$8.4 million and \$10.7 million, respectively, consists of the following:

(in thousands)	2021	2020
0.875% Senior Unsecured Cash Convertible Notes due 2021	\$—	\$200
0.500% Senior Unsecured Cash Convertible Notes due 2023	375,149	361,304
1.000% Senior Unsecured Cash Convertible Notes due 2024	446,503	429,496
0.000% Senior Unsecured Convertible Notes due 2027	496,804	442,481
3.75% Series B Senior Notes due October 16, 2022	301,843	304,761
3.90% Series C Senior Notes due October 16, 2024	26,967	26,956
German Private Placement (Schuldschein)	294,504	357,551
Total long-term debt	1,941,770	1,922,749
Less current portion	847,626	42,539
Long-term portion	\$1,094,144	\$1,880,210

The notes are all unsecured obligations that rank pari passu. Interest expense on long-term debt was \$50.7 million, \$63.5 million and \$68.0 million for the years ended December 31, 2021, 2020 and 2019, respectively.

Repayments of long-term debt for the years ended December 31, 2021, 2020 and 2019 consisted of:

(in thousands)	2021	2020	2019
German Private Placement (Schuldschein)	\$41,145	\$—	\$—
0.875% Senior Unsecured Cash Convertible Notes due 2021	200	296,400	3,400
0.375% Senior Unsecured Cash Convertible Notes due 2019	—	—	430,000
3.19% Series A Senior Notes due October 16, 2019	—	—	73,000
	\$41,345	\$296,400	\$506,400

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The principal amount, carrying amount and fair values of long-term debt instruments are summarized below:

(in thousands)	As of December 31, 2021				
	Principal Amount	Unamortized debt discount and issuance costs	Carrying Amount	Fair Value	
				Amount	Leveling
Cash Convertible Notes due 2023	\$400,000	(\$24,851)	\$375,149	\$547,256	Level 1
Cash Convertible Notes due 2024	500,000	(53,497)	446,503	647,100	Level 1
Convertible Notes due 2027	500,000	(3,196)	496,804	536,400	Level 1
U.S. Private Placement ⁽¹⁾	328,971	(161)	328,810	331,566	Level 2
German Private Placement	294,738	(234)	294,504	296,587	Level 2
	\$2,023,709	(\$81,939)	\$1,941,770	\$2,358,909	

(in thousands)	As of December 31, 2020				
	Principal Amount, net of equity component	Unamortized debt discount and issuance costs	Carrying Amount	Fair Value	
				Amount	Leveling
Cash Convertible Notes due 2021	\$200	\$—	\$200	\$370	Level 1
Cash Convertible Notes due 2023	400,000	(38,696)	361,304	530,376	Level 1
Cash Convertible Notes due 2024	500,000	(70,504)	429,496	636,455	Level 1
Convertible Notes due 2027 ⁽²⁾	445,948	(3,467)	442,481	510,930	Level 1
U.S. Private Placement ⁽¹⁾	332,042	(325)	331,717	337,747	Level 2
German Private Placement	357,911	(360)	357,551	361,957	Level 2
	\$2,036,101	(\$113,352)	\$1,922,749	\$2,377,835	

⁽¹⁾ The principal amount of the U.S. Private Placement includes the \$2.0 million and \$5.0 million as of December 31, 2021 and 2020, respectively for the impact of the interest rate swaps which qualify for hedge accounting as fair value hedges which are further discussed in Note 14 "Derivatives and Hedging".

⁽²⁾ As of December 31, 2020, \$54.1 million was allocated to the equity component, representing the conversion option. ASU 2020-06 was adopted on January 1, 2021 as discussed in Note 2 "Effects of New Accounting Pronouncements".

Future maturities (stated at the carrying values) of long-term debt as of December 31, 2021, are as follows:

Years ending December 31, (in thousands)	
2022	\$847,626
2023	—
2024	580,946
2025	—
2026	—
thereafter	513,198
	\$1,941,770

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Interest expense for the years ended December 31, 2021 and 2020 related to the 2027 Notes and the Cash Convertible Notes was comprised of the following:

(in thousands)	2021	2020
Coupon interest	\$7,000	\$9,025
Amortization of original issuance discount	28,864	38,229
Amortization of debt issuance costs	2,521	2,942
Total interest expense	\$38,385	\$50,196

Convertible Notes due 2027

On December 17, 2020, we issued zero coupon convertible notes in an aggregate principal amount of \$500.0 million with a maturity date of December 17, 2027 (2027 Notes). The 2027 Notes carry no coupon interest. The net proceeds of the 2027 Notes totaled \$497.6 million, after payment of debt issuance costs of \$3.7 million.

In accounting for the issuance of the 2027 Notes in 2020 prior to the adoption of ASU 2020-06, we separated the 2027 Notes into liability and equity components. We allocated \$445.9 million of the 2027 Notes to the liability component, representing the fair value of a similar debt instrument that does not have an associated convertible feature; and \$54.1 million to the equity component, representing the conversion option, which does not meet the criteria for separate accounting as a derivative as it is indexed to our own stock. ASU 2020-06 was adopted on January 1, 2021 as discussed in Note 2 "Effects of New Accounting Pronouncements".

The effective interest rate of the 2027 Notes is 1.65%, which is imputed based on the amortization of the fair value of the embedded conversion option over the remaining term of the 2027 Notes.

The 2027 Notes are convertible into common shares based on an initial conversion rate, subject to adjustment, of 2,477.65 shares per \$200,000 principal amount of notes (which represents an initial conversion price of \$80.7218 per share, or 6.2 million underlying shares). At conversion, we will settle the 2027 Notes by repaying the principal portion in cash and any excess of the conversion value over the principal amount in shares of common stock.

The notes may be redeemed at the option of each noteholder at their principal amount on December 17, 2025 or in connection with a change of control or delisting event.

The 2027 Notes are convertible in whole, but not in part, at the option of the noteholders on a net share settlement basis, at the prevailing conversion price in the following circumstances beginning after January 27, 2021 through June 16, 2027:

- if the last reported sale price of our common stock for at least 20-consecutive trading days during a period of 30-consecutive trading days ending on the last trading day of the immediately preceding calendar quarter is greater than or equal to 130% of the conversion price on each applicable trading day; or
- if we undergo certain fundamental changes, including a change of control, as defined in the agreement; or
- if parity event or trading price unavailability event, as the case maybe occurs during the period of 10 days, including the first business day following the relevant trading price notification date; or
- if we distribute assets or property to all or substantially all of the holders of our common stock and those assets or other property have a value of more than 25% of the average daily volume-weighted average trading price of our common stock for the prior 20 consecutive trading days; or
- in case of early redemption in respect of the outstanding notes at our option, where the conversion date falls in the period from (and including) the date on which the call notice is published to (and including) the 45th business day prior to the redemption date; or
- if we experience certain customary events of default, including defaults under certain other indebtedness, until such event of default has been cured or waived.

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The noteholders may convert their notes at any time, without condition, on or after June 17, 2027 until the 45th business day prior to December 17, 2027.

No Contingent Conversion Conditions were triggered for the 2027 Notes as of December 31, 2021.

Cash Convertible Notes due 2021, 2023, and 2024

On March 19, 2014, we issued \$730.0 million aggregate principal amount of Cash Convertible Senior Notes in two tranches consisting of \$430.0 million due on March 19, 2019 (2019 Notes) and \$300.0 million due on March 19, 2021 (2021 Notes). The aggregate net proceeds of the 2019 and 2021 Convertible Notes were \$680.7 million, after payment of the net cost of the Call Spread Overlay described below and transaction costs. Repayment of these Notes are further detailed in the table above.

On September 13, 2017, we issued \$400.0 million aggregate principal amount of Cash Convertible Senior Notes which is due in 2023 (2023 Notes). The net proceeds of the 2023 Notes were \$365.6 million, after payment of the net cost of the Call Spread Overlay described below and transaction costs.

On November 13, 2018, we issued \$500.0 million aggregate principal amount of Cash Convertible Senior Notes which is due in 2024 (2024 Notes). The net proceeds of the 2024 Notes were \$468.9 million, after payment of the net cost of the Call Spread Overlay described below and transaction costs.

We refer to the 2019 Notes, 2021 Notes 2023 Notes, and 2024 Notes, collectively as the "Cash Convertible Notes".

Interest on the Cash Convertible Notes is payable semi-annually in arrears and will mature on the maturity date unless repurchased or converted with their terms prior to such date. The interest rate and corresponding maturity of each Note are summarized in the table below. The Cash Convertible Notes that remain outstanding as of December 31, 2021 are solely convertible into cash in whole, but not in part, at the option of noteholders under the circumstances described below and during the contingent conversion periods as shown in the table below.

Cash Convertible Notes	Annual Interest Rate	Date of Interest Payments	Maturity Date	Contingent Conversion Period	Conversion Rate per \$200,000 Principal Amount
2023 Notes	0.500%	March 13 and September 13	September 13, 2023	From October 24, 2017 to March 13, 2023	4,829.7279
2024 Notes	1.000%	May 13 and November 13	November 13, 2024	From December 24, 2018 to August 2, 2024	4,360.3098

Additionally, conversion may occur at any time following a Contingent Conversion Period through the fifth business day immediately preceding the applicable maturity date.

Upon conversion, noteholders will receive an amount in cash equal to the Cash Settlement Amount, calculated as described below. The Cash Convertible Notes are not convertible into shares of our common stock or any other securities.

Noteholders may convert Cash Convertible Notes into cash at their option at any time during the Contingent Conversion Periods described above only under the following circumstances (Contingent Conversion Conditions):

- if the last reported sale price of our common stock for at least 20-consecutive trading days during a period of 30-consecutive trading days ending on the last trading day of the immediately preceding calendar quarter is greater than or equal to 130% of the conversion price on each applicable trading day;
- if we undergo certain fundamental changes, including a change of control, as defined in the agreement;

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- if parity event or trading price unavailability event, as the case maybe occurs for the 2023 Notes and 2024 Notes during the period of 10 days, including the first business day following the relevant trading price notification date;
- if we elect to distribute assets or property to all or substantially all of the holders of our common stock and those assets or other property have a value of more than 25% of the average daily volume-weighted average trading price of our common stock for the prior 20 consecutive trading days;
- if we elect to redeem the Cash Convertible Notes; or
- if we experience certain customary events of default, including defaults under certain other indebtedness until such event has been cured or waived or the payment of the Notes have been accelerated.

The Contingent Conversion Conditions in the 2023 and 2024 Notes noted above have been analyzed under ASC 815, *Derivatives and Hedging*, and, based on our analysis, we determined that each of the embedded features listed above are clearly and closely related to the 2023 and 2024 Notes (i.e., the host contracts). As a result, pursuant to the accounting provisions of ASC 815, *Derivatives and Hedging*, the Contingent Conversion Conditions noted above are not required to be bifurcated as separate instruments.

As of December 31, 2021, the 2023 Notes may be surrendered for conversion through the close of business on March 31, 2022 (the "Relevant Fiscal Quarter"). The 2023 Notes have become convertible pursuant to Section 12.01(b)(iv) of the indenture because the arithmetic mean of the last reported sale prices of our common stock, in each trading day in at least one 20 consecutive trading day period during the 30 consecutive trading day period ending on the last trading day of the preceding fiscal quarter, was greater than 130% of the conversion price in effect on such last trading day. The 2023 Notes will be convertible at a conversion ratio of 4,829.7279 per \$200,000 principal amount of 2023 Notes, which is equivalent to a conversion price of approximately \$41.4102 per share of our common stock.

No Contingent Conversion Conditions were triggered for the 2024 Notes as of December 31, 2021.

Upon conversion, holders are entitled to a cash payment (Cash Settlement Amount) equal to the average of the conversion rate multiplied by the daily volume-weighted average trading price for our common stock over a 50-day period. The conversion rate is subject to adjustment in certain instances but will not be adjusted for any accrued and unpaid interest. In addition, following the occurrence of certain corporate events that may occur prior to the applicable maturity date, we may be required to pay a cash make-whole premium by increasing the conversion rate for any holder who elects to convert Cash Convertible Notes in connection with the occurrence of such a corporate event.

We may redeem the Cash Convertible Notes in their entirety at a price equal to 100% of the principal amount of the applicable Cash Convertible Notes plus accrued interest at any time when 20% or less of the aggregate principal amount of the applicable Cash Convertible Notes originally issued remain outstanding.

Because the Cash Convertible Notes contain an embedded cash conversion option, we have determined that the embedded cash conversion option is a derivative financial instrument, which is required to be separated from the Cash Convertible Notes and accounted for separately as a derivative liability, with changes in fair value reported in our consolidated statements of income (loss) until the cash conversion option transaction settles or expires. The initial fair value liability of the embedded cash conversion option for the 2019 and 2021 Notes was \$51.2 million and \$54.0 million, respectively, \$74.5 million for the 2023 Notes, and \$98.5 million for the 2024 Notes, which simultaneously reduced the carrying value of the Cash Convertible Notes (effectively an original issuance discount). For further discussion of the derivative financial instruments relating to the Cash Convertible Notes, refer to Note 14 "Derivatives and Hedging".

As noted above, the reduced carrying value on the Cash Convertible Notes resulted in a debt discount that is amortized to the principal amount through the recognition of non-cash interest expense using the effective interest method over the expected life of the debt, which is five and seven for the 2019 Notes and 2021 Notes, and six years for the 2023 Notes and 2024 Notes, respectively. This resulted in our recognition of interest expense on the Cash Convertible Notes at an effective rate approximating

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what we would have incurred had nonconvertible debt with otherwise similar terms been issued. The effective interest rate of the 2019 Notes, 2021 Notes, 2023 Notes and 2024 Notes is 2.937%, 3.809%, 3.997% and 4.782%, respectively, which is imputed based on the amortization of the fair value of the embedded cash conversion option over the remaining term of the Cash Convertible Notes.

In connection with the issuance of the May 2014 Cash Convertible Senior Notes, which included 2021 Notes, we incurred approximately \$13.1 million in transaction costs. We incurred approximately \$6.2 million and \$5.7 million in transaction costs for the 2023 Notes and 2024 Notes, respectively. Such costs have been allocated to the Cash Convertible Notes and deferred and are being amortized to interest expense over the terms of the Cash Convertible Notes using the effective interest method.

Cash Convertible Notes Call Spread Overlay

Concurrent with the issuance of the Cash Convertible Notes, we entered into privately negotiated hedge transactions (Call Options) with, and issued warrants to purchase shares of our common stock (Warrants) to, certain financial institutions. We refer to the Call Options and Warrants collectively as the "Call Spread Overlay". The Call Options are intended to offset any cash payments payable by us in excess of the principal amount due upon any conversion of the Cash Convertible Notes.

The Call Options are derivative financial instruments and are discussed further in Note 14 "Derivatives and Hedging". The Warrants are equity instruments and are further discussed in Note 18 "Equity".

Aside from the initial payment of a premium, we will not be required to make any cash payments under the Call Options, and will be entitled to receive an amount of cash, generally equal to the amount by which the market price per share of our common stock exceeds the exercise price of the Call Options during the relevant valuation period. The exercise price under the Call Options is initially equal to the conversion price of the Cash Convertible Notes.

During 2019, we received \$133.2 million in cash upon the exercise of the call options in connection with the repayment of the 2019 Notes. In the same transaction, we paid \$132.7 million for the intrinsic value of the 2019 Notes' embedded cash conversion option. The net effect of the cash paid and received of \$0.5 million was recognized as a gain in other income, net. In connection with the early conversion of a portion of 2021 Notes during 2019, we received \$1.5 million upon the exercise of the related call options. Also, we paid \$1.1 million for the intrinsic value of the 2021 Notes' embedded cash conversion option. As a result of these early conversions, a gain of \$0.4 million was recognized in other income, net.

During 2020, while the 2021 Notes were contingently convertible, we received conversion notices for \$119.4 million of outstanding principal. In December 2020, we initiated a tender offer and repurchased a further \$177.0 million of outstanding principal. In connection with these transactions, we received \$239.8 million in cash upon the exercise of the call options and we paid \$237.4 million for the intrinsic value of the 2021 Notes' embedded cash conversion option. The net effect of the cash paid and received of \$2.4 million was recognized as a gain in other income, net.

The Warrants that were issued with our Cash Convertible Notes, could have a dilutive effect to the extent that the price of our common stock exceeds the applicable strike price of the Warrants. For each Warrant that is exercised, we will deliver to the holder a number of shares of our common stock equal to the amount by which the settlement price exceeds the exercise price, plus cash in lieu of any fractional shares. We will not receive any proceeds if the Warrants are exercised.

U.S. Private Placement

In October 16, 2012, we completed a private placement through the issuance of new senior unsecured notes at a total amount of \$400.0 million with a weighted average interest rate of 3.66% (settled on October 16, 2012). The notes were issued in three series: (1) \$73.0 million 7-year term due and paid on October 16, 2019 (3.19%); (2) \$300.0 million 10-year term due on October 16, 2022 (3.75%); and (3) \$27.0 million 12-year term due on October 16, 2024 (3.90%). We paid \$2.1 million in debt

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issuance costs which will be amortized through interest expense using the effective interest method over the lifetime of the notes. The note purchase agreement contains certain financial and non-financial covenants, including but not limited to, restrictions on priority indebtedness and the maintenance of certain financial ratios. We were in compliance with these covenants at December 31, 2021. During 2014, we entered into interest rate swaps, which effectively fixed the fair value of \$200.0 million of this debt, which was reduced to \$127.0 million following the 2019 \$73.0 million repayment. These interest rate swaps qualify for hedge accounting as fair value hedges as described in Note 14 "Derivatives and Hedging".

German Private Placement (Schuldschein)

In 2017, we completed a German private placement bond (Schuldschein) which was issued in several tranches totaling \$331.1 million due in various periods through 2027. In the first quarter of 2021, we repaid \$41.1 million for two tranches that matured. The Schuldschein consists of one U.S. dollar and several Euro denominated tranches. The Euro tranches are designated as a foreign currency non-derivative hedging instrument that qualifies as a net investment hedge as described in Note 14 "Derivatives and Hedging". Based on the spot rate method, the change in the carrying value of the Euro denominated tranches attributed to the net investment hedge as of December 31, 2021 totaled \$2.1 million of unrealized loss and is recorded in equity. We paid \$1.2 million in debt issuance costs which are being amortized through interest expense over the lifetime of the notes. A summary of the tranches is as follows:

Currency	Notional Amount	Interest Rate	Maturity	Carrying Value (in thousands) as of December 31,	
				2021	2020
EUR	€11.5 million	Fixed 0.4%	March 2021	\$—	\$14,115
EUR	€23.0 million	Floating EURIBOR + 0.4%	March 2021	—	28,224
EUR	€21.5 million	Fixed 0.68%	October 2022	24,340	26,361
EUR	€64.5 million	Floating EURIBOR + 0.5%	October 2022	73,020	79,083
USD	\$45.0 million	Floating LIBOR + 1.2%	October 2022	44,976	44,948
EUR	€25.0 million	Floating EURIBOR + 0.5%	October 2022	28,298	30,642
EUR	€64.0 million	Fixed 1.09%	June 2024	72,405	78,429
EUR	€31.0 million	Floating EURIBOR + 0.7%	June 2024	35,071	37,989
EUR	€14.5 million	Fixed 1.61%	June 2027	16,394	17,760
				\$294,504	\$357,551

The financial markets regulators in the United Kingdom and the Eurozone have passed regulations wherein non-dollar LIBORs and one-week and two-month USD LIBOR ended after 2021, while the remaining USD LIBOR tenors will end as of June 30, 2023. Market participants and regulators are working on establishing new interest rate benchmarks. While the outcome of this work is not clear yet, the USD tranche of the Schuldschein and our interest rate swaps continue to make reference to the current LIBOR benchmark rate. These agreements contain language for the determination of interest rates in case the benchmark rate is not available. However, as the maturity date for the USD tranche of the Schuldschein and related interest rate swaps is in October 2022, these instruments will be settled before the LIBOR end date of June 30, 2023. Therefore we currently do not anticipate any impact from the LIBOR phase out.

Revolving Credit Facility

Our credit facilities available and undrawn at December 31, 2021 total €427.0 million (approximately \$483.6 million). This includes a €400.0 million syndicated ESG-linked revolving credit facility expiring December 2024 and three other lines of credit amounting to €27.0 million with no expiration date. The €400.0 million facility can be utilized in Euro and bears interest of 0.550% to 1.500% above EURIBOR, and is offered with interest periods of one, three or six months. The commitment fee is

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calculated based on 35% of the applicable margin. In 2021, \$1.3 million of commitment fees were paid. The revolving facility agreement contains certain financial and non-financial covenants, including but not limited to, restrictions on the encumbrance of assets and the maintenance of certain financial ratios. We were in compliance with these covenants at December 31, 2021. The credit facilities are for general corporate purposes and no amounts were utilized at December 31, 2021.

17. Income Taxes

Income (loss) before income taxes for the years ended December 31, 2021, 2020 and 2019 consisted of:

(in thousands)	2021	2020	2019
Pretax income (loss) in the Netherlands	\$7,062	(\$38,242)	(\$77,433)
Pretax income (loss) from foreign operations	618,771	477,714	(343)
	\$625,833	\$439,472	(\$77,776)

Income tax expense (benefit) for the years ended December 31, 2021, 2020 and 2019 are as follows:

(in thousands)	2021	2020	2019
Current:			
The Netherlands	\$1,714	\$270	\$5,670
Foreign	116,808	86,720	13,371
	118,522	86,990	19,041
Deferred:			
The Netherlands	(1,776)	(6,921)	4,177
Foreign	(3,512)	215	(59,539)
	(5,288)	(6,706)	(55,362)
Total income tax expense (benefit)	\$113,234	\$80,284	(\$36,321)

The Netherlands statutory income tax rate was 25% for the years ended December 31, 2021, 2020 and 2019. Income from foreign subsidiaries is generally taxed at the statutory income tax rates applicable in the respective countries of domicile. The principal items comprising the differences between income taxes computed at the Netherlands statutory rate and our effective tax rate for the years ended December 31, 2021, 2020 and 2019 are as follows:

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	2021	2020	2019
Income taxes at the Netherlands statutory rate	25.0%	25.0%	25.0%
Valuation allowance	(4.4)	(8.1)	(26.9)
Taxation of foreign operations, net ⁽¹⁾	(3.0)	(2.1)	33.1
Unrecognized tax benefits ⁽²⁾	1.6	8.2	(14.1)
Excess tax benefit related to share-based compensation	(1.0)	(0.6)	5.1
Prior year taxes	0.6	(1.6)	(1.4)
Government incentives ⁽³⁾	(0.6)	(0.6)	9.7
Changes in tax laws and rates	(0.4)	(0.3)	(0.4)
Tax impact from (deductible) nondeductible items	0.2	(0.8)	(10.3)
Tax impact from intangible property transfer	0.0	(0.8)	27.2
Other items, net	0.1	0.0	(0.3)
Effective tax rate	18.1%	18.3%	46.7%

⁽¹⁾ Our effective tax rate reflects the benefit of our global operations where certain income or loss is taxed at rates higher or lower than the Netherlands' statutory rate of 25% as well as the benefit of some income being partially exempt from income taxes due to various intercompany operating and financing activities. These foreign tax benefits are due to a combination of favorable tax laws, regulations and exemptions in these jurisdictions. Partial tax exemptions exist on foreign income primarily derived from operations in Germany, the Netherlands and Singapore. Further, we have intercompany financing arrangements in which the intercompany income is nontaxable or partially exempt or subject to lower statutory tax rates. During 2021 and 2020, we had intercompany arrangements through Dubai, and through mid-2019 had arrangements through Luxembourg and Ireland.

⁽²⁾ In 2020, we recorded tax accruals related to the potential nondeductibility of the \$95.0 million expense reimbursement paid in connection with the unsuccessful acquisition attempt by Thermo Fisher.

⁽³⁾ Government incentives include tax credits in the U.S. relating to research and development expense and other government incentives.

We conduct business globally and, as a result, file numerous consolidated and separate income tax returns in the Netherlands, Germany, and the U.S. federal jurisdiction, as well as in various other state and foreign jurisdictions. In the normal course of business, we are subject to examination by taxing authorities throughout the world. Tax years in the Netherlands are potentially open back to 2009 for income tax examinations by the Netherlands taxing authority. The German group is open to audit for the tax years starting in 2014 and in 2019, the German tax authority commenced an audit for the 2014-2016 tax years. The U.S. consolidated group is subject to federal and most state income tax examinations by tax authorities beginning with the year ending December 31, 2018 through the current period. Our other subsidiaries, with few exceptions, are no longer subject to income tax examinations by tax authorities for years before 2017.

Changes in the amount of unrecognized tax benefits for the years ended December 31, 2021, 2020, and 2019 are as follows:

(in thousands)	2021	2020	2019
Balance at beginning of year	\$100,092	\$58,002	\$55,780
Additions based on tax positions related to the current year	6,629	31,758	5,770
Additions for tax positions of prior years	5,036	3,560	14,532
Decrease for tax position of prior years	(266)	(57)	(9,073)
Decrease related to settlements	—	—	(7,605)
Decrease due to lapse of statute of limitations	(344)	(520)	(409)
(Decrease) increase from currency translation	(7,529)	7,349	(993)
Balance at end of year	\$103,618	\$100,092	\$58,002

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At December 31, 2021 and 2020, our net unrecognized tax benefits totaled approximately \$103.6 million and \$100.1 million, respectively, which, if recognized, would favorably affect our effective tax rate in any future period. It is reasonably possible that approximately \$35.1 million of the unrecognized tax benefits may be released or utilized during the next 12 months due to lapse of statute of limitations or settlements with tax authorities. However, various events could cause our current expectations to change in the future. The above unrecognized tax benefits, if ever recognized in the financial statements, would be recorded in the statements of income (loss) as part of income tax expense (benefit).

Our policy is to recognize interest accrued related to an underpayment of income taxes in interest expense and penalties within income tax expense. For the years ended December 31, 2021, 2020 and 2019, we recognized (income) expense, net for interest and penalties of \$(0.6) million, \$1.9 million and \$1.6 million, respectively. At December 31, 2021 and 2020, we have accrued interest and penalties of \$3.8 million and \$4.6 million, respectively, which are not included in the table above.

We have recorded net deferred tax assets of \$35.3 million and \$15.7 million at December 31, 2021 and 2020, respectively. The components of the net deferred tax asset and liability at December 31, 2021 and 2020 are as follows:

(in thousands)	2021		2020	
	Deferred Tax Asset	Deferred Tax Liability	Deferred Tax Asset	Deferred Tax Liability
Net operating loss and tax credit carryforward	\$67,853	\$—	\$67,856	\$—
Accrued and other liabilities	26,513	—	22,926	—
Inventories	4,790	(3,935)	3,872	(2,269)
Unrealized loss on investments	—	(32)	—	(25,779)
Property, plant and equipment	6,046	(29,241)	6,099	(23,376)
Intangible assets	4,066	(62,585)	2,817	(55,999)
Share-based compensation	20,464	—	18,377	—
Disallowed interest carryforwards	16,219	—	42,090	—
Convertible notes	5,231	—	6,512	(13,513)
Other	7,287	(6,045)	9,428	(6,046)
	158,469	(101,838)	179,977	(126,982)
Valuation allowance	(21,326)	—	(37,332)	—
	\$137,143	(\$101,838)	\$142,645	(\$126,982)
Net deferred tax assets		\$35,305		\$15,663

As of December 31, 2021, the valuation allowance principally relates to net operating loss carryforwards. A deferred tax asset can only be recognized to the extent it is "more likely than not" that the assets will be realized. Judgments around realizability depend on the availability and weight of both positive and negative evidence. At December 31, 2021, we had \$599.5 million in total net operating loss (NOL) carryforwards which included \$231.2 million for Germany, \$158.8 million for the U.S., \$59.7 million for Spain, \$55.7 million for the Netherlands, and \$94.1 million for other foreign jurisdictions. The NOL carryforwards in Germany, the Netherlands and Spain carryforward indefinitely. The entire NOL carryforward in the U.S. is subject to limitations under Section 382 of the U.S. Internal Revenue Code. The NOL carryforwards in the U.S. expire between 2024 and 2034. NOL carryforwards of \$19.9 million in other foreign jurisdictions expire between 2022 and 2031 while the remainder can be carried forward indefinitely. At December 31, 2021, tax credits total \$3.0 million which expire between 2031 and 2040.

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The United States Coronavirus Aid, Relief, and Economic Security Act (CARES Act) was enacted on March 27, 2020. The CARES Act and related notices include several significant provisions, including delaying certain payroll tax payments and mandatory transition tax payments under the Tax Cuts and Jobs Act as well as an extension of the NOL carryback period to five years. At present, the primary impact from the CARES Act is that it allowed us to carry back U.S. NOLs for five years. We will continue to monitor and assess the impact the CARES Act and similar legislation in other countries may have on our business and financial results.

During the year ended December 31, 2021, we recorded an increase to the valuation allowance of \$0.6 million related to losses in certain foreign jurisdictions and a decrease of \$28.2 million. The decrease primarily included \$16.0 million due to the utilization of previously disallowed U.S. interest carryforwards and \$9.4 million due to a change in judgment about the realizability of previously disallowed U.S. interest carryforwards in future years. We expect to utilize the remaining total of \$16.2 million of disallowed interest carryforwards in 2022. Additionally, in 2021, \$13.5 million of the valuation allowance, which had been established in additional paid in capital in 2020, was reversed due to adopting ASU 2020-06.

During the year ended December 31, 2020, we recorded an increase to the valuation allowance of \$6.6 million related to losses in certain foreign jurisdictions and a decrease of \$42.2 million primarily related to utilized U.S. disallowed interest carryforwards and \$13.5 million valuation allowance in additional paid in capital related to the 2027 Convertible Notes.

During the year ended December 31, 2019, we increased the valuation allowance by \$20.9 million related to losses in certain foreign jurisdictions and U.S. disallowed interest carryforwards.

As of December 31, 2021, a deferred tax liability has not been recognized for residual income taxes in the Netherlands on the undistributed earnings of the majority of our foreign subsidiaries as these earnings are considered to be either indefinitely reinvested or can be repatriated tax free under the Dutch participation exemption. The indefinitely reinvested earnings retained of our subsidiaries that would be subject to tax if distributed amounted to \$950.5 million at December 31, 2021. Estimating the amount of the unrecognized deferred tax liability on indefinitely reinvested foreign earnings is not practicable. Should the earnings be remitted as dividends, we may be subject to taxes including withholding tax. We have \$24.5 million of undistributed earnings that we do not consider indefinitely reinvested and have recorded a deferred tax liability at December 31, 2021 and 2020, of \$1.5 million and \$1.6 million, respectively.

18. Equity Shares

The authorized classes of our shares consist of Common Shares (410 million authorized), Preference Shares (450 million authorized) and Financing Preference Shares (40 million authorized). All classes of shares have a par value of €0.01. No Financing Preference Shares or Preference Shares have been issued. Like all shareholders' equity accounts, common shares are translated to U.S. dollars at the foreign exchange rates in effect when the shares are issued.

Issuance and Conversion of Warrants

In connection with the issuance of the Cash Convertible Notes as described in Note 16 "Debt", we issued Warrants as summarized in the table below. The number of warrants and exercise prices are subject to customary adjustments under certain circumstances. The proceeds, net of issuance costs, from the sale of the Warrants are included as additional paid in capital in the accompanying consolidated balance sheets.

The Warrants are exercisable only upon expiration. For each Warrant that is exercised, we will deliver to the holder a number of shares of our common stock equal to the amount by which the settlement price exceeds the exercise price, divided by the settlement price, plus cash in lieu of any fractional shares. The Warrants could separately have a dilutive effect on shares of our common stock to the extent that the market value per share of our common stock exceeds the applicable exercise price of the Warrants (as measured under the terms of the Warrants).

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Cash convertible notes	Issued on	Number of share warrants issued (in millions)	Exercise price per share	Proceeds from issuance of warrants, net of issuance costs (in millions)	Warrants expire over a period of 50 trading days beginning on
2023	September 13, 2017	9.7	\$49.9775	\$45.3	June 26, 2023
2024	November 13, 2018	10.9	\$50.2947	\$72.4	August 27, 2024

During 2020, 0.8 million common shares were issued in connection with the early conversion of 4.2 million warrants related to the 2021 Notes which resulted in a \$7.5 million decrease to additional paid in capital, a \$22.7 million decrease in retained earnings, and a decrease of \$30.3 million in treasury shares. The remaining warrants related to the 2021 Notes of 6.3 million were terminated in 2020, resulting in a cash payment of \$174.6 million, a \$30.3 million decrease to additional paid in capital and a \$144.3 million decrease in retained earnings.

Share Repurchase Programs

On July 12, 2021, we announced our seventh share repurchase program of up to \$100 million of our common shares. During 2021, we repurchased 1.9 million QIAGEN shares for \$100.0 million (including transaction costs). This program ended on October 29, 2021.

On May 6, 2019, we announced our sixth share repurchase program of up to \$100 million of our common shares. During 2020, we repurchased 1.3 million QIAGEN shares for \$64.0 million (including transaction costs). This program ended on December 17, 2020.

On January 31, 2018, we announced our fifth share repurchase program of up to \$200 million of our common shares. During 2019, we repurchased 2.0 million QIAGEN shares for \$74.5 million (including transaction costs), bringing the total shares repurchased under this program to 4.9 million for \$179.1 million (including transaction costs). This program ended on June 30, 2019.

The cost of repurchased shares is included in treasury stock and reported as a reduction in total equity when a repurchase occurs. Repurchased shares will be held in treasury in order to satisfy various obligations, which include exchangeable debt instruments, warrants and employee share-based remuneration plans.

Accumulated Other Comprehensive Loss

The following table is a summary of the components of accumulated other comprehensive loss as of December 31, 2021 and 2020:

(in thousands)	2021	2020
Net unrealized income (loss) on hedging contracts, net of tax	\$1,245	(\$23,268)
Net unrealized loss on pension, net of tax	(588)	(599)
Foreign currency effects from intercompany long-term investment transactions, net of tax of \$12.4 million and \$10.7 million in 2021 and 2020, respectively	(30,768)	(25,717)
Foreign currency translation adjustments	(296,559)	(194,238)
Accumulated other comprehensive loss	(\$326,670)	(\$243,822)

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19. Earnings Per Common Share

We present basic and diluted earnings per share. Basic earnings per share is calculated by dividing the net income (loss) by the weighted average number of common shares outstanding. Diluted earnings per share reflect the potential dilution that would occur if all "in the money" securities to issue common shares were exercised.

The following schedule summarizes the information used to compute earnings per common share for the years ended December 31, 2021, 2020 and 2019:

(in thousands, except per share data)	2021	2020	2019
Net income (loss)	\$512,599	\$359,188	(\$41,455)
Weighted average number of common shares used to compute basic net income per common share	227,983	228,427	226,777
Dilutive effect of stock options and restrictive stock units	3,403	3,350	—
Dilutive effect of outstanding warrants	648	2,437	—
Weighted average number of common shares used to compute diluted net income per common share	232,034	234,214	226,777
Outstanding options and awards having no dilutive effect, not included in above calculation	8	11	107
Outstanding warrants having no dilutive effect, not included in above calculation	19,912	26,438	32,938
Basic earnings (loss) per common share	\$2.25	\$1.57	(\$0.18)
Diluted earnings (loss) per common share	\$2.21	\$1.53	(\$0.18)

For purposes of considering the 2027 Notes in determining diluted earnings (loss) per common share, only an excess of the conversion value over the principal amount would have a dilutive impact using the treasury stock method. Since the 2027 Notes were out of the money and anti-dilutive during the period from December 17, 2020 through December 31, 2021, they were excluded from the diluted earnings (loss) per common share calculation in 2020 and 2021.

Due to the net loss for the year ended December 31, 2019, stock options and restricted stock units representing approximately 3.9 million weighted-average shares of common stock and warrants representing 1.7 million shares of common stock were excluded from the computation of diluted net loss because the impact would have been antidilutive.

20. Commitments and Contingencies

Licensing and Purchase Commitments

We have licensing agreements with companies, universities and individuals, some of which require certain up-front payments. Royalty payments are required on net product sales ranging from 0.45 percent to 25 percent of covered products or based on quantities sold. Several of these agreements have minimum royalty requirements. The accompanying consolidated balance sheets include accrued royalties relating to these agreements in the amount of \$12.6 million and \$7.4 million at December 31, 2021 and 2020, respectively. Royalty expense relating to these agreements amounted to \$18.5 million, \$12.2 million, and \$13.5 million for the years ended December 31, 2021, 2020 and 2019, respectively. Royalty expense is primarily recorded in cost of sales, with a small portion recorded as research and development expense depending on the use of the technology under license. Some of these agreements also have minimum raw material purchase requirements and requirements to perform specific types of research.

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At December 31, 2021, we had commitments to purchase goods or services, and for future license and royalty payments. They are as follows:

Years ending December 31, (in thousands)	Purchase Commitments	License & Royalty Commitments
2022	\$ 115,180	\$ 6,701
2023	14,897	3,941
2024	9,250	1,994
2025	—	1,483
2026	—	793
Thereafter	—	2,885
	\$ 139,327	\$ 17,797

We have total purchase commitments of \$ 12.3 million included in the table above and future license and royalty commitments of \$ 9.2 million associated to a January 2022 agreement that will be paid over the next 19 years with companies in which we hold an interest and are considered related parties.

Contingent Consideration Commitments

Pursuant to the purchase agreements for certain acquisitions we could be required to make additional contingent cash payments, based on the achievement of certain revenue and operating results milestones, totaling up to \$ 26.6 million in 2022 of which \$ 24.1 million is included in accrued and other current liabilities in the accompanying consolidated balance sheet as of December 31, 2021.

Employment Agreements

Certain of our employment contracts contain provisions which guarantee the payments of certain amounts in the event of a change in control, as defined in the agreements, or if the executive is terminated for reasons other than cause, as defined in the agreements. At December 31, 2021, the commitment under these agreements totaled \$ 9.2 million.

Contingencies

In the ordinary course of business, we provide a warranty to customers that our products are free of defects and will conform to published specifications. Generally, the applicable product warranty period is one year from the date of delivery of the product to the customer or of site acceptance, if required. Additionally, we typically provide limited warranties with respect to our services. We provide for estimated warranty costs at the time of the product sale. The changes in the carrying amount of warranty obligations for the years ended December 31, 2021 and 2020 are as follows:

(in thousands)	2021	2020
Balance at beginning of year	\$ 4,813	\$ 3,141
Provision charged to cost of sales	7,518	5,645
Usage	(5,774)	(3,978)
Adjustments to previously provided warranties, net	(43)	(125)
Currency translation	(190)	130
Balance at end of year	\$ 6,324	\$ 4,813

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Litigation

From time to time, we may be party to legal proceedings incidental to our business. As of December 31, 2021, certain claims, suits or legal proceedings arising out of the normal course of business have been filed or were pending against QIAGEN or our subsidiaries. These matters have arisen in the ordinary course and conduct of business, as well as through acquisition. Although it is not possible to predict the outcome of such litigation, we assess the degree of probability and evaluate the reasonably possible losses that we could incur as a result of these matters. We accrue for any estimated loss when it is probable that a liability has been incurred and the amount of probable loss can be estimated.

Litigation accruals recorded in accrued and other current liabilities totaled \$5.7 million as of December 31, 2021 and \$5.2 million as of December 31, 2020.

ArcherDX spun out as an independent company in conjunction with QIAGEN's acquisition of Enzymatics in 2015. In 2018, ArcherDX (recently acquired by Invitae) and Massachusetts General Hospital (MGH) sued QIAGEN for patent infringement. In August 2021, a Federal jury ruled that QIAGEN infringed two patents owned by ArcherDX and awarded damages of \$4.7 million which were expensed in Restructuring, acquisition, integration and other, net, and remain accrued as of December 31, 2021. We plan to appeal the verdict as soon as the final verdict is entered.

On September 17, 2020, QIAGEN acquired NeuMoDx. As part of the purchase, QIAGEN also acquired preexisting contingencies and became defendant in ongoing litigation matters pertaining to preexisting claims made by Becton Dickinson (BD) and subsidiaries over patent infringement. In addition to patent infringement allegations, the litigation involved trade secret misappropriation and other non-patent claims relating to NeuMoDx and former NeuMoDx officers, before the acquisition by QIAGEN. On September 26, 2021, through mediation, the parties reached a preliminary settlement of \$53.0 million due to BD for the past infringements of NeuMoDx prior to QIAGEN's acquisition. On November 5, 2021, QIAGEN and BD reached an agreement to settle their ongoing litigation in the U.S. District Court of the District of Delaware and certain inter partes review proceedings. As part of the settlement, QIAGEN paid \$53.0 million to BD in November 2021 and all claims asserted against QIAGEN, as well as counterclaims asserted against BD, were dismissed.

The estimated amount of a range of possible losses for other specific matters as of December 31, 2021, is between \$0.2 million and \$2.1 million. For these other matters a total of \$1.0 million is accrued as of December 31, 2021. Based on the facts known to QIAGEN and after consultation with legal counsel, management believes that such litigation will not have a material adverse effect on our financial position or results of operations above the amounts accrued. However, the outcome of these matters is ultimately uncertain, thus any settlements or judgments against us in excess of management's expectations could have a material adverse effect on our financial position, results of operations or cash flows.

21. Segment Information

We operate as one operating segment in accordance with the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) Topic 280, Segment Reporting. We have a common basis of organization and our products and services are offered globally. Considering our continued restructuring and streamlining of the growing organization, our chief operating decision maker (CODM) continues to make decisions with regards to business operations and resource allocation based on evaluations of QIAGEN as a whole. Accordingly, we operate and make decisions as one business segment. Product category and geographic information follows below.

Product Category Information

Net sales for the product categories are attributed based on those revenues related to sample and assay products and similarly related revenues including bioinformatics solutions, and revenues derived from instrumentation sales. Refer to Note 4 "Revenue" for disaggregation of revenue based on product categories, product type and customer class.

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Geographical Information

Net sales are attributed to countries based on the location of the customer. QIAGEN operates manufacturing facilities in Germany, China, and the United States that supply products to customers as well as QIAGEN subsidiaries in other countries. The intersegment portions of such net sales are excluded to derive consolidated net sales. No single customer represents more than ten percent of consolidated net sales. Our country of domicile is the Netherlands, which reported net sales of \$28.3 million, \$17.8 million and \$15.8 million for the years ended 2021, 2020 and 2019, respectively, and these amounts are included in the line item Europe, Middle East and Africa as shown in the table below.

Net sales (in thousands)	2021	2020	2019
Americas:			
United States	\$909,690	\$728,577	\$663,869
Other Americas	97,686	96,880	58,121
Total Americas	1,007,376	825,457	721,990
Europe, Middle East and Africa	814,417	682,289	487,476
Asia Pacific, Japan and Rest of World	429,864	362,600	316,958
Total	\$2,251,657	\$1,870,346	\$1,526,424

Long-lived assets include property, plant and equipment. The Netherlands, which is included in the balances for Europe, reported long-lived assets of \$1.1 million and \$1.5 million as of December 31, 2021 and 2020, respectively.

Long-lived assets (in thousands)	2021	2020
Americas:		
United States	\$158,949	\$154,843
Other Americas	2,805	2,436
Total Americas	161,754	157,279
Europe, Middle East and Africa:		
Germany	373,609	304,571
Other Europe, Middle East and Africa	78,608	71,444
Total Europe, Middle East and Africa	452,217	376,015
Asia Pacific and Japan	24,212	26,078
Total	\$638,183	\$559,372

22. Share-Based Compensation

We adopted the QIAGEN N.V. Amended and Restated 2005 Stock Plan (the 2005 Plan) in 2005 and the QIAGEN N.V. 2014 Stock Plan (the 2014 Plan) in 2014. The 2005 Plan expired by its terms in April 2015 and no further awards will be granted under the 2005 Plan. The plans allow for the granting of stock rights and incentive stock options, as well as non-qualified options, stock grants and stock-based awards, generally with terms of up to 3 years, with previous grants through 2020 having terms of 5 years subject to earlier termination in certain situations. The vesting and exercisability of certain stock rights will be accelerated in the event of a Change of Control, as defined in the plans. All option grants have been at the market value on the grant date or at a premium above the closing market price on the grant date. We issue Treasury

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Shares to satisfy option exercises and award releases and had approximately 12.9 million Common Shares reserved and available for issuance under the 2005 and 2014 Plans at December 31, 2021.

Stock Options

We have not granted stock options since 2013. A summary of the status of employee stock options as of December 31, 2021 and changes during the year then ended is presented below:

	Number of Shares (in thousands)	Weighted Average Exercise Price	Weighted Average Contractual Term (in years)	Aggregate Intrinsic Value (in thousands)
All Employee Options				
Outstanding at January 1, 2021	427	\$ 19.28		
Exercised	(409)	\$ 19.34		
Outstanding at December 31, 2021	18	\$ 17.79	1.08	\$ 664
Vested at December 31, 2021	18	\$ 17.79	1.08	\$ 664
Vested and expected to vest at December 31, 2021	18	\$ 17.79	1.08	\$ 664

The total intrinsic value of options exercised during the years ended December 31, 2021, 2020 and 2019 was \$ 14.4 million, \$ 6.5 million and \$ 2.0 million, respectively. The actual tax benefit for the tax deductions from option exercises totaled \$ 2.2 million, \$ 1.3 million, and \$ 0.5 million during the years ended December 31, 2021, 2020 and 2019, respectively. At December 31, 2021, there was no unrecognized share-based compensation expense related to employee stock option awards.

At December 31, 2021, 2020 and 2019, 18 thousand, 0.4 million and 0.8 million options were exercisable at a weighted average price of \$ 17.79, \$ 19.28 and \$ 20.06 per share, respectively. The options outstanding at December 31, 2021 expire in various years through 2023.

Stock Units

Stock units represent rights to receive Common Shares at a future date and include restricted stock units which are subject to time-vesting only and performance stock units which include performance conditions in addition to time-vesting. The final number of performance stock units earned is based on the performance achievement which for some grants can reach up to 200% of the granted shares. There is no exercise price and the fair market value at the time of the grant is recognized over the requisite vesting period. The fair market value is determined based on the number of stock units granted and the market value of our shares on the grant date. Pre-vesting forfeitures were estimated to be approximately 6.9%. At December 31, 2021, there was \$ 68.9 million remaining in unrecognized compensation cost including estimated forfeitures related to these awards, which is expected to be recognized over a weighted average period of 1.78 years. The weighted average grant date fair value of stock units granted during the years ended December 31, 2021, 2020 and 2019 was \$ 48.77, \$ 36.92 and \$ 37.28, respectively. The total fair value of stock units that vested during the years ended December 31, 2021, 2020 and 2019 was \$ 52.6 million, \$ 29.3 million and \$ 123.9 million, respectively.

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A summary of stock units as of December 31, 2021 and changes during the year are presented below:

Stock Units	Stock Units (in thousands)	Weighted Average Contractual Term (in years)	Aggregate Intrinsic Value (in thousands)
Outstanding at January 1, 2021	5,133		
Granted	739		
Vested	(1,031)		
Forfeited	(860)		
Outstanding at December 31, 2021	3,981	1.78	\$221,284
Vested and expected to vest at December 31, 2021	3,526	1.69	\$195,972

We net share settle for the tax withholding upon the vesting of awards. Shares are issued on the vesting dates net of the applicable statutory tax withholding to be paid by us on behalf of our employees. As a result, fewer shares are issued than the number of stock units outstanding. We record a liability for the tax withholding to be paid by us as a reduction to treasury shares.

Compensation Expense

Share-based compensation expense before taxes for the years ended December 31, 2021, 2020 and 2019 totaled approximately \$38.4 million, \$40.9 million and \$65.9 million, respectively, as shown in the table below.

(in thousands)	2021	2020	2019
Cost of sales	\$40	\$2,897	\$2,493
Research and development	4,909	7,014	5,810
Sales and marketing	13,630	15,889	7,947
General and administrative	19,812	15,136	23,705
Restructuring, acquisition, integration and other, net	—	—	25,938
Share-based compensation expense	38,391	40,936	65,893
Less: income tax benefit ⁽¹⁾	8,956	9,552	12,153
Net share-based compensation expense	\$29,435	\$31,384	\$53,740

⁽¹⁾ Does not include the excess tax benefit realized for the tax deductions of the share-based payment arrangements which totaled \$6.5 million, \$2.5 million and \$4.0 million, respectively, for the years ended December 31, 2021, 2020 and 2019.

The lower share-based compensation expense in cost of sales in 2021 resulted from forfeitures upon the separation of an executive who received a cash severance payment in lieu of accelerated vesting upon separation per the terms of the arrangement. The cash separation accrual offset the share-based compensation forfeiture.

Share-based compensation expense includes amounts related to the restructuring programs discussed in Note 6 "Restructuring and Impairments", including accelerated expense in 2019. No share-based compensation costs were capitalized for the years ended December 31, 2021, 2020 or 2019 as the amounts were not material.

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23. Employee Benefits

We maintain various benefit plans, including defined contribution and defined benefit plans. Our U.S. defined contribution plan is qualified under Section 401(k) of the Internal Revenue Code, and covers substantially all U.S. employees. Participants may contribute a portion of their compensation not exceeding a limit set annually by the Internal Revenue Service. This plan includes a provision for us to match a portion of employee contributions. Total expense under the 401(k) plans, including the plans acquired via business acquisitions, was \$3.7 million, \$3.6 million and \$4.0 million for the years ended December 31, 2021, 2020 and 2019, respectively. We also have a defined contribution plan which covers certain executives. We make matching contributions up to an established maximum. Matching contributions made to the plan, and expensed, totaled approximately \$0.2 million in each of the years ended December 31, 2021, 2020 and 2019.

We have six defined benefit, non-contributory retirement or termination plans that cover certain employees in Germany, France, Italy, Japan, Philippines and the United Arab Emirates. These defined benefit plans provide benefits to covered individuals satisfying certain age and/or service requirements. For certain plans, we calculate the vested benefits to which employees are entitled if they separate immediately. The benefits accrued on a pro-rata basis during the employees' employment period are based on the individuals' salaries, adjusted for inflation. The liability under the defined benefit plans was \$9.3 million as of both December 31, 2021 and 2020, and is included as a component of other long-term liabilities on the accompanying consolidated balance sheets.

24. Related Party Transactions

From time to time, we have transactions with other companies in which we hold an interest, all of which are individually and in the aggregate immaterial, as summarized in the table below.

Net sales to related parties for the years ended December 31, 2021, 2020, and 2019 are as follows:

(in thousands)	2021	2020	2019
Net sales	\$9,089	\$6,025	\$20,002

Net sales with related parties primarily reflects our venture in China including our partnership in China to externalize the HPV test franchise for cervical cancer screening in China. During the year ended December 31, 2019, net sales also includes activity with Sichuan Maccura Biotechnology Co., Ltd which was terminated in conjunction with the 2019 restructuring activities discussed further in Note 6 "Restructuring and Impairments".

As of December 31, 2021 and 2020 balances with related parties are as follows:

(in thousands)	2021	2020
Accounts receivable	\$3,868	\$3,961
Prepaid expenses and other current assets	\$16,956	\$25,429
Other long-term assets	\$61	\$10,843
Accounts payable	\$4,149	\$4,050
Accrued and other current liabilities	\$1,558	\$1,380

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Prepaid expenses and other current assets include loans receivable and supplier advances from companies with which we have an investment or partnership interest. As of December 31, 2021, prepaid expenses and other current assets include a \$10.0 million convertible note which bears interest at 10% and is due in December 2022 from a privately held company. In the event the company goes public, this note will convert into common shares in the company ranking pari passu with existing common shares. As of December 31, 2020, two convertible notes were due from this company including \$15.0 million of principal and \$2.1 million accrued interest in prepaid expenses and other current assets and \$10.0 million of principal and \$0.2 million of accrued interest in other long-term assets. In 2021, we settled the \$15.0 million convertible note in exchange for a fully paid-up technology license.

List of Subsidiaries

The following is a list of the Registrant's subsidiaries as of December 31, 2021, other than certain subsidiaries that did not in the aggregate constitute a significant subsidiary.

Company Name	Jurisdiction of Incorporation
Amnisure International LLC	USA
Cellestis Pty. Ltd.	Australia
Life Biotech Partners B.V.	Netherlands
NeuMoDx Inc.	USA
STAT-Dx Life S.L.	Spain
QIAGEN Aarhus A/S	Denmark
QIAGEN AB	Sweden
QIAGEN AG	Switzerland
QIAGEN Australia Holding Pty. Ltd.	Australia
QIAGEN Benelux B.V.	Netherlands
QIAGEN Beverly LLC	USA
QIAGEN Business Management MEA Ltd.	UAE
QIAGEN Business Services (Manila), Inc.	Philippines
QIAGEN Business Services S.p.z.o.o.	Poland
QIAGEN China (Shanghai) Co. Ltd.	China
QIAGEN Luxembourg SARL	Luxembourg
QIAGEN Deutschland Holding GmbH	Germany
QIAGEN Distribution B.V.	Netherlands
QIAGEN France S.A.S.	France
QIAGEN Gaithersburg LLC	USA

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Company Name	Jurisdiction of Incorporation
QIAGEN GmbH	Germany
QIAGEN Hamburg GmbH	Germany
QIAGEN Hong Kong Pte. Ltd.	China
QIAGEN Inc.	Canada
QIAGEN Instruments AG	Switzerland
QIAGEN K.K.	Japan
QIAGEN Korea Ltd.	Korea (South)
QIAGEN LLC	USA
QIAGEN Ltd.	UK
QIAGEN Manchester Ltd.	UK
QIAGEN Marseille S.A.	France
QIAGEN North American Holdings Inc.	USA
QIAGEN Pty. Ltd.	Australia
QIAGEN Redwood City Inc.	USA
QIAGEN Sciences LLC	USA
QIAGEN Shared Services LLC	USA
QIAGEN Singapore Pte. Ltd.	Singapore
QIAGEN S.r.l.	Italy
QIAGEN U.S. Finance LLC	USA

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Report of Independent Registered Public Accounting Firm

To the Shareholders and Supervisory Board

QIAGEN N.V.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of QIAGEN N.V. and subsidiaries (the Company) as of December 31, 2021 and 2020, the related consolidated statements of income (loss), comprehensive income (loss), changes in equity, and cash flows for each of the years in the three-year period ended December 31, 2021, and the related notes (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2021 and 2020, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2021, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2021, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission, and our report dated March 14, 2022 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 2 to the consolidated financial statements, the Company has changed its method of accounting for convertible instruments as of January 1, 2021 due to the adoption of ASU 2020-06, *Debt-Debt with Conversion and Other Options (Subtopic 470-20) and Derivatives and Hedging—Contracts in Entity's Own Equity (Subtopic 815-40): Accounting for Convertible Instruments and Contracts in an Entity's Own Equity*. In 2020 the Company changed its method of accounting for expected credit losses on financial instruments and other commitments due to the adoption of Accounting Standards Codification Topic 326 – *Measurement of Credit Losses on Financial Instruments*.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

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Appendix**Critical Audit Matter**

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the consolidated financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of a critical audit matter does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Assessment of unrecognized tax benefits

As discussed in Note 17 to the consolidated financial statements, the Company conducts its business globally and operates more than 50 consolidated subsidiaries in multiple tax jurisdictions. This multi-jurisdictional business operation involves complex intercompany operating and financing activities. The nature of these activities can result in uncertainties in the estimation of the related tax exposures. The Company initially recognizes and subsequently measures the unrecognized tax benefit in its consolidated financial statements when it is more likely than not that the position will be sustained upon examination by the tax authorities. As at 31 December 2021, the Company recorded unrecognized tax benefits of \$103.6m.

We identified the assessment of unrecognized tax benefits as a critical audit matter. Complex auditor judgment and specialized skills and knowledge were required in evaluating the Company's interpretation and application of tax laws in the jurisdictions where it operates and its estimate of the ultimate resolution of the tax position.

The following are the primary procedures we performed to address this critical audit matter. We evaluated the design and tested the operating effectiveness of certain internal controls related to the Company's unrecognized tax benefit process, including controls related to (1) its interpretation and application of tax statutes and legislation, and changes thereto, in the various jurisdictions in which it operates and (2) its determination of the estimate for the associated unrecognized tax benefit. We inspected the Company's legal composition to identify and assess changes in operating structures and financing arrangements. We inquired of the Company's tax department in combination with inspecting correspondence with the responsible tax authorities with respect to the results of inspections by tax authorities. We involved tax and transfer pricing professionals with specialized skills and knowledge, who assisted in:

- analyzing the Company's interpretation and application of multi-jurisdictional tax laws, and changes thereto, and its impact on the unrecognized tax benefit by reading advice obtained from the Company's external specialists,
- inspecting the lapse of statute of limitations and settlements with tax authorities over a selection of unrecognized tax benefits to evaluate the amount in the settlement documents compared to the unrecognized tax benefit, and
- inspecting a selection of intercompany operating and financing activities between group entities to assess the sustainability of tax positions based on their technical merits and the probabilities of possible settlement alternatives.

/s/ KPMG AG Wirtschaftsprüfungsgesellschaft

We have served as the Company's auditor since 2015.

Düsseldorf, Germany

March 14, 2022

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Report of Independent Registered Public Accounting Firm

To the Shareholders and Supervisory Board

QIAGEN N.V.:

Opinion on Internal Control Over Financial Reporting

We have audited QIAGEN N.V. and subsidiaries' (the Company) internal control over financial reporting as of December 31, 2021, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2021, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2021 and 2020, the related consolidated statements of income (loss), comprehensive income (loss), changes in equity, and cash flows for each of the years in the three-year period ended December 31, 2021, and the related notes (collectively, the consolidated financial statements), and our report dated March 14, 2022 expressed an unqualified opinion on those consolidated financial statements.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying 'Report of Management on Internal Control over Financial Reporting'. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

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Appendix**Definition and Limitations of Internal Control Over Financial Reporting**

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ KPMG AG Wirtschaftsprüfungsgesellschaft

Düsseldorf, Germany

March 14, 2022