UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 8-K

CURRENT REPORT
Pursuant to Section 13 or 15(d)
of the Securities Exchange Act of 1934

Date of Report (Date of Earliest Event Reported): **September 30, 2018**

Blueprint Medicines Corporation

(Exact name of registrant as specified in its charter)

Delaware	**001-37359**	**26-3632015**
(State or other jurisdiction of incorporation)	(Commission File Number)	(I.R.S. Employer Identification No.)

45 Sidney Street **Cambridge, Massachusetts**	**02139**
(Address of principal executive offices)	(Zip Code)

Registrant's telephone number, including area code: **(617) 374-7580**

(Former name or former address, if changed since last report)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions:

- o Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)
- o Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)
- o Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))
- o Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§240.12b-2 of this chapter).

Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Item 7.01 Regulation FD Disclosure.

On October 1, 2018, Blueprint Medicines Corporation (the "Company") issued a press release announcing the presentation of preclinical proof-of-concept data for BLU-782, the Company's investigational oral precision therapy specifically designed to target mutant activin-like kinase 2, the underlying cause of fibrodysplasia ossificans progressiva. The data were presented on September 30, 2018 in a plenary oral session at the 2018 American Society for Bone and Mineral Research Annual Meeting in Quebec, Canada. A copy of the press release is furnished as Exhibit 99.1 to this Current Report on Form 8-K, and a copy of the presentation is furnished as Exhibit 99.2 to this Current Report on Form 8-K.

The information in Item 7.01 of this Current Report on Form 8-K, including Exhibits 99.1 and 99.2, is intended to be furnished and shall not be deemed "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), or otherwise subject to the liabilities of that section, nor shall it be deemed incorporated by reference in any filing under the Securities Act of 1933, as amended, or the Exchange Act, except as expressly set forth by specific reference in such filing.

Item 9.01 Financial Statements and Exhibits.

(d) Exhibits.

Exhibit No.	Description
99.1	Press release issued by Blueprint Medicines Corporation on October 1, 2018
99.2	Presentation by Blueprint Medicines Corporation on September 30, 2018

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

BLUEPRINT MEDICINES CORPORATION

Date: October 1, 2018

By: /s/ Tracey L. McCain
Tracey L. McCain
Chief Legal Officer

Blueprint Medicines Presents Foundational Preclinical Data Supporting the Development of BLU-782, a Highly Selective ALK2 Inhibitor, for the Treatment of Patients with Fibrodysplasia Ossificans Progressiva

-- Expect to File an IND Application by end of 2018 --
-- Plan to Initiate Phase 1 Clinical Trial in Healthy Volunteers in First Quarter of 2019 --

CAMBRIDGE, Mass., October 1, 2018 – Blueprint Medicines Corporation (NASDAQ: BPMC), a leader in discovering and developing targeted kinase medicines for patients with genomically defined diseases, today announced preclinical proof-of-concept data for BLU-782, an investigational oral precision therapy specifically designed to target mutant activin-like kinase 2 (ALK2), the underlying cause of fibrodysplasia ossificans progressiva (FOP). Preclinical studies in a well-characterized, genetically accurate FOP model showed BLU-782 prevented injury- and surgery-induced heterotopic ossification (HO), reduced edema and restored healthy tissue response to muscle injury. The data were presented on September 30 in a plenary oral session at the 2018 American Society for Bone and Mineral Research (ASBMR) Annual Meeting in Quebec, Canada.

“We are excited to report preclinical proof-of-concept data for BLU-782, a highly selective oral inhibitor of mutant ALK2, the underlying cause of FOP,” said Marion Dorsch, Ph.D., Chief Scientific Officer of Blueprint Medicines. “Despite the discovery of the FOP gene more than a decade ago, prior efforts to develop a selective ALK2 inhibitor faltered due to persistent technical challenges. By leveraging our proprietary compound library and expertise in structure-guided medicinal chemistry, we overcame these challenges and successfully designed BLU-782 to selectively target mutant ALK2. The new preclinical data reported at the ASBMR Annual Meeting showed BLU-782 prevented abnormal bone growth in a well-characterized FOP model, validating selective ALK2 inhibition as an important potential therapeutic strategy.”

FOP is a rare genetic disorder characterized by the abnormal transformation of skeletal muscle, ligaments and tendons into bone, either spontaneously or as the result of physical trauma. FOP is caused by a mutation in the gene for ALK2, which is known as ACVR1, that causes hypersensitivity to certain bone morphogenetic proteins (BMP) and a neomorphic response to activins.

In the preclinical data presented at the ASBMR meeting, BLU-782 demonstrated exquisite selectivity for R206H mutant ALK2 in cellular assays, while sparing closely related anti-targets including ALK1, ALK3, and ALK6. Additionally, BLU-782 potently inhibited mutant ALK2 *in vitro*, regardless of the activating ligand, including Activin A, Activin B and BMP6. *In vivo* studies in a conditional knock-in $ALK2^{R206H}$ transgenic mouse model showed BLU-782 prevented the formation of injury-induced HO and edema, as measured by micro computed tomography and magnetic resonance imaging. Immunohistochemistry analyses also showed restoration of a healthy response to tissue injury in $ALK2^{R206H}$ mice, including skeletal myofiber regeneration. In addition, BLU-782 prevented the formation of surgery-induced HO following fibular osteotomy surgery in $ALK2^{R206H}$ mice.

“Given the disabling and destructive nature of this disease, people living with FOP have a desperate need for a safe and effective treatment,” said Adam Sherman, Research Development and Partnerships Director at the International Fibrodysplasia Ossificans Progressiva Association. “We are immensely grateful to have companies like Blueprint Medicines developing new treatments for those living with FOP. We look forward to seeing BLU-782 advance through the development pathway and hope a therapeutic option will one day change the course of this disease.”

Blueprint Medicines expects to submit an investigational new drug (IND) application for BLU-782 by the end of 2018, and subject to approval of the IND application by the U.S. Food and Drug Administration, plans to initiate a Phase 1 clinical trial in healthy volunteers in the first quarter of 2019. In addition, Blueprint Medicines plans to continue working with clinical experts and the patient community to design a potential Phase 2 clinical trial of BLU-782 in patients with FOP.

About BLU-782

BLU-782 is an oral precision therapy specifically designed to selectively target mutant ALK2, the underlying cause of FOP. Blueprint Medicines is developing BLU-782, an investigational medicine, for the treatment of patients with FOP. BLU-782 was derived from Blueprint Medicines' proprietary compound library and optimized via structure-guided medicinal chemistry for potent and selective targeting of mutant ALK2. Blueprint Medicines owns worldwide development and commercialization rights for BLU-782.

About Fibrodysplasia Ossificans Progressiva

FOP is a rare, severely disabling genetic disorder characterized by progressive HO, or the abnormal transformation of muscle, ligaments and tendons into bone. HO may be spontaneous or associated with painful episodic disease flare-ups that are usually precipitated by soft tissue injury. As the disease progresses, extra-skeletal bone increasingly restricts joints, resulting in severe disability and loss of mobility, compromised respiratory function and increased risk of early death. FOP is caused by a mutation in the gene for ALK2, which is known as ACVR1, leading to inappropriate activation of the bone morphogenetic pathway. Currently, there are no approved therapies for FOP.

About Blueprint Medicines

Blueprint Medicines is developing a new generation of targeted and potent kinase medicines to improve the lives of patients with genomically defined diseases. Its approach is rooted in a deep understanding of the genetic blueprint of cancer and other disease driven by the abnormal activation of kinases. Blueprint Medicines is advancing multiple programs in clinical development for subsets of patients with gastrointestinal stromal tumors, hepatocellular carcinoma, systemic mastocytosis, non-small cell lung cancer, medullary thyroid cancer and other advanced solid tumors, as well as multiple programs in research and preclinical development. For more information, please visit www.blueprintmedicines.com.

Cautionary Note Regarding Forward-Looking Statements

This press release contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, as amended, including, without limitation, statements regarding plans and timelines for the preclinical and clinical development of BLU-782, including a Phase 1 clinical trial in healthy volunteers and a Phase 2 clinical trial in patients with FOP; the potential benefits of BLU-782 in treating patients with FOP; plans and timelines for submitting an IND application for BLU-782; and Blueprint Medicines' strategy, business plans and focus. The words "may," "will," "could," "would," "should," "expect," "plan," "anticipate," "intend," "believe," "estimate," "predict," "project," "potential," "continue," "target" and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. Any forward-looking statements in this press release are based on management's current expectations and beliefs and are subject to a number of risks, uncertainties and important factors that may cause actual events or results to differ materially from those expressed or implied by any forward-looking statements contained in this press release, including, without limitation, risks and uncertainties related to the delay of any current or planned clinical trials or the development of Blueprint Medicines' drug candidates, including avapritinib, BLU-554, BLU-667 and BLU-782; Blueprint Medicines' advancement of multiple early-stage efforts; Blueprint Medicines' ability to successfully demonstrate the safety and efficacy of its drug candidates; the preclinical and clinical results for Blueprint Medicines' drug candidates, which may not support further development of such drug candidates; actions of regulatory agencies, which may affect the initiation, timing and progress of clinical trials; Blueprint Medicines' ability to develop and commercialize companion diagnostic tests for its current and future drug candidates, including companion diagnostic tests for BLU-554 for FGFR4-driven hepatocellular carcinoma, avapritinib for PDGFRα D842V-driven gastrointestinal stromal tumors and BLU-667 for RET-driven non-small cell lung cancer; and the success of Blueprint Medicines' cancer immunotherapy collaboration with F. Hoffmann-La Roche Ltd and Hoffmann-La Roche Inc and Blueprint Medicines' collaboration with CStone Pharmaceuticals. These and other risks and uncertainties are described in greater detail in the section entitled "Risk Factors" in Blueprint Medicines' Quarterly Report on Form

10-Q for the quarter ended June 30, 2018, as filed with the Securities and Exchange Commission (SEC) on August 1, 2018, and any other filings that Blueprint Medicines has made or may make with the SEC in the future. Any forward-looking statements contained in this press release represent Blueprint Medicines' views only as of the date hereof and should not be relied upon as representing its views as of any subsequent date. Except as required by law, Blueprint Medicines explicitly disclaims any obligation to update any forward-looking statements.

Investor Relations and Media Contacts

Kristin Hodous
617-714-6674
KHodous@blueprintmedicines.com

Jim Baker
617-844-8236
JBaker@blueprintmedicines.com

BLU-782

A highly selective ALK2 inhibitor, designed specifically to target the cause of fibrodysplasia ossificans progressiva

Andrew Garner, Ph.D.

SEPTEMBER 30TH 2018

Disclosures

I am an employee and stockholder of Blueprint Medicines Corporation (Blueprint Medicines)

I will discuss the preclinical characterization of the investigational agent BLU-782, which is being developed by Blueprint Medicines

Forward-looking statements

This presentation contains forward-looking statements as defined in the Private Securities Litigation Reform Act of 1995, as amended. The words "may," "will," "could," "would," "should," "expect," "plan," "anticipate," "intend," "believe," "estimate," "predict," "project," "potential," "continue," "target" and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words.

In this presentation, forward-looking statements include, without limitation, statements about plans and timelines for the development of BLU-782 and the ability of Blueprint Medicines Corporation (the "Company") to implement those preclinical and clinical development plans; the potential benefits of BLU-782 in treating patients with fibrodysplasia ossificans progressiva; plans and timelines for regulatory submissions, filings or discussions; and the Company's strategy, business plans and focus. The Company has based these forward-looking statements on management's current expectations, assumptions, estimates and projections. While the Company believes these expectations, assumptions, estimates and projections are reasonable, such forward-looking statements are only predictions and involve known and unknown risks, uncertainties and other important factors, many of which are beyond the Company's control and may cause actual results, performance or achievements to differ materially from those expressed or implied by any forward-looking statements. These risks and uncertainties include, without limitation, risks and uncertainties related to the delay of any current or planned clinical trials or the development of the Company's drug candidates, including avapritinib, BLU-554, BLU-667 and BLU-782; the Company's advancement of multiple early-stage efforts; the Company's ability to successfully demonstrate the efficacy and safety of its drug candidates; the preclinical and clinical results for the Company's drug candidates, which may not support further development of such drug candidates; actions or decisions of regulatory agencies or authorities, which may affect the initiation, timing and progress of clinical trials; the Company's ability to obtain, maintain and enforce patent and other intellectual property protection for any drug candidates it is developing; the Company's ability to develop and commercialize companion diagnostic tests for its current and future drug candidates, including companion diagnostic tests for BLU-554 for FGFR4-driven hepatocellular carcinoma, avapritinib for PDGFRα D842V-driven gastrointestinal stromal tumors and BLU-667 for RET-driven non-small cell lung cancer; and the success of the Company's current and future collaborations, including its cancer immunotherapy collaboration with F. Hoffmann-La Roche Ltd and Hoffmann-La Roche Inc. and its collaboration with CStone Pharmaceuticals.

These and other risks and uncertainties are described in greater detail under "Risk Factors" in the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2018, as filed with the Securities and Exchange Commission ("SEC") on August 1, 2018, and any other filings the Company has made or may make with the SEC in the future. The Company cannot guarantee future results, outcomes, levels of activity, performance, developments, or achievements, and there can be no assurance that the Company's expectations, intentions, anticipations, beliefs, or projections will result or be achieved or accomplished. The forward-looking statements in this presentation are made only as of the date hereof, and except as required by law, the Company undertakes no obligation to update any forward-looking statements contained in this presentation as a result of new information, future events or otherwise.

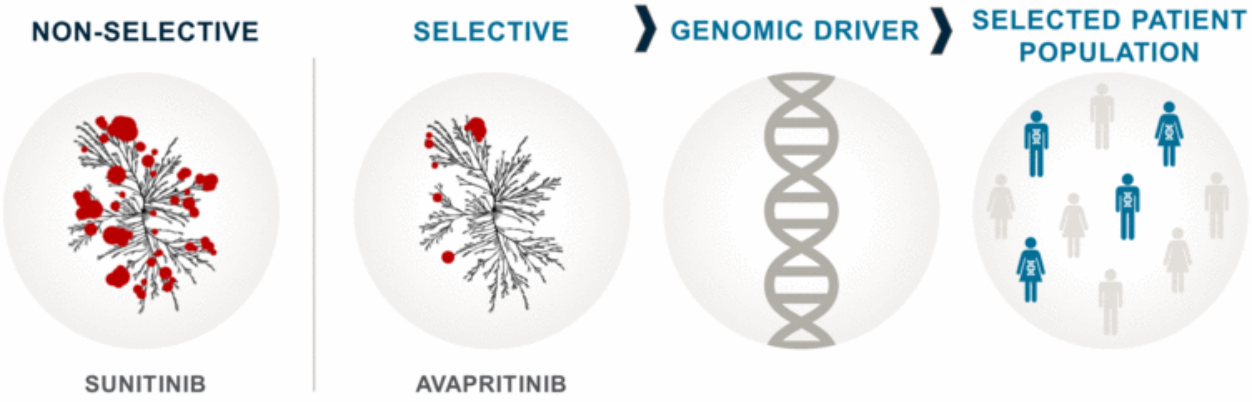
Acknowledgements

Alison Davis, Brian Hodous, Timothy LaBranche, Michael Sheets, Natasja Brooijmans, Joseph Kim, Brett Williams, Sean Kim, Lan Xu, John Vassiliadis, Paul Fleming, Mark Cronin, Julia Zhu, Ruduan Wang, Rachel Stewart, Chris Graul, Elliot Greenblatt, Keith Bouchard, Vivek Kadambi, Timothy Guzi, Jeffrey Hunter, Christoph Lengauer, Marion Dorsch

Blueprint Medicines thanks the International Fibrodysplasia Ossificans Progressiva Association for providing advisory support

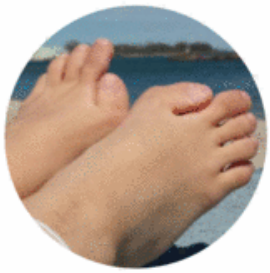
Blueprint Medicines is pioneering a new way of discovering and developing kinase medicines

Highly selective kinase medicines offer potential for improved potency, less off-target activity and increased probability of clinical success

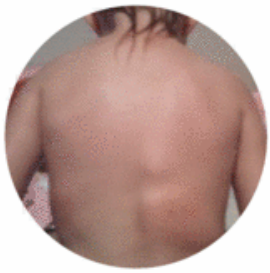


Kinome illustration reproduced courtesy of Cell Signaling Technology, Inc. (www.cellsignal.com) (CSTI). The foregoing website is maintained by CSTI, and Blueprint Medicines is not responsible for its content.

Fibrodysplasia ossificans progressiva (FOP) is caused by mutant ALK2



MALFORMED TOES



TUMOR-LIKE SWELLINGS

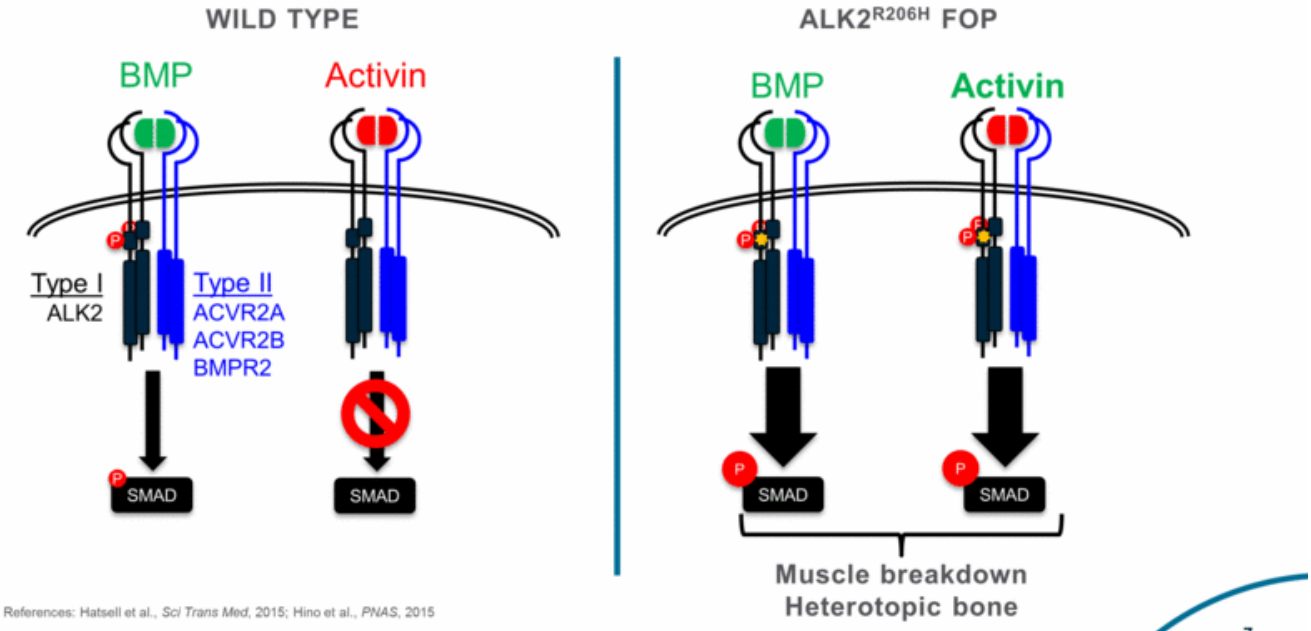
EXTRASKELETAL BONE

PROGRESSIVE INCAPACITATION

- $ALK2^{R206H}$ mutations are found in 100% of FOP patients
  - 85% – 97% are $ALK2^{R206H}$
- $ALK2^{R206H}$ mice recapitulate all the key features of FOP
- Selective ALK2 inhibition targets the underlying cause of FOP

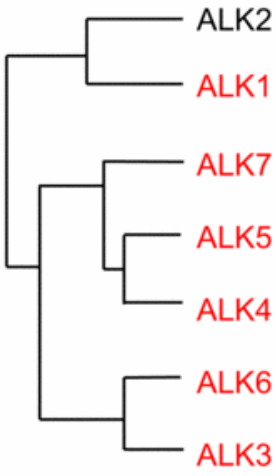
References: Kaplan et al., *Hum Mutat*, 2009; Zhang et al., *Bone*, 2013; Shore et al., *Nat Gen*, 2006; Chakkalakal et al., *JBMR*, 2012

ALK2^{R206H} causes FOP by changing the response to ligands



References: Hatsell et al., *Sci Trans Med*, 2015; Hino et al., *PNAS*, 2015

Selective ALK2 inhibition is important for chronic dosing



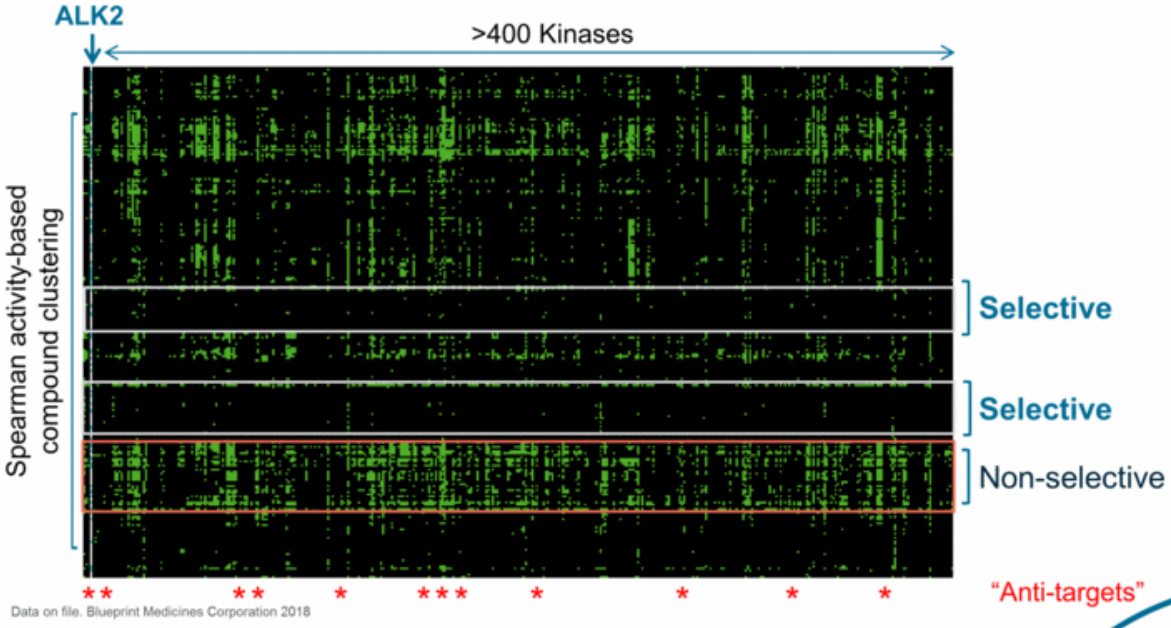
BMP Pathway ALKs: ALK1 / 3 / 6

- ALK1 regulates blood vessels
- ALK3 regulates iron storage
- ALK6 regulates embryonic digit growth

TGFβ Pathway ALKs: ALK4 / 5 / 7

- TGFβ modulates the immune response; ALK4, 5, and 7 inhibition could cause systemic inflammation
- ALK5 inhibition can result in heart valve lesions

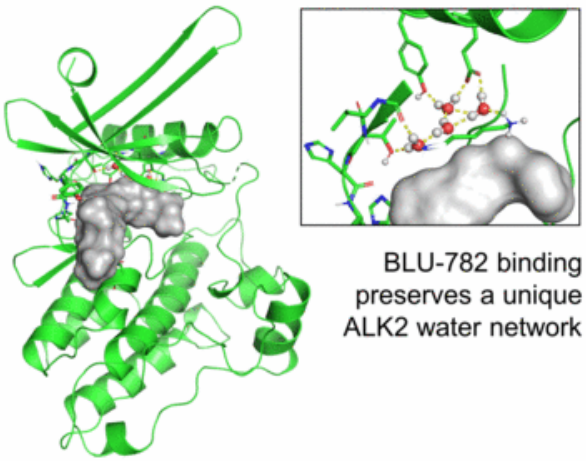
Blueprint's kinase library yielded multiple selective ALK2 start points



Data on file. Blueprint Medicines Corporation 2018

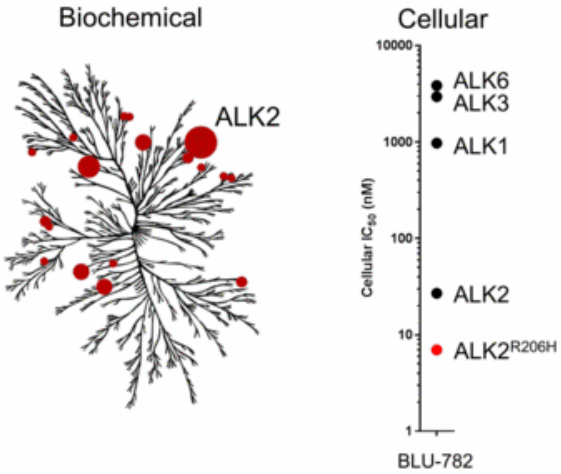
Structure-based drug design yielded BLU-782, a highly selective ALK2 inhibitor

BLU-782 CRYSTAL STRUCTURE

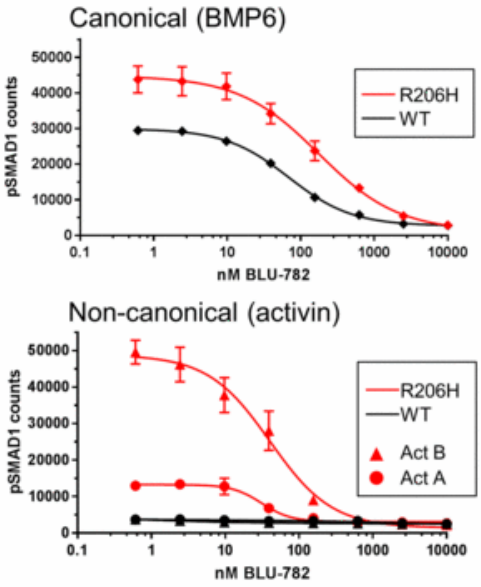


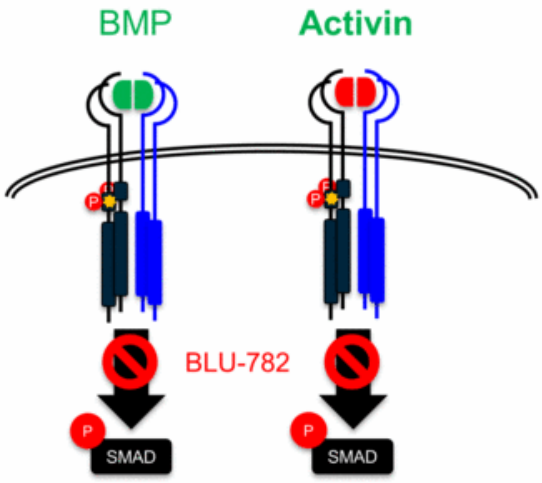
BLU-782 binding preserves a unique ALK2 water network

BLU-782 SELECTIVITY



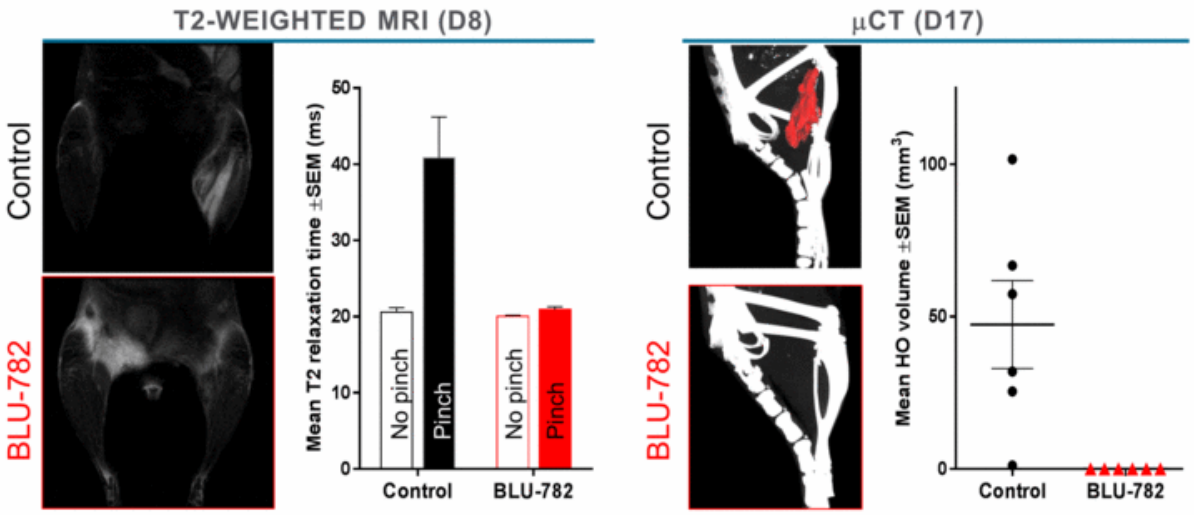
BLU-782 potently inhibits ALK2^{R206H} irrespective of the activating ligand





Data on file. Blueprint Medicines Corporation 2018

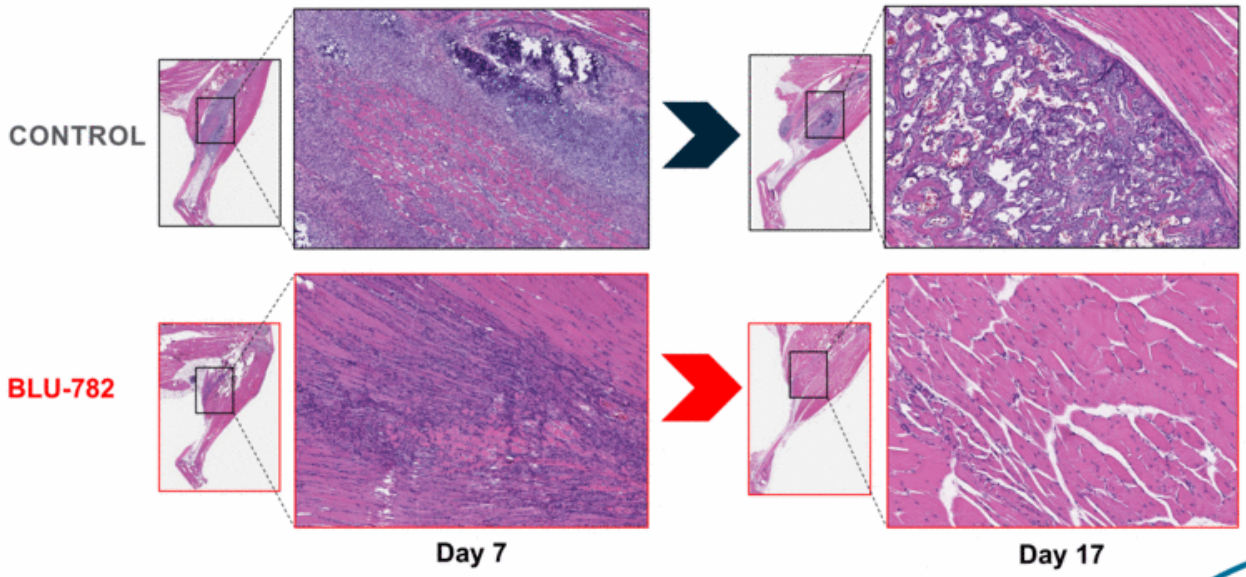
BLU-782 selectively targets the root cause of FOP



BLU-782 prevents injury-induced heterotopic ossification (HO) in ALK2^{R206H} mice

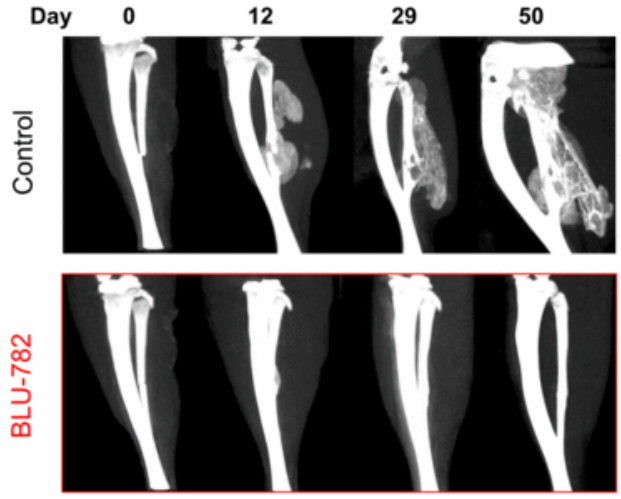
Data on file. Blueprint Medicines Corporation 2018

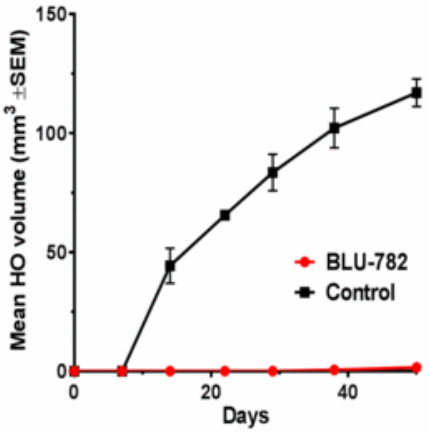
BLU-782 restores the normal tissue response to muscle injury in ALK2^{R206H} mice



Data on file. Blueprint Medicines Corporation 2018

BLU-782 inhibits surgery-induced HO in ALK2^{R206H} mice





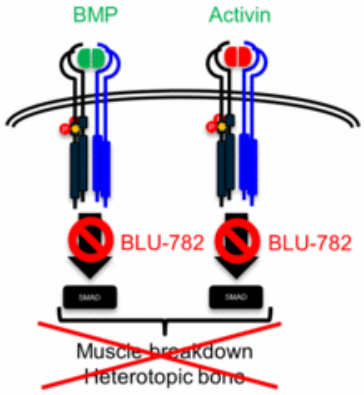
- BLU-782 prevents HO in a fibular osteotomy model in ALK2^{R206H} mice
- BLU-782 does not impact fracture repair or surgical wound closure

Data on file. Blueprint Medicines Corporation 2018

BLU-782- an ALK2 kinase inhibitor specifically tailored for FOP

BLU-782 IS HIGHLY SELECTIVE

BLU-782 TARGETS THE ROOT CAUSE OF FOP



- Plan to file an Investigational New Drug (IND) application for BLU-782 by end of 2018
- Subject to approval of IND application by the FDA, plan to initiate Phase 1 healthy volunteer study in Q1 2019


Thank you