

Ensuring global access to IMPC-generated mouse resources distributed by US public repositories

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ABSTRACT—From 2011-2021, the 21 institutional members of the International Mouse Phenotyping Consortium (IMPC) in 15 countries on 5 continents have generated and phenotyped mouse lines for 7,824 unique genes, depositing data freely available online to anyone at www.impc.org. But what about access by scientists to these mouse resources themselves for further research and study? As a condition of membership into the IMPC, individuals and organizations agreed to share their mice with the global research community, either directly by responding to requests from investigators or indirectly by deposition into publicly accessible mouse repositories for archiving and distribution. In the United States, the three NIH-funded IMPC Knockout Mouse Projects (KOMP) at JAX, DTCC, and BCM have deposited 5,287 unique knockout mouse lines into the KOMP Repository from 2012 to 2014 and then the Mutant Mouse Research and Resource Center (MMRRC; www.mmrrc.org) from 2014 to 2021, representing 93% of KOMP mouse lines produced and phenotyped thus far. Over the last 10 years, scientists in 26 countries placed 5,637 orders for 3,119 unique knockout mouse lines representing ~59% of the total KOMP production effort available as live mice and/or frozen germplasm. This level of distribution activity affirms the research quality and utility of baseline-characterized mouse lines, the benefits of mandating the sharing of publicly funded resources, the cost and time efficiencies of obtaining ready-made knockout mice instead of remaking them in individual laboratories, and the ongoing scientific value of the IMPC to inform gene function *in vivo*. Studies using IMPC KOMP mice obtained from public repositories have resulted in at least 1,163 publications.

Introduction—Sharing of data and model organisms is key to ensuring broad access to publicly funded resources, enabling equal opportunity to participation in the research enterprise, advancing science, and promoting research collaborations. As a condition of funding, NIH expected IMPC-KOMP grant awardees to ensure rapid availability of validated and phenotyped knockout mouse lines to the research community either directly to requesting investigators or indirectly by deposition in public biorepositories.

Methods—Deposition, request, and order fulfillment data was mined and analyzed from the 3 KOMP awardees (JAX, DTCC, BCM) and the KOMP and MMRRC repositories databases. Publications associated with distributed KOMP mouse lines that cited these awardees or 2 repositories were searched using terms “KOMP” and “mice” from the PubMedCentral database between 2011 (KOMP2-Phase1) and 2021 (KOMP2-Phase2).

Results

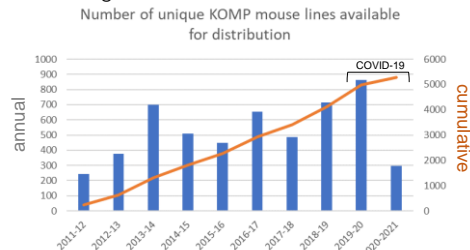


Figure 1 Annual (blue columns, left axis) and cumulative (orange line, right axis) numbers of unique KOMP knockout mouse lines available for distribution.

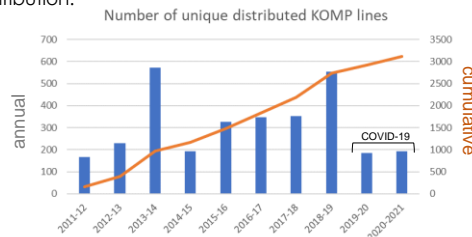


Figure 3 Annual (blue columns, left axis) and cumulative (orange line, right axis) numbers of orders for unique KOMP knockout mouse lines.

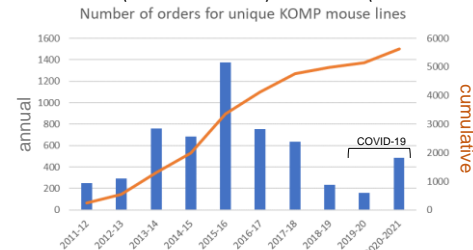


Figure 2 Annual (blue columns, left axis) and cumulative (right axis, orange line) numbers of total orders for KOMP knockout mouse lines.

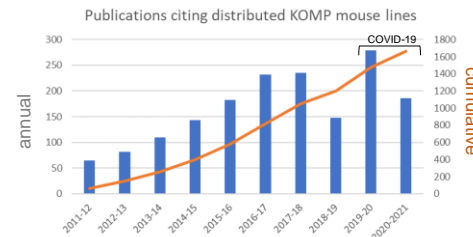


Figure 4 Annual (blue columns, left axis) and cumulative (orange line, right axis) numbers of publications using and citing KOMP knockout mouse lines.

Conclusions—KOMP awardees and the KOMP and MMRRC repositories have to date distributed ~59% of the entire collection of KOMP knockout mouse lines produced to date. Significant reductions in depositions, orders, and distribution between 2019-2021 are attributed to the effects of the global COVID-19 pandemic. Nonetheless, the cumulative level of past and ongoing distribution activity affirms researchers' interest in and scientific value of the IMPC project and the investment in generating and phenotyping knockout mice for the mammalian genome. Supported by NIH Grants UM1OD023221 (KOMP2) and U42OD012210 (MMRRC)