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## Data Article

# Dataset on lipid profile of bovine oocytes exposed to $\text{L}\alpha$ -phosphatidylcholine during in vitro maturation investigated by MALDI mass spectrometry and gas chromatography-flame ionization detection

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## ABSTRACT

Data presented in this article are related with the research article entitled “Effect of soybean phosphatidylcholine on lipid profile of bovine oocytes matured in vitro” [1]. This article describes the differences in the relative abundance of the lipid ions detected by matrix-assisted laser desorption/ionization mass spectrometry (MALDI-MS) in control and  $\text{L}\alpha$ -phosphatidylcholine-treated oocytes. In addition, the fatty acids (FA) content in pure  $\text{L}\alpha$ -phosphatidylcholine supplement and oocytes was analyzed by gas chromatography-flame ionization detection (GC-FID). The

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MALDI-MS  
GC-FID

dataset provides information and inputs for further studies aiming to optimize *in vitro* maturation conditions and cryotolerance of mammalian oocytes.

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### Specifications Table

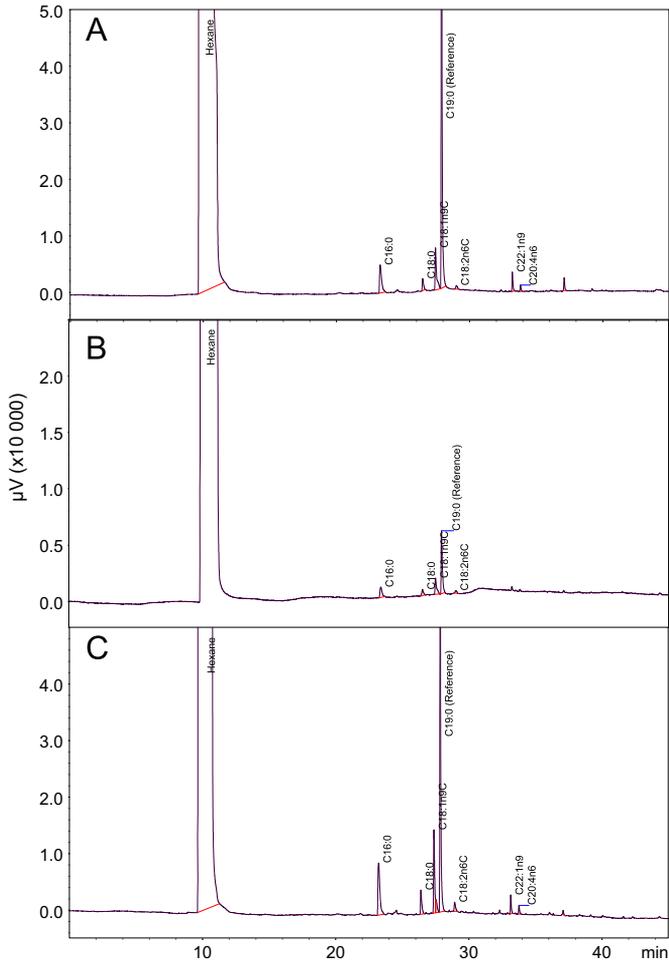
Subject area	<i>Biology</i>
More specific subject area	<i>Assisted reproductive technology</i>
Type of data	<i>Text file, table, figures</i>
How data was acquired	<i>Autoflex III MALDI time-of-flight mass spectrometer (Bruker Daltonics, Bremen, Germany) and GC-2010 capillary gas chromatograph system (Shimadzu, Tokyo, Japan)</i>
Data format	<i>Analyzed</i>
Experimental factors	<i>NA</i>
Experimental features	<i>Phospholipid and fatty acid detection by MALDI-TOF mass spectrometry and GC-FID in oocytes</i>
Data source location	<i>NA</i>
Data accessibility	<i>The data are available with this article</i>

### Value of the data

- The data presents a comparison of the relative abundance of lipid ions detected by MALDI-MS in sampled control oocytes and oocytes supplemented with  $L\alpha$ -phosphatidylcholine at 50 and 100  $\mu$ M during *in vitro* maturation.
- First FA content analysis by GC-FID of oocytes exposed to phosphatidylcholines during *in vitro* maturation.
- The samples were subjected to transmethylation/methylation procedures according to ISO 12966-2:2011 standard [2] and FAME (fatty acid methyl esters) were analyzed under conditions described in ISO 12966-4:2015 standard [3] and could be compared to others protocols.
- This data allow other researchers to develop targeted strategies for studying the effects of phospholipids on *in vitro* maturation of oocytes, embryo culture and cryopreservation.

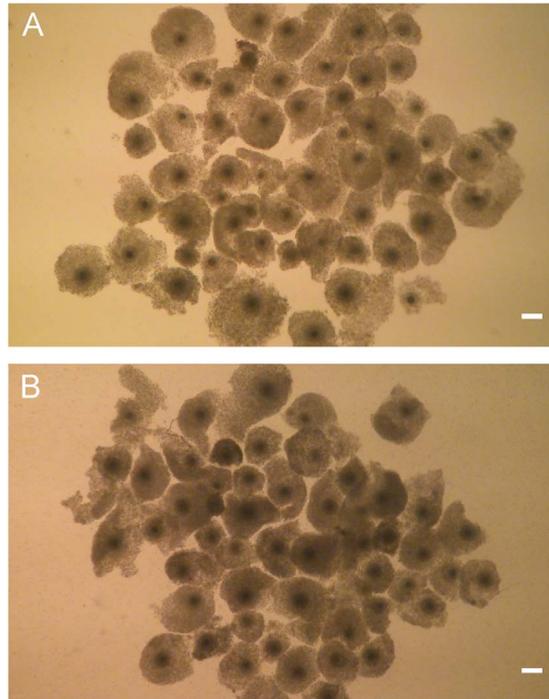
### 1. Data

The dataset of this article provides information on lipid profile and FA content in bovine oocytes supplemented with  $L\alpha$ -phosphatidylcholine (PC) during *in vitro* maturation (IVM). The Fig. 1 shows chromatograms of FA detected by GC-FID in control and PC-supplemented oocytes. The Figs. 2–4 are optical images showing the morphology of PC oocytes during IVM and resulting *in vitro* produced embryos. Table 1 contains a list of all significant ions detected by MALDI-MS in tissue culture medium



**Fig. 1.** Identification chromatograms of bovine oocytes exposed to 100  $\mu\text{M}$   $\alpha$ -phosphatidylcholine during in vitro maturation and analyzed by GC-FID method. Immature (fresh) oocytes (A); control in vitro-matured oocytes (B) and PC-supplemented oocytes (C).

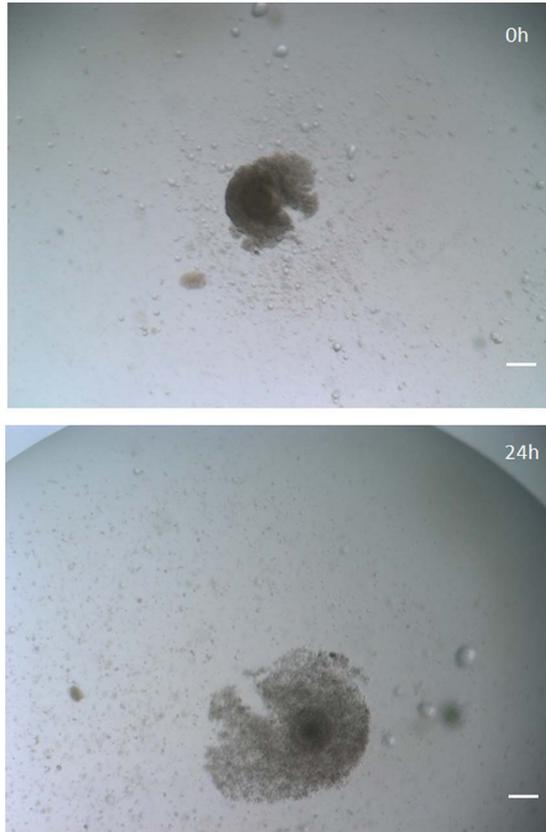
(TCM) and bovine oocytes. Table 2 shows the differences in the relative abundance of the five significant lipid ions detected in oocytes matured in TCM medium supplemented with purified soybean PC at 50 or 100  $\mu\text{M}$  [1]. Table 3 contains a list of FA quantified in  $\alpha$ -phosphatidylcholine supplement.



**Fig. 2.** Bovine cumulus-oocyte complexes matured *in vitro* in TCM medium supplemented with 10% fetal bovine serum. Control oocytes (A); oocytes supplemented with  $L\alpha$ -phosphatidylcholine at 100  $\mu$ M (B). Bar = 100  $\mu$ m.

## 2. Experimental design, materials and methods

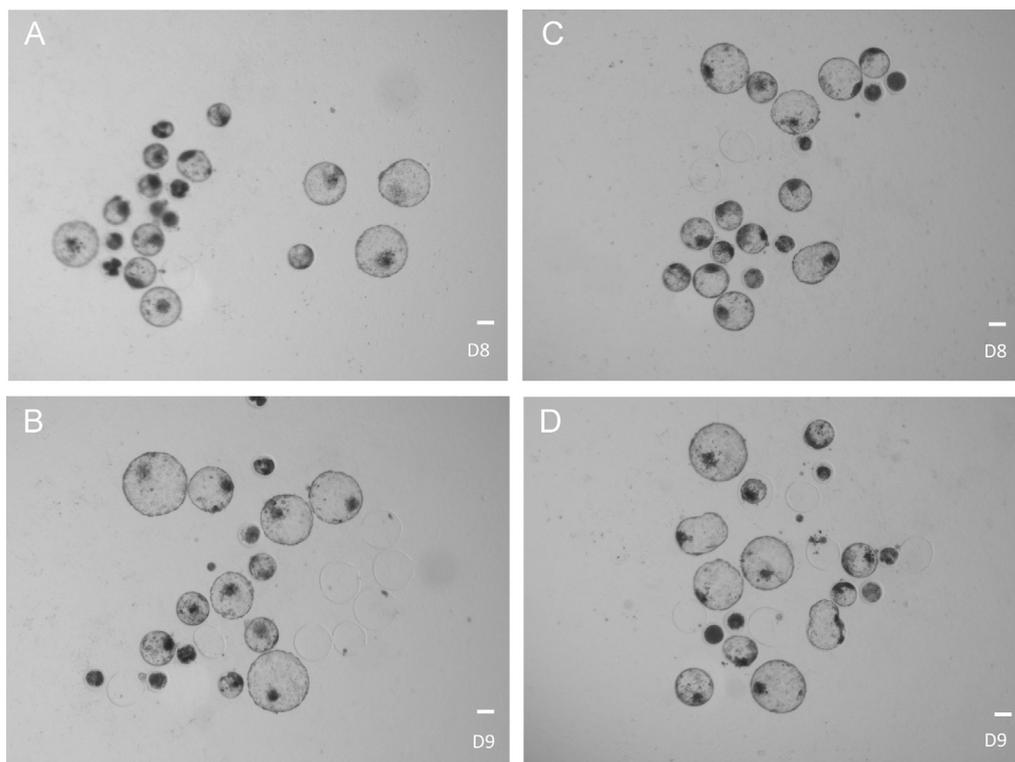
The  $L\alpha$ -phosphatidylcholine was solubilized in pure DMSO and then diluted in TCM medium [5] supplemented with 0.05% bovine BSA (bovine serum albumin) to give a 10 mM stock solution (1:1, by vol) and stored at  $-20$  °C in sterile vials sealed under nitrogen. On the day of use, the stock solution



**Fig. 3.** Cumulus oophorus expansion of bovine matured *in vitro* in TCM-PC100. Bar = 100  $\mu$ m.

was diluted in culture medium at 50 or 100  $\mu$ M. Pools of oocytes from each group (TCM, TCM-PC50 and TCM-PC100) were matured, prepared and analyzed by MALDI-MS as previously described [1].

For FA identification and quantitation by GC-FID, the PC sample or oocytes were subjected to transmethylation/methylation procedures under sequential alkaline and acid conditions, according to



**Fig. 4.** Bovine embryos produced *in vitro* from oocytes exposed to  $\alpha$ -phosphatidylcholine during IVM. A-B: control embryos derived from oocytes unexposed to PC supplement, C-D: embryos derived from PC-treated oocytes; D8/D9: days of embryo culture post-insemination. Bar = 100  $\mu$ m.

**Table 1**

Phospholipids (PL) and triacylglycerols (TAG) identified via MALDI(+)-MS in TCM medium and bovine oocytes supplemented with  $\alpha$ -phosphatidylcholine at 50 and 100  $\mu$ M during in vitro maturation.

<i>m/z</i>	<i>Lipid ion (carbons:unsaturation)</i>
725.5	[SM (16:0) + Na] <sup>+</sup>
734.6	[PC (32:0) + H] <sup>+</sup>
758.6	[PC (34:2) + H] <sup>+</sup>
782.6	[PC (36:4) + H] <sup>+</sup> , [PC (34:1) + Na] <sup>+</sup>
804.6	[PC(38:7) + H] <sup>+</sup> , [PC(36:4) + Na] <sup>+</sup>
806.6	[PC (38:6) + H] <sup>+</sup> , [PC(36:3) + Na] <sup>+</sup>

Identification based on MALDI-MS lipid profile studies as described by Ferreira et al. [4] as well as two lipid databases (<http://lipidsearch.jp> and <http://www.lipidmaps.org>).

ISO 12966-2:2011 standard [2]. To the each oocyte sample,  $n = 200$ – $400$  per group [6], suspended in 0.1 mL PBS were added 30  $\mu$ L C19 standard (concentration of 0.5 mg/g) and 100  $\mu$ L 0.2 M NaOH methanolic solution. The samples were placed in a water bath at 80 °C for 40 min and shaken manually every 5 minutes. In the next step, 100  $\mu$ L of 1.0 M methanolic solution of H<sub>2</sub>SO<sub>4</sub> was added and the samples were placed additionally in a water bath at 80 °C. Then 200  $\mu$ L of aqueous NaCl solution and 100  $\mu$ L of hexane were added and the vial was shaken vigorously. The upper phase containing hexane and FAME was then carefully collected and transferred to another vial. The extraction procedure was repeated two more times with 100  $\mu$ L of hexane and under vigorous stirring

**Table 2**

Averaged relative intensity of PL detected by MALDI-MS in oocytes supplemented with soybean phosphatidylcholine (PC) at 50 and 100  $\mu$ M during in vitro maturation in TCM medium.

<i>m/z</i>	TCM	TCM PC 50	TCM PC 100
725.5	2	4	38
734.6	10	18	42
758.6	5	15	48
782.6	10	40	80
806.6	0	2	10

**Table 3**

Fatty acid content in  $\alpha$ -phosphatidylcholine supplement analyzed by gas chromatography-flame ionization detection (GC-FID) method.

Name	Fatty acid	% of Área
Palmitic acid	C16:0	42,62
Stearic acid	C18:0	33,93
Oleic acid	C18:1	1,10
Linoleic acid	C18:2	18,83
Linolenic acid	C18:3	2,41
Heneicosanoic acid	C21:0	1,11

for FAME extraction. FAME were analyzed by capillary gas chromatography, under conditions described in ISO 12966-4:2015 standard [3]. Peaks were identified by comparison with a commercial Certified Reference Material FAME mix C4:0 to C24:0 purchased from Supelco Inc. (Bellefonte, PA) and quantified by area normalization (Table 3).

### Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.dib.2017.06.026>.

### References

- [1] C.P. Pitangui-Molina, A. Vireque, A. Tata, K.R.A. Belaz, V.G. Santos, C.R. Ferreira, M.N. Eberlin, M.F.S. Sá, R.A. Ferriani, A.C.J. S. Rosa e Silva, Effect of soybean phosphatidylcholine on lipid profile of bovine oocytes matured in vitro, *Chem. Phys. Lipids* 204 (2017) 76–84.
- [2] ISO 12966-2, Animal and Vegetable Fats and Oils – Gas Chromatography of Fatty Acid Methyl Esters – Part 2: Preparation of Methyl Esters of Fatty Acids, International Organization for Standardization, Geneva, Switzerland, 2011.
- [3] ISO 12966-4, Animal and Vegetable Fats and Oils – Gas Chromatography of Fatty Acid Methyl Esters – Part 4: Determination by Capillary Gas Chromatography, International Organization for Standardization, Geneva, Switzerland, 2015.
- [4] C.R. Ferreira, S.A. Saraiva, R.R. Catharino, J.S. Garcia, F.C. Gozzo, G.B. Sanvido, L.F. Santos, E.G. Lo Turco, J.H. Pontes, A.C. Basso, R.P. Bertolla, R. Sartori, M.M. Guardieiro, F. Perecin, F.V. Meirelles, J.R. Sangalli, M.N. Eberlin, Single embryo and oocyte lipid fingerprinting by mass spectrometry, *J Lipid Res* 51 (2010) 1218–1227.
- [5] R. Smith, C. Tanford, The critical micelle concentration of  $\alpha$ -dipalmitoylphosphatidylcholine in water and water-methanol solutions, *J Mol. Biol.* 67 (1972) 75–83.
- [6] J.Y. Kim, M. Kinoshita, M. Ohnishi, Y. Fukui, Lipid and fatty acid analysis of fresh and frozen-thawed immature and in vitro matured bovine oocytes, *Reproduction* 122 (2001) 131–138.